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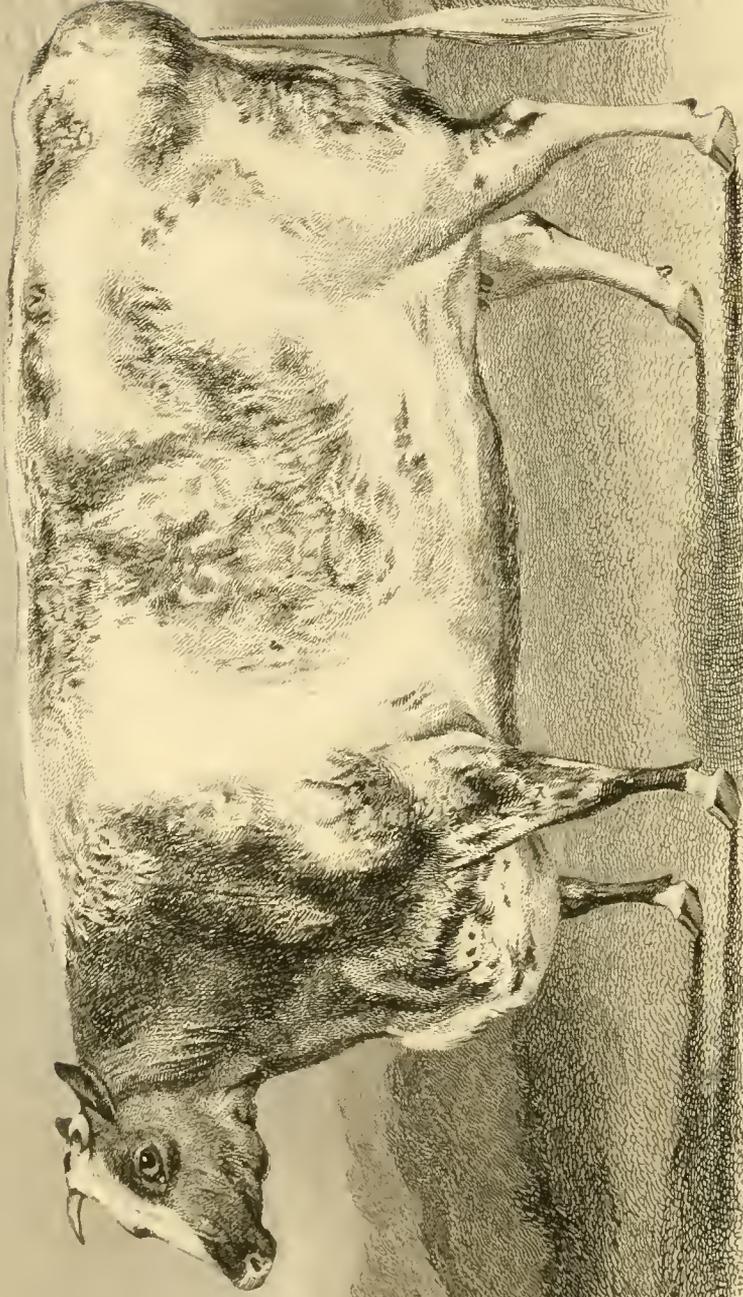


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London. Published by Hogenson & Tuzard, 24F Strand 1856

# THE FARMER'S MAGAZINE.

VOLUME THE NINTH.

(THIRD SERIES.)

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JANUARY TO JUNE, MDCCCLVI.

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# INDEX.

## A.

- Adulterations: Dr. Hassell's services: the Hassell Testimonial, 543
- Agriculture, Calendar of, 86, 181, 276, 366, 461, 558
- Agriculture in France and England
- Agriculture (Modern), Mr. Wren Hoskyns on, 387
- Agriculture, no Country can be Great that is Poor in, 556
- Agriculture of Belgium, 400
- Agriculture, the Development of, 104
- Agriculture, the Power of the Press to promote, 195
- Agriculture, Turkish, the Improvement of, 29
- Agricultural Improvements, Impediments through the present System of College Holdings, to, 102
- Agricultural Intelligence, 90, 186, 280, 370, 465, 562
- Agricultural Observations by the Way, 520
- Agricultural Progression, 114
- Agricultural Queries, 90
- Agricultural Reports, 88, 183, 277, 367, 461, 559
- AGRICULTURAL SOCIETIES—
- Bath and West of England, 272
- Gloucestershire, 37
- Rutland, 47
- Shropshire, 51
- Waltham, 364
- Agricultural Show in Upper Canada, 166
- Agricultural Statistics, growing Feeling in Favour of, 198
- Agricultural Statistics (Irish), 144
- Agricultural Statistics:—Observations and Suggestions, 401, 545
- Agricultural Statistics, Opinions offered at Agricultural Meetings on their proposed Collection, 25
- Agricultural Statistics, Resolutions of the Wirral Agricultural Society on, 38
- Agricultural Statistics (Scotch), 141
- Agricultural Statistics, their Collection in Scotland, 27
- Agricultural Statistics, the individual and general Advantages of, 24
- Agricultural Statistics, the new Bill on, 290
- Air, how valuable to the successful Husbandry of the Soil and its Produce, animal and vegetable, 310
- Averages imperial, 95, 189, 283, 378, 469, 566

## B.

Bark, the Price of, 471

- Barks used in Tanning, on, 392, 502
- Belle-isle Nuisances, 526
- Benefit Clubs, the Earl of Albemarle on, 236
- BIOGRAPHICAL SKETCHES—
- B. T. Brandreth Gibbs, Esq., 16
- W. Miles, Esq., M.P., 97
- The late Professor Johnston, 182
- Birmingham Cattle Show, the, 9
- Bondage System in Scotland, 548
- Boydell's Traction Engines for the public Service, 409
- Bread, the Devonshire System of making, 362
- Bread Question, the. By J. Towers, 407

## C.

- Carlisle Meeting, official Report of the Judges of Drills at the, 396
- Carts, single horse, the Use and Advantage of, 226
- Cattle, on fattening, 106
- Cattle Pathology, 554
- Cattle Shows of Birmingham and Smithfield. By F. Robion de la Trehonnais, 363
- Cattle-trade, Review of the, 89, 184, 278, 368, 462, 561
- Cheese, &c., the prices of, 190, 284, 469
- Cheese, the Improvement in the Manufacture of, 85
- Chicory, price of, 190, 470
- Christmas Cattle Show in Baker-street—the Memory of the Past reviewed by a Visit, 124
- Christmas prize Meat, 121
- Churn, Stiernsvard's Swedish centrifugal, 395
- Clay Soils, the Cultivation of, 381
- Clover (red), on the Growth of, 491
- Corn—the Sale by Law or Custom? 389
- Corn Trade, Review of the, 91, 187, 281, 376, 466, 564
- Cottages for the Poor, Mr. Neeld's, 135
- Covent Garden Market, prices in, 470
- Covered Yards and Box-feeding, 273
- Currency per Imperial Measure, 95, 189, 283, 468, 566

## D.

- Dairy Management, Mr. Horsfall's, 408, 431, 541
- Decimal System of Accounts, their Advantage to the Farmer, 358
- Deep Cultivation at home and abroad, 536
- Drainage and liquid manuring, 427
- Drainage, arterial, 223
- Drainage, the Evidence taken by the Lords Committee, 413

Drainage, the Keythorpe System, 15  
 Drainage, the Objects and Purposes of, 194  
 Drainage (under) of Land in Great Britain, on the Progress and Results of. By J. Bailey Denton, 145

Drainage (under):—the Discussion on Mr. Bailey Denton's Paper, 207, 228

Dry-drill *v.* Water-drill, 39

## E.

English Agriculture, its Progress during the last Fifteen Years—Mr. Chandos Wren Hoskyn's lecture, 343

## F.

Farm Agreement, the Form adopted by the Duke of Northumberland, 302

Farmer of the new School, the, 319

Farmers, an Appeal to their Patriotism, 32

FARMERS' CLUB—London, 72, 112, 260, 322, 416, 530

Farmers, Facts for, 144

Farmers' Sons, the Education of, 487

Farming Agreement adopted by the Cheshire Agricultural Society, 258

Farming on light Land, 126

Farming without a Drill, 528

Fawsley Herd, the Sale of, 443

Flax, &c., Price of, 470

Flockmasters of the United Kingdom, to the, 458

French Commerce in Agricultural Produce, 550

## G.

Game Laws and Landlords, 110

Game Laws and Vermin, 111

Geology and the Keythorpe System, 557

Gorse, on the Uses of, 495

Grass, the Growth of. By Cuthbert W. Johnson, Esq., 379

Green Crops, the increased Use of, 119

Guano, artificial, from Fish, 36

Guano (Chincha Islands), proposed Sale of the, 108

Guano, on Peruvian: its History, Composition, and fertilizing Qualities, with the best Mode of its Application to the Soil. By J. C. Nesbit, F.G.S., F.C.S., &c., 507

## H.

Hacks and Hunters, the Breeding of, by Farmers, 383

Hay Market, 470

Hereford Bull, Description of "Attingham," 191

Hop Market, 96, 189, 284, 371, 469, 566

Hull Annual Trade Report, 172

Hunt's Patent Safety Hook as a Relief to fallen Horses, 229

Husbandry (good), the Necessity for its Extension, 113

Hide and Skin Markets, 471

## K.

Kennington Agricultural and Chemical College: Lectures Delivered there on scientific and agricultural Subjects, 404, 522

## L.

Labour in Ireland; its Division, manual and mechanical, 22

Labourers, underground. By Cuthbert W. Johnson, Esq., 98, 192

Lambing Season, 294

Land Agent, the, 360

Land Drainage, 320, 553

Land Drainage, the Prospects of, 391

Land Improvement Companies, 289

Land, Means Available for the Improvement of, 233

Land, Security for Capital invested in, &c., 225

Landlord, the modern, 301

Lease and no Lease, 334

Leather Market, 471

Leicester, improved Wethers, Description of Plate, 379

Liebig's Mineral Theory, 516

Linseed Trade, annual Report of the, 176

## M.

McCormick's Reaper, Description of Plate, 459

Machinery for Agricultural Purposes, the extended Use of, 120

Malt made in 1854-5, 459

Mangel Wurzel Crop, 525

Manure, Fish, 129

Manure, on spreading Farm-yard, 107

Manure, Sea Sand as, 428

Manure Tolls, the Law of, 366

Manures, Price of, 96, 284, 471

Manures, the real Value of some of our, 519

Manures, the relative Values of artificial Manures, and their comparative Adaptation to different Crops. By J. C. Nesbit, Esq., 416

Manuring Land, Progress in, 517

Meteorological Diary, 87, 180, 274, 365, 460, 563

Metropolitan Cattle Market, great Christmas Show, 71

Microscope as an Agricultural Agent, 551

Milk, Variation in the Composition of, 489

Modern Professor, the, 414

Molasses for Feeding Purposes, 35

Money, the decimal System, 237

## N.

Nesbit, J. C. Esq., proposed Testimonial to, 427

Northumberland, the Duke of, and his Tenantry, 164

## O.

Oil, Price of, 470

## P.

- Paris Agricultural Exhibition of Stock, &c., 136, 397, 399  
 Paris Universal Exhibition of 1855, official Report.—By J. Evelyn Denison, Esq., M.P., 449  
 Patent Laws, the Abuses of the, 101  
 Patent Office Reform, 315  
 Ploughing by Steam, the Possibility of, 158  
 POETRY—Song of the Spade, 128  
 Political? what is, 317  
 Poor Man's Bane, 235  
 Potato Cholera, 181  
 Potato Markets, 96, 189, 284, 371, 469, 566  
 Potato Planting, 411  
 Potato Trade, Smithfield as a central Market, 197  
 Potatoes, Cultivation of, 179  
 Practice with Science, 157  
 Produce, Quality of, 232  
 Progress, on, 296

## R.

- Rabbits noxious Vermin to the Tenant Farmer, 52  
 Rain and drainage Water, on the Composition of, 547  
 Rain Falls, 555  
 REVIEW—Journal of the Royal Agricultural Society of England, 269  
 Richmond's Patent Lawn Mower, 521  
 Royal Agricultural Society of England, Proceedings of, 4, 200, 336, 432, 478  
 Royal Agricultural Society of England and the Implement Makers, 204  
 Royal Agricultural Society of England, the Charta of, v. Agricultural Statistics, 271  
 Royal Dublin Society's Spring Show, 446

## S.

- Seeds, Price of, 96, 189, 283, 378, 469, 566  
 Sheep, Scab in, 459  
 Sheep, the Management of, 28  
 Short-horned Bull "Gloucester," Description of, 473  
 Short-horned Bull "Master Butterfly," Description of, 285  
 Skin Diseases of our domestic Animals, 441  
 Smithfield Cattle Show, Critique on the Animals exhibited, List of Prizes, &c., 54  
 Smithfield Club and Birmingham Cattle Show, 53  
 Soil, the Autumn Cleaning of the, &c., 23  
 Soil, the best System of Tenure to insure the proper Cultivation of the, 34  
 Soils, the Moisture of. By Cuthbert W. Johnson, Esq., 474  
 Spring Dressings. By Cuthbert W. Johnson Esq., 286

- Stallion "Ravenhill," a thorough-bred, Pedigree and Performances, 473  
 Stallion, the celebrated Norfolk one "Phenomenon," Description of, &c., 285  
 Stallions for 1856, List of, 372  
 Steam, Cultivation by, its past History and probable Prospects. By John Fowler, jun., of Bristol, 239  
 Steam Culture, Usher's Plough, &c., 130, 230  
 Steam Culture, the Plough, 40  
 Stock, the economical Feeding of, 162  
 Suffolk Crag, its Use in the Improvement of Land, 309  
 Sunflower, the Culture of it as an Agricultural Plant, 300

## T.

- Temperatures, low. By Cuthbert W. Johnson, Esq., 1  
 Tenant Right, *alias* Equity, very Profitable to the Landlord, 445  
 Tenant Right, the gradual Extension of English, 159  
 Thrashing by Steam Power, on, 313  
 Tillage in the Fifteenth Century, 501  
 Timber, Price of, 470  
 Tithe Commutation, 179  
 Top-dressing, Experiments of the late Mr. Pewsey, 342  
 Tull, Jethro, his Husbandry (concluded), 17  
 Turnip Crop, the Swedish, 476  
 Turnips, Report of an Experiment on growing them with different Manures, 275

## V.

- Vidette, the, Description of Plate, 192

## W.

- War, its Effects on the Commerce of the Country, 275  
 Water Rights and Outfalls, 292  
 Wheat Crop of 1855, the Yield and Quality, 273  
 Wheat, fumigating, Salaville's "Grain aëerator," 402  
 Wheat on the Use of a Solution of the Chloride of Lime as a Steep for, 497  
 Wheat Plant, the young, 161  
 Woodlands Draining, 488  
 Wool Markets, 96, 190, 284, 471, 566  
 Wool Trade, 42, 537  
 Wool Trade, annual Report of the, 169  
 Work, and how to do it, 304, 384  
 Worms, how to kill them, 109

## Y.

- Year, the Close of the, 117  
 Year, the new, 163

## THE EMBELLISHMENTS.

---

	Page.
Bridesmaid, a short-horned Cow . . . . .	1
Three improved Berkshire and Essex Pigs . . . . .	1
Portrait of William Mills, Esq., M.P. . . . .	97
Design for a covered Homestead at Sillyflat, Kincardineshire, N. B. . . . .	97
The Vidette . . . . .	191
A Hereford Bull . . . . .	191
Improvements in Corn Planters . . . . .	272
Phenomenon, the Norfolk trotting Stallion . . . . .	285
A short-horned Bull . . . . .	285
Three Leicester Wethers . . . . .	379
McCormick's Reaper . . . . .	459
A short-horned Bull . . . . .	473
A thorough-bred Stallion, "Ravenhill" . . . . .	473



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Three Yorkshire White Swine, taken in 1854, at the  
London Exhibition, and exhibited at the Crystal Palace,  
London, in 1851. The largest of these swine was carried away by the  
Government, and is now in the possession of the  
Royal Agricultural Society.

# THE FARMER'S MAGAZINE.

JANUARY, 1856.

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## PLATE I.

### BRIDESMAID; A SHORT-HORNED COW,

THE PROPERTY OF RICHARD BOOTH, ESQ., OF WARLABY, NORTHALLERTON.

BRIDESMAID, roan, calved February 14th, 1851; got by Harbinger (10297), dam (Bianca) by Leonard (4210), g. d. (Bagatelle) by Buckingham (3239), gr. g. d. (Jemima) by Raspberry (4875), — (Strawberry 3rd) by Young Matchem (4422), — by Young Alexander (2977), — by Pilot (496), — by The Lame Bull (359), — by Easby (232), — by Suwarrow (636). See vol. ii., *Herd Book*, p. 348.

PERFORMANCES: 1852.—At Lewes (Royal Agricultural Society), 2nd prize as a yearling; Sheffield (Yorkshire Society), 2nd prize; Sunderland (Durham County), 1st prize. 1853.—At Gloucester (Royal Agricultural Society), 1st prize for two years old; at York (Yorkshire Society), 1st prize; Blackburn (North Lancashire), 1st prize, also a silver cup value 10gs., and a silver medal. 1854.—Berwick-on-Tweed (Highland Society), 1st prize for the best cow in milk; at Armagh (Royal Improvement Agricultural Society of Ireland), 1st prize for the best three-year-old cow in milk. 1855.—At Carlisle (Royal Agricultural Society), 1st prize for the best cow in milk; Malton (Yorkshire Society), 1st prize for the best cow in milk.

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## PLATE II.

### THREE IMPROVED BERKSHIRE AND ESSEX PIGS,

BRED AND FED BY MR. MATTHEW NEWMAN, OF HAYES COURT, UXBRIDGE,

To which a prize of Five Sovereigns was awarded at the Smithfield Club Show, December, 1854. This breed, or cross, have the especial recommendation of a great aptitude to fatten. They attained the weight of fifty stones each—of 8 lbs. to the stone—at the age of thirty-six weeks and a day; with a good average portion of lean meat to fat. The same sort, in addition to other prizes, took that for three store breeding sows of one litter, at the Windsor Show of the Royal Agricultural Society of England, in 1851. We believe Mr. Newman has a few pigs to dispose of; particulars of which may be known on application to him.

---

## LOW TEMPERATURES.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

Some of the effects of a low temperature upon animals and vegetables have been always familiar to the dwellers in rural districts. The true explanation of such phenomena has not, however, been so well or so long understood. The cultivator of cereal crops, to give one instance amongst many, is well aware that his seed wheat will germinate and continue to extend its roots when the surface of the soil is at or below the freezing point; that a covering of snow rather promotes than retards this

operation; and that, in fact, to use his own words, "the growing plants keep on working under the soil," when all is cold and torpid above ground. The explanation of this fact must be sought in the much higher and equable temperature of the soil, into which—at least, within the cereal or corn-producing zone of the earth—the frost rarely if ever penetrates below a few inches. In our island, at 12 or 18 inches below the surface, the thermometer generally indicates, even in the most severe

frosts, a temperature several degrees above the freezing point of water; and this warmth, be it remembered, increases the deeper the roots of the plant penetrate into the soil. If I give the result of two or three observations made during the present winter, it may serve to make these truths still more apparent. I have at Croydon three thermometers placed on a wooden post, on the northern side of my house, and 6 inches from the wall—1, about a foot from the ground; 2, a self-registering thermometer, placed about three feet above No. 1; and 3, a thermometer whose bulb descends about 18 inches into the soil.

The instances of low temperature commenced this winter on the nights of the 14th, 15th, and 16th of November, when the thermometer, exposed to the air, descended as low as 20, 20, and 25 degrees; and at 9 o'clock on the following mornings it was at 25, 25, and 33 degrees; but at 18 inches it was 43, 41, and 41 degrees; and, again, on the nights of the 2nd, 5th, 6th, and 7th of December, the self-registering thermometer was down to 20, 22, 24, and 22 degrees; but that whose bulb was 18 inches below the surface, was as high as 38½, 38, 37, and 37 degrees. On the nights of the 11th, 12th, and 13th of December, the temperature of the air was as low as 20, 11, and 15 degrees; but that of the earth at 18 inches from the surface, was 35, 34½, and 34½. The lowest temperature of the nights of the 20th, 21st, and 22nd, was 12, 6, and 9 degrees; but that of the earth was 34 degrees—a temperature not so low as to preclude the growth of the rootlets which the soil contains.

My readers will remember that the temperature of the soil is influenced, 1st, by that of the atmosphere in which it is placed, and, 2ndly, by the internal temperature of the earth, which, as far as we are aware, has little connection with that of the surrounding atmosphere. As we descend into the earth, its warmth increases at the rate of about one degree of Fahrenheit for every sixty feet from the surface. This rule holds in all seasons, in the deepest mines, and the springs of the greatest artesian wells. In the artesian boring at New Salwerk, near Minden, which is 2,232 feet deep, the water which rises to the surface is in all seasons of the temperature of 91 degrees; and the same phenomenon occurs in the water of the artesian well of Grenelle, near Paris, the depth and the temperature of the water nearly corresponding to that of the well of Minden.

The specific effect of low temperature upon the growth of different varieties of the same plant has never been so carefully examined as is desirable. We know it is true that wheat will continue to vegetate in a temperature in which barley ceases to grow, and that rye and oats are cultivated success-

fully long after the climate has become too cold for the profitable cultivation of wheat; but no experiments have been instituted to show the rate at which the roots of different varieties of the same cereal extend themselves in a low temperature, although it is probable that useful practical conclusions might be derived from such a course of inquiry.

Various have been the wild dreamings hazarded to account for the different power to resist the destructive influence of frost which is possessed by plants; but such reveries have commonly consisted in the substitution of mere words as an explanation of unknown facts. And our state of useful knowledge is not much enlarged, if we adopt a recent explanation of Dr. Lindley's, who arrives at the conclusion, after a series of observations extended over a period of forty years, that the power of resisting frost is the consequence of "specific vitality," and nothing else. And, as he remarks, that a low temperature acts differently upon different plants very nearly allied to each other, is notorious, and this even where they are mere varieties of each other. The China rose, for instance, resists any amount of English cold; while the variety called tea-scented perishes or suffers severely in every ordinary winter. The gay-flowered Senecio of the Canaries, known in gardens under the name of *Cineraria*, shrinks from the mere approach of frost, and perishes upon its first arrival; yet the ragworts, and mugworts, and groundsels, all equally Senecios, can bear a Russian winter. In like manner, oaks, chestnuts, conifers exhibit similar differences in their power of resisting frost. It is impossible, adds Dr. Lindley, upon any other principle to account for the facts that surround us. For example, *Genista aetnensis* survived all the cold of the winter of 1854-5. What is there in its constitution, except specific vitality, which can account for the fact?—which can explain why it endured without suffering a degree of cold that proved fatal to its first cousin the common furze? It may be very reasonably asked what *is* this specific vitality? To that we have no more satisfactory reply to give than that we do not know. It is an axiom in animal economy, that the general effect of cold on living bodies is a diminution of vital activity, which terminates, if the cold be intense, and its application continued, in death; hence, it is to be inferred that all living things whatsoever must finally perish beneath the influence of cold, provided it is severe enough and prolonged enough. But living things have each their separate constitutional vitality, the power of which, in resisting cold, differs between species and species, or variety and variety, and even between individual and individual. It is a peculiarity derived from the great Source of all things—

a reality, inexplicable but indisputable, like light, and heat, and electricity. We see it manifested amongst plants; between the yellow and the spider ophrys, and the tea-rose and the China rose; as amongst animals, between the ass and the zebra, Negro and the Esquimaux, the terrier and the Italian greyhound.

The influence of a low temperature upon the two great classes of organised beings, then, is alike extensive and injurious if continued below a certain point; and that action is, in the case of animals, still more generally marked and traceable in its practical results than in the case of plants. Its influence upon the amount of food consumed by our domestic animals, was well traced by the late Mr. Philip Pusey, in one of the latest of those many instructive papers in which he so ardently laboured to combine practical and scientific observations. In the course of an able retrospect of the recent progress of agricultural knowledge, he observed (*Jour. Roy. Ag. Soc.*, vol. ii., p. 381): "Besides fibrine, which becomes meat, vegetable food contains other substances—gum, starch, sugar. All these are without nitrogen, and consist of charcoal (carbon) with the elements of water (oxygen and hydrogen), that is of the substance of wood. Liebig has shown that in the animal body they are used as wood, being absorbed combined with oxygen, and exhaled as carbonic acid. In the words of Dr. Playfair, the body is the furnace, the food is the fuel, the excrements are the ashes, and the gases exhaled from the mouth are of the same composition as those which fly up the chimney of the furnace. If, then, we want an animal to lay on meat, we give him beans, which abound in fibrine, and chopped straw for fuel; just as we ourselves eat beefsteak and potatoes. Animals seem to know this by instinct; for my shepherd tells me it is useless to give the sheep chaff in their troughs until the cold weather comes on. As the winter deepens they eat more chaff, but in spring gradually leave it off, till in May they refuse it; as we light our fires at Michaelmas, and leave our grates empty in May." And after giving a sketch of the opinions then engaging the attention of the chemist, as to the source of fat, he remarks: "There is one point, however, certain—the importance of warmth. Wherever fat comes from, there is no doubt that both fat and flesh are wasted from the production of beef in an animal frame suffering by excessive cold. The substance of an animal pining from cold evaporates with the breath, as the spirit would pass from wine in an uncorked bottle. The comfort of our stock, therefore, is in unison with their master's profit." As to their food, practice (as Boussingault himself—no mean chemist—frankly says) "has got the start of theory; and I own," he adds, with perfect hu-

mility, "that I think its conclusions are in general greatly to be preferred." Still animal chemistry has made great advances, and does at least *explain* much; of vegetable chemistry Mr. Pusey added—rather too hastily, perhaps, as much can scarcely be said—in the words of its able exponent, the late Dr. Fownes, speaking at the premature close of his labours, "the chemistry of vegetable life is of a very high and mysterious order, and the glimpses occasionally obtained of its general nature are few and rare." However few these glimpses of truth may be, no one was latterly more ready than Mr. Pusey to acknowledge their importance to agriculture—no one was more anxious than himself to give due prominence, in the pages of the valuable Journal he so ably conducted, to every discovery in agricultural chemistry. He had once, a very groundless fear that the importance and the interest so generally excited by the chemists' researches might seduce the agriculturist from other valuable paths, which as certainly lead to the acquisition of practical knowledge.

Such fears—such unfounded conclusions, however, are ever injurious to the progress of knowledge. The mysteries of vegetable life are too many, and far too interesting not to stimulate our curiosity, and excite us to pursue every path which tends towards enlarged knowledge. Even now, our old conclusions with regard to the great pastures from whence the growing plant obtains its food, are threatened with a considerable revolution from the more recent inquiries of the chemist. The source from whence it acquires its nitrogen, has been lately examined with equal skill and industry. Much has been done towards proving that the nitrogen gas of the atmosphere exercises more than a passive influence upon the growing plant; and if this conclusion is supported by the result of other and varied researches, it may lead to the adoption of new and improved rotations of crops, as well as material improvements in the application of the manures by which their growth is promoted. Of the influence of temperature upon plants, we have seen much yet remains to be accomplished. I have directed my attention in this paper only to the effect of atmosphere of a low temperature upon organised substances, but there are other branches of the same important inquiry to which I may hereafter recur; and in these much progress has of late been made. To whichever side, indeed, we turn, many and certain indications present themselves that all our present amount of information will only serve as stepping-stones to a future and much more important extent of knowledge, to that to which we have at present attained.

## ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A MONTHLY COUNCIL was held at the Society's House, in Hanover-square, on Wednesday, the 5th of December. Present: Mr. RAYMOND BARKER, V.P., in the Chair; Sir Archibald Keppel Macdonald, Bart.; Mr. Bramston, M.P.; Mr. Brandreth; Mr. Evelyn Denison, M.P.; Mr. Brandreth Gibbs, Mr. Fisher Hobbs, Mr. Wren Hoskyns, Mr. Kinder, Professor Simonds, Mr. Jonas Webb, and Mr. Burch Western.

The following new Members were elected:—

Aytown, Roger Sinclair, Inchdairnie, Kirkcaldy.  
 Boghurst, William Philip, Freting Abbey, Colchester.  
 Bonnell, Thomas Lowrey, Carlisle, Cumberland.  
 Bonnell, James, Pelling-place, Old Windsor.  
 Christie, James, Melbourne Hall, Pocklington, Yorkshire.  
 Dalziel, James, New House, Lanark.  
 Denman, Lord, Middleton Hall, Bakewell, Derbyshire.  
 Denton, C. L., St. Briavell's, Coleford, Gloucestershire.  
 De Tipula, T. F., Derekegyaza, Pesth, Hungary.  
 Ellis, John Pierce, Eastington Farm, Upton, Worcestershire.  
 Elkington, George Richards, Pembrey, Llanelly, Carmarthen-shire.  
 Erkörg, Adolphus, Derekegyaza, Pesth, Hungary.  
 Fane, Rev. Prebendary, Warminster, Wiltshire.  
 Fison, John Potterton, Horningsea, Cambridgeshire.  
 Gilding, Richard, Malvern Wells, Worcestershire.  
 Goddard, William Rainey, Inspector of Registration, Somerset House.  
 Harding, Joshua, Rosliston, Burton-on-Trent.  
 Hicks, William Gunman, Halstead, Sevenoaks, Kent.  
 Hempson, John A., St. Osyth, Colchester, Essex.  
 Hunt, Richard, The Mills, Stanstead, Essex.  
 Ireland, John Smith, Forthampton, Tewkesbury, Gloucester.  
 Iven, Thomas, Stansbury Hall, Wrexham, Denbighshire.  
 Knight, John, Widnes, Warrington, Lancashire.  
 Jakeman, James, Hill Farm, Northampton.  
 James, John, Stafford.  
 Lobb, George, jun., Lawhitton, Launceston, Cornwall.  
 Lord, Richard, Longdon, Upton, Worcestershire.  
 Louch, Francis William B., Stanchester House, Landport, Somersetshire.  
 Lowndes, George Alan, Barrington Hall, Harlow, Essex.  
 Mack, Andrew, Lower Dale, Hereford.  
 Muggeridge, Sir Henry, Knt., St. Andrew's Hill, Streatham.  
 Oldfield, Charles Frederick, Peldou Lodge, Colchester, Essex.  
 Pack, Thomas Henry, Ditton, Maidstone, Kent.  
 Phillips, James Henry, Ansty, Dorchester, Dorsetshire.  
 Robson, James, Breckenborough, Louth, Lincolnshire.  
 Scragg, William, Great Clacton, Colchester, Essex.  
 Sexton, George Mumford, Cockfield, Bury St. Edmund's.  
 Stenton, Henry Cawdron, Southwell, Nottinghamshire.  
 Stephenson, Henry Halfrey, Crosslands, Alston, Cumberland.  
 Sturgess, Thomas, Bedale, Yorkshire.  
 Twiddle, John, Askerton Castle, Cumberland.  
 Pollard, Joseph, Highdown, Hitchin, Hertfordshire.  
 Weatherall, Joseph, Stockton-on-Tees, Durham.

FINANCES.—Mr. Raymond Barker laid before the Council the Monthly Report on the accounts of the Society, from which it appeared that the current cash-balance in the hands of the bankers was £361.

PARIS IMPLEMENT SHOW.—Mr. Evelyn Denison, M.P., as English Juror of Agricultural Implements at the recent Paris Exhibition, having transmitted to the Council at their previous monthly meeting the earliest information of the results of that exhibition in his own department, it was suggested by Mr. Bramston, M.P., supported by Mr. Jonas Webb, that a document so important at the present moment to the agricultural implement makers of this country, and so important to

those members of the Society who desired in their purchases to avail themselves of the information it conveyed, should at once be made public, especially as the awards to which it referred had now been confirmed by the imperial edict and the premiums awarded. The Council unanimously adopted this suggestion, and ordered the publication of the following letter:—

“Ossington, Nov. 6, 1855.

“Dear Sir,—I returned on Thursday last from Paris, having concluded my business in connection with the Exhibition. My first visit occupied me for a month, my second for more than three weeks. I send you, for the information of the Council, a short account of what has taken place. The Committee appointed by the Council to make a selection of agricultural implements for the Paris Exhibition executed their task, I think, with great judgment. The implements sent were not too numerous, and they were all of established excellence. The collection attracted great attention, and has been examined with increasing interest up to the latest days of the Exhibition. I will not now enter into a description of the foreign implements exhibited, nor of the vast collection of agricultural products (an opportunity for this will be afforded in a report which the Board of Trade has asked me to furnish). I will confine myself now to the results of the Exhibition, as bearing on British exhibitors and British interests. To the five principal makers of agricultural machines—

Messrs. Ransome	Messrs. Howard
„ Garrett	„ Crosskill,
„ Hornsby	

the Gold Medal of Honour has been awarded; and to them alone, of all the exhibitors of agricultural machinery of all countries, with the exception of McCormick and Pitt, of the United States, one for his reaping machine, the other for a thrashing machine. To Messrs. Ball, Bentall, Busby, Coleman, Smith and Ashby, W. Smith, the Silver Medal of the first class has been voted.

“According to the French classification (carried perhaps to an extreme point of subdivision), thrashing machines and tile-making machines were not included in the list of agricultural implements: they were removed to the class of general machinery, class 6. Mr. Hornsby, if he had not already gained a Gold Medal in class 3, would have had one for his thrashing machine in class 6.

“A Gold Medal of Honour has been voted to Mr. Clayton for his brick-making machine. I should add that medals have been awarded, by the express command of the Emperor, to the leading workmen of the establishments of successful exhibitors. After making an examination of the foreign implements, in company with Mr. Amos, it became apparent to my colleague, Mr. Wilson, and myself, that our time would be best employed, both for the interests of England and of France, in endeavouring to open the trade for agricultural machinery between the two countries—France requiring improved implements, England able and willing to supply them. The high rate of duty on the importation of machinery into France amounted virtually to a prohibition. I talked to the distinguished Frenchmen who composed my class on the disadvantages of this exclusive system. To open the trade might confer some benefit on England, but it would confer a far greater benefit on France. Ultimately, our class agreed unanimously to make a representation to the Imperial Government in favour of a reduction of the duty on agricultural machinery. The representation was successful. An Imperial Decree appeared in the *Moniteur* on Friday, the 7th of Sept., making a considerable reduction in the duties on many articles of machinery, and specially reducing the duty on agricultural implements to 15 francs per 100 kilogrammes. I look upon this as a very important concession, and one which may be productive of very beneficial consequences.

“I am glad to attribute it, not so much to our representations, as to the good sense and just views of our French

colleagues; and no doubt it was to their appreciation of the extent to which French interests were involved, that this decree must in a great degree be attributed. It was part of the original plan of the Exhibition, that any article exhibited might be sold, at the close, on payment of a duty of 20 per cent., *ad valorem*. The new duty is by weight—15 francs per 100 kilogrammes, equal to 2 cwt. I have procured from the French Customs the weight of some of the English machines; and I have made a comparison between the duty charged by weight, and an *ad valorem* duty of 20 per cent. On an iron plough, in which the weight of the raw material, in comparison to workmanship, is considerable, the duty of weight will be something above 20 per cent. *ad valorem*. In the more complicated machines, in which labour enters more largely, as in drills, the duty will be about 15 per cent. *ad valorem*. On the whole, the proposed duty by weight appears to be fully as favourable as a duty would have been at 20 per cent. *ad valorem*.

"The makers of machines, whom I had an opportunity of seeing at Paris, and their agents there, were satisfied with the proposed scale, and thought an opening had been made for the establishment of a considerable and beneficial trade. It would not become me to suggest to our machine makers the best means to be taken for occupying the new ground laid open before them. Their own enterprise and knowledge of business will be their best guides. Our American brethren have already set them an example. I understand a Franco-American Company has been set on foot, for the purpose of supplying France with M'Cormick's reaping machine.

"These, then, have been the chief results of the Paris Exhibition, as regards the Class of Agriculture:—

"1. Successful competition on the part of English Machinery, and the award to it of the Gold Medal of Honour.

"2. A great reduction of the duties on the importation of Agricultural Machinery into France, and the prospect of a new market opened to our machine-makers.

"I could not be content to conclude this short account without acknowledging the invariable courtesy and attention which have been shown me by the members of my own class, and by all persons connected with the French Commission.

"I am, yours very faithfully,

"EVELYN DENISON.

"To J. Hudson, Esq., Sec. of E. A. S."

**IMPLEMENT PRIZES, 1856.**—Mr. Brandreth having moved that the consideration of the Implement Prize-sheet for next year should be postponed till the Wednesday in next week, when a special Council would be held, gave notice of the following motion: "To move, when the Implement-sheet is finally taken into consideration, that, in future, special prizes only be given in rotation for certain great classes of Implements: as an arrangement likely to prove of advantage to the Society, to the implement-makers, and to the public in general; and also, as tending to lead to greater efficiency and economy in the respective trials of implements in each year." The explanations given by Mr. Brandreth of his intended motion, and the remarks of the different members present, on the modes by which the Society's exhibition and trial of implements in each year may be rendered most effective and economical, led to an interesting discussion on this important subject.

**STANDING COMMITTEES.**—The Standing Committees for next year having been appointed, it was ordered, on the motion of Mr. Fisher Hobbs, seconded by Mr. Brandreth Gibbs, that the chairmen of the different standing committees of the current year report respectively in writing, to the Monthly Council in February, the number of times they have met, and the number of reports they have made to the Council.

**MEMBER OF COUNCIL.**—On the motion of Mr. Raymond Barker, seconded by Mr. Wren Hoskyns, the Earl of Essex was unanimously elected a General Member of Council, to supply the vacancy occasioned by the transfer of Lord Berners to the class of Trustees.

**AUSTRALIAN SHEEP.**—The Earl of Chichester com-

municated to the Council a statement made to him from South Australia, of the great losses sustained by the flock-masters in that colony from the disease of scab among their sheep.—The Council directed Professor Simonds, as the Veterinary Inspector of the Society, to enter into communication with the Earl of Chichester on this subject. Professor Simonds took that opportunity of remarking that he believed the sheep of the colony had always suffered from the scab in its common form, and would continue to be exposed to the same annoyance as the native sheep of the colony extended and became mingled with newly-imported animals. He thought the same treatment would succeed in Australia as employed in England. The disease arose from the presence of a special parasitical animal, which penetrated the skin of the sheep, and caused by its constant attacks their increasing irritation and annoyance. He would communicate, as desired, with the Earl of Chichester on the subject.

**LECTURE.**—Mr. Raymond Barker gave notice that he should move at a future Council, that Prof. Simonds be requested to deliver a lecture on the subject of skin diseases and constitutional irritation occurring among the animals of the farm from the insidious presence and attacks of parasitical animals. He made this motion both in reference to its interest and importance, and from the circumstance of knowing that Prof. Simonds possessed a most valuable collection of magnified diagrams and drawings connected with this subject, which he had at great personal exertion and expense prepared for the service of the Society.

The Council adjourned to Dec. 12.

A **SPECIAL COUNCIL** was held on the 12th of December: present, Lord PORTMAN, President, in the Chair; Earl of Essex, Lord Berners, Lord Ashburton, Hon. A. Leslie Melville, Sir Archibald Keppel Macdonald, Bart., Mr. Dyke Acland, Mr. Raymond Barker, Mr. Barnett, Mr. Barthropp, Mr. Brandreth, Col. Challoner, Mr. Evelyn Denison, M.P., Mr. Gadesden, Mr. Garrett, Mr. Hamond, Mr. Fisher Hobbs, Mr. Wren Hoskyns, Mr. Hudson (Castleacre), Mr. Jonas, Mr. Kinder, Colonel MacDouall, Mr. Miles, M.P., Mr. Milward, Mr. Allen Ransome, Mr. Slaney, Mr. Robert Smith, Mr. Thompson, Colonel Towneley, Mr. Woodward, and Mr. Burch Western.

Mr. PUSEY.—On the 7th of November, on the motion of Lord Portman, seconded by Colonel Challoner and Mr. Raymond Barker, the following resolution having been carried unanimously:—

"That a letter be written to the family of the late Philip Pusey, Esq., expressing the gratitude of the Royal Agricultural Society of England for his services as Chairman of the Journal Committee, and their great sorrow for his early death. That it be engrossed on vellum, and signed by the President, with the seal of the Society attached."

Lord Portman reported, at this meeting, that in pursuance of that resolution he had addressed the following letter to the family of the late Mr. Pusey:—

"The Council of the Royal Agricultural Society of England have directed me, as the President, to assure the family of the late Ph. Pusey, Esq., that the Society deeply and unfeignedly unite with them in their grief for the irreparable loss which they have sustained in the early and lamented death of their beloved father. In this bereavement the Council and the Society participate with the surviving and sorrowing members of Mr. Pusey's family; for while the recollection of parental affection and domestic virtue will long endear his memory to all the members of his family, his distinguished position when twice elected President of the Royal Agricultural Society of England, and his unceasing labours for seventeen years as Chairman of the Journal Committee, will long be cherished by his

surviving colleagues, and be remembered with gratitude and respect by every member of this Society.

“(Signed) PORTMAN, President.”

To which he had received the following reply :—

“London, Dec. 12.

“My Lord,—The family of the late Mr. Pusey have requested me, as one of the executors under his will, to express to your Lordship and the Council of the Royal Agricultural Society of England their graceful sense of the sympathy shown to them in their bereavement.

“They will not fail to appreciate duly such a communication from the Society, remembering how their father cherished the memory of Earl Spencer, its first President, and of others with whom he had the honour to be associated in its foundation.

“Of Mr. Pusey himself, it will long be remembered that to practical habits of business he joined deep philosophical thought, accurate scholarship, and genial appreciation of the arts and letters of modern as well as ancient times—that he applied a powerful intellect, with a keen forecast of the wants of his country, to develop the resources of British farming, and that, by a rare union of endowments, he did much to render science practical, and to win for agriculture a worthy place among the intellectual pursuits of the present day.

“How much labour he underwent, what forbearance and discrimination he exercised, how considerate he was of the feelings of others, how modest in the expression of his own, may never be known except to his personal friends; but some of the results of his unceasing exertions during many of the best years of his life are to be found in the Journal (to which the Council have referred by their resolution); and by that Journal at least his name will be permanently and honourably connected with the Society from the date of its commencement.

“This may not be the occasion on which to speak of his exertions for the labouring poor, or of his private virtues, but I trust that I shall be pardoned for having said thus much in response to the recognition of Mr. Pusey’s services by the important public body over which your lordship presides.

“I have only further to request that you will be pleased to convey to the Council the respectful acknowledgments of Mr. Pusey’s friends, and that you will accept personally their sincere thanks for the kind terms in which your letter to the family is expressed.—I have the honour to be, my lord, your lordship’s faithful servant,  
“THOMAS DYKE ACLAND, JUN.

“The Right Hon. Lord Portman.”

On the motion of Mr. Jonas, seconded by Mr. Fisher Hobbs, it was resolved that the foregoing letters be entered in the proceedings of the day, and be printed in the forthcoming number of the Journal.

**GUANO SUBSTITUTE.**—Mr. Raymond Barker having submitted the report of the Guano Substitute Committee, on a formal claim made for the Society’s £1,000 prize, the Council adopted the opinion of the Committee that the proposed substitute was not entitled to the prize offered.

**TRIAL OF IMPLEMENTS.**—Colonel Challoner, Chairman of the Implement Committee, having read to the Council the suggestions of the implement-makers who had met that committee in conference two days previously, it was carried, on the motion of Mr. Thompson, seconded by Colonel Challoner, “That at future country meetings the competitive trials of implements shall be confined to certain specified classes of implements, and that it be referred to the Implement Committee to make such a classification as shall ensure the trial of every description of agricultural implement once in three years;” and on the motion of Mr. Brandreth, seconded by Mr. Slaney, “That after the word ‘Implements’ in the previous resolution, the words be added, ‘for which alone in each year prizes shall be offered.’” The Implement prize sheet was accordingly referred to the Implement Committee to report to the Council in February what prizes they would recommend to be offered at the Chelmsford Meeting next year.

**STEAM-CULTIVATOR.**—It was carried, on the motion of Mr. Evelyn Denison, M.P., seconded by Mr.

Hamond: “That the sum of £500 be offered by the Society for the best steam-cultivator that shall be an economical substitute for the plough or the spade; and that it be referred to the Implement Committee to consider the details of the conditions to be made for the prize.”

A SPECIAL COUNCIL was held on the 13th of December: present, Lord PORTMAN, President, in the Chair; Lord Berners, Lord Feversham, Sir Archibald Keppel Macdonald, Bart., Mr. Raymond Barker, Mr. Barthropp, Mr. Fisher Hobbs, Mr. Jonas, Mr. Miles, M.P., Professor Simonds, Mr. Robert Smith, Colonel Towneley, Mr. Jonas Webb, and Mr. Woodward.

**LIVE STOCK PRIZES.**—On the motion of Mr. Miles, M.P., seconded by Lord Feversham, prizes were unanimously voted for foreign stock of any pure native breeds of cattle and sheep, open to all foreigners, under conditions to be recommended to the Council at their February meeting by a special committee, consisting of Mr. Miles, M.P., Mr. Evelyn Denison, M.P., Lord Feversham, Mr. Jonas Webb, Mr. Fisher Hobbs, Mr. Jonas, Mr. Milward, and Professor Simonds. A sum not exceeding £120 was voted for Poultry Prizes to be arranged by the Council in February. On the suggestion of Mr. Townley Parker, a class of Prizes was voted for Dray Horses. The general conditions and regulations of the prize sheet were then adopted in reference to the usual prizes offered by the Society.

A SPECIAL COUNCIL was held on the 14th of December: present, Colonel Challoner, Trustee, in the chair; Lord Berners, Mr. Dyke Acland, Mr. Raymond Barker, Mr. Barthropp, Mr. Mainwaring Paine, Mr. Slaney, and Mr. Jonas Webb.

The Council Meetings stand adjourned over the Christmas Recess to the first Wednesday in February.

#### DISEASE AMONG CATTLE.

London, Dec. 22.

The Earl of Clarendon has transmitted to the Society, through Lord Wodehouse, a copy of a despatch from Her Majesty’s Minister at Berlin, reporting that the cattle disease from Poland had broken out in the eastern provinces of Prussia, where it was making considerable ravages. A military cordon had been established on the frontier where the plague was raging; and both in East and West Prussia, where cattle were already very dear from the inundations of the Vistula this year, apprehensions were entertained that the disease would spread, and raise considerably the price of horned cattle, and thereby cause great damage to agriculture.

The Half-yearly General Meeting of this Society was held on Saturday, Dec. 15, at the Society’s Rooms in Hanover-square. The chair was taken at 11 o’clock by Colonel Challoner. Among those present were Mr. R. Barker, Mr. Slaney, Mr. W. F. Hobbs, Mr. Paine, Mr. Girdwood, Professor Way, Mr. R. W. Baker, Mr. S. Druce, Mr. S. Druce, jun., Mr. Dyer, &c.

The CHAIRMAN, on taking his seat, said he had to state that Lord Portman, the President of the Society for the year, very much regretted that he was unable to attend that day. In his lordship’s absence, it was his own duty, as the senior trustee present, to take the chair.

Mr. R. BARKER wished to add to what had fallen from the chairman, that he had been particularly requested by Lord Portman to say that he extremely regretted that he was compelled to leave London on that day, the cause of his doing so being domestic affliction.

Mr. HUDSON then read the following Report of the Council:—

REPORT.

The Society, during the past half-year, has lost 40 of its members by death, and gained, during the same period, 116 new members by election. Its list now contains—

- 90 Life-Governors,
- 140 Annual Governors,
- 815 Life-Members,
- 3,895 Annual Members, and
- 18 Honorary Members.

The Council have elected Lord Berners to fill the vacancy in the number of Trustees, occasioned by the lamented decease of Mr. Pusey; and the Earl of Essex to supply the vacancy in the General Members of Council, created by the transfer of Lord Berners's name to the class of Trustees.

The Society at large will have deeply participated with the Council in their sense of the great loss they have sustained in the removal of Mr. Pusey from the sphere of his invaluable co-operation; and from the direction of that Journal which has so long formed the strongest bond of union among its members. The Council have already expressed, through their President, Lord Portman, their condolence with the family of Mr. Pusey on their irreparable loss, and their grateful estimation of his devoted services to the Society.

The Carlisle Meeting has been one of the most successful of the efforts of the Society to promote and extend to remote districts the practical value arising from the trial of Implements and the exhibition of Live-Stock. The lateness of the season preventing efficient trials of the Reaping Machines at Carlisle, they were postponed until the end of August, when they took place at Abbot's Leigh, in Somersetshire, on a farm of Mr. Miles, M.P., the President of the Society, who placed for that purpose the whole of his crops, horses, and men, at the service of the Society; and most hospitably received at Leigh Court, the official company who attended the trials on the part of the Society.

The Council have already agreed to the Live-Stock Prize-Sheet for the Country Meeting to be held next year at Chelmsford; including, along with the usual prizes, additional classes for Foreign Cattle and Sheep, and a distinct division for Dray Horses; the arrangement of the Prizes for Farm Poultry and for Agricultural Implements and Machinery being postponed until February.

Mr. Miles, M.P., having in June last, as the President of the Society at that time, headed a Deputation of the Society to the French Agricultural Meeting at Paris, agreeably with an express invitation of the Imperial Government, has reported to the Council the successful results of that mission in every point of view.

The Earl of Clarendon has continued to transmit to the Society the successive returns furnished by the consuls residing in various tropical districts where guano, nitrates, and other manuring deposits are thought likely to be discovered. The Council have again expressed to Lord Clarendon their deep sense of his lordship's kindness in thus continuing to promote the objects of the society; and they have requested Prof. Way to prepare for publication in the Journal a digested arrangement of the returns already received by the Society from the Foreign Office in reference to that subject.

A claim having at length been made in form for the Society's £1000 Prize for a substitute for Guano, the Special Committee on that subject have taken it into their careful consideration; and, on their report, the Council have resolved that the substitute proposed is not entitled to the Prize.

Since the last General Meeting, Prof. Simonds has delivered a lecture on the Physiology of Milk-Secretion,

and Prof. Way a lecture on the Value of Fish as Manure. Prof. Way is also actively engaged, as the Consulting Chemist of the Society, in prosecuting important researches under the direction of the Chemical Committee.

The Council have every reason, in conclusion, to congratulate the members on the position of usefulness which the Society continues to maintain, and on the success with which its operations for promoting improvement in every branch of husbandry continue to be attended. They feel the responsibility which so great a power as the Society now possesses places in their hands, and entertain an anxious desire accordingly to render its operations sound and practical, at the same time that they are progressive. They confidently expect that the union of practice with science, will result in the discovery of principles, and their just application, without which Agriculture can never attain to the rank of a rational pursuit, but will remain a mere art, limited by routine, and capable only of slow and doubtful extension.

By order of the Council,  
 JAMES HUDSON,  
 Secretary.

Mr. R. BARKER said, having assisted in the preparation of the report which had just been read, he would move that it be received and adopted.

Mr. W. F. HOBBS, in seconding the motion, said he hoped that if any member of the society present desired to express any opinion with regard to the contents of the report, he would not hesitate to do so. He assured the meeting that the Council were most anxious to carry out the wishes of the members, so far as they could do so consistently with the principles of the Society.

The motion was then agreed to.

Mr. R. BARKER, as Chairman of the Finance Committee, presented the following balance-sheet:

HALF-YEARLY ACCOUNT, ENDING 30TH JUNE, 1855.

RECEIPTS.		£	s.	d.
Balance, Jan. 1, 1855.....		1184	4	7
Balance, Sec. Do.....		3	16	3
Dividends on Stock.....		130	17	3
Governors' Life-Compositions .....		50	0	0
Governors' Annual Subscriptions .....		441	5	0
Members' Life-Compositions .....		310	0	0
Members' Annual Subscriptions .....		1886	4	0
Receipts on account of Journal.....		173	19	3
Receipts (in London) on account of Country Meetings, during the half-year:				
On Account of Carlisle .....		1400	0	0
		<hr/>		
		£5580	6	4
PAYMENTS.		£	s.	d.
Permanent Charges .....		166	5	0
Taxes and Rates .....		14	18	0
Establishment .....		862	5	7
Postage and Carriage .....		25	1	1
Advertisements .....		9	13	3
Payments on account of Journal .....		623	16	10
Prizes for Essays and Reports .....		160	0	0
Veterinary Grant: half-a-year .....		100	0	0
Veterinary Investigations .....		91	7	0
Chemical Grant: half-a-year .....		150	0	0
Chemical Investigations .....		100	0	0
Payments (in London) on account of Country Meetings during the half-year:				
On account of Lincoln .....		30	0	0
On account of Carlisle .....		540	2	4
Sundry Items of Petty Cash .....		8	0	11
Secretary's Expenses on Paris Deputation ....		14	6	0
Balance, Bankers, 30th June, 1855 .....		2668	12	0
Balance, Sec. ....		15	18	4
		<hr/>		
		£5580	6	4

Mr. BARKER went on to observe, that notwithstanding the large amount of the receipts at Carlisle, they did not equal the expenditure, but left a deficiency of £870.

Mr. ASTBURY proposed a vote of thanks to the Auditors, observing that they were entitled to such an acknowledgment.

Mr. R. W. BAKER seconded the motion.

The CHAIRMAN, before putting the motion, observed that in these days, when in some public establishments regularity in regard to accounts was not quite so much the order of the day as it was there, it was exceedingly gratifying that the Society had for its auditors gentlemen in whom it could safely place confidence, and who were so well entitled to thanks for the manner in which they performed their duties.

The motion having been passed, Mr. Dyer returned thanks for himself and his brother auditors.

Mr. DRUCE, jun., moved that the auditors be re-appointed.

Mr. GIRDWOOD, in seconding the motion, said he agreed with the Chairman that it was exceedingly gratifying that the accounts were audited by gentlemen of such business-like qualities, especially as some large public concerns had exhibited deficiencies in that respect.

The motion having been agreed to, Mr. Dyes briefly returned thanks.

Mr. DRUCE, sen., moved that the thanks of the meeting be presented to Professors Simonds and Way for their excellent lectures, and for the valuable information communicated by them to the members.

The motion was seconded by Mr. M. Paine.

Mr. GIRDWOOD said he thought justice would hardly have been done to the Professors if some allusion were not made to the nature of their services. He really felt that they were all exceedingly indebted to them (Hear, hear). He was sure that all those gentlemen who had come in contact with them, or had consulted them on any point connected with their duties to the Society, had met with the greatest frankness and kindness (Hear, hear). No question scarcely could be put to them to which they would not endeavour to give an answer, and any answer which they did give was almost sure to be of practical value (Hear, hear). Their lectures to the members had been attended, he believed, with the greatest benefit to the agricultural world. Professor Way had explained many agricultural laws in a clear and satisfactory manner. Professor Simonds had investigated various diseases of cattle, which had appeared almost inexplicable till he brought the light of science to bear upon them—revealing to agriculturists the causes of disorders which had attacked their flocks and herds, and enabling them to provide remedies. He felt great pleasure in supporting a resolution acknowledging such invaluable services.

The CHAIRMAN said Mr. Girdwood had, in supporting the resolution, done no more, he believed, than express the universal feeling of the members of the Society with regard to the two professors. Professor Way had not only thrown light on the connection of chemistry with farming, but had also assisted the farmer, by throwing every obstacle in the way of imposition upon him as regarded the quality of artificial manures; and if he had done nothing else since he was chosen to fill the office of chemical professor, that alone would be quite sufficient to entitle him to the cordial thanks of the members.

The resolution having been adopted,

Professor WAY returned thanks for himself and his colleague, who was stated to be unavoidably absent. He said he appreciated very highly the manner in which his own services and those of his colleague had been acknowledged. He believed he might say for Professor

Simonds, as he certainly could for himself, that it was his wish to throw himself entirely into the interests of the Society. For his own part, he had but one interest, which was that of the Society. His whole life was mixed up with the Society; and he had very little connection with any other calling than that of an agricultural chemist. He believed the members of that Society generally would recognize the difficulties which surrounded science in its advance. There could be no doubt that they were making progress in chemical science at that moment; but instead of being of a dazzling kind, they were solid and substantial. The researches of chemistry were so gradual, that their progress was scarcely perceptible. They sometimes saw improved methods of farming in which chemical laws were brought into play; these improvements were adopted as a matter of course, and wonder was sometimes expressed that they had not been adopted before; and it appeared to be often forgotten that it was to science that this progress was attributable.

Mr. SLANEY said he must congratulate the meeting on the progress which the Society was making in every part of the country. He would not dilate upon the advantage which it had conferred; but he was desirous of inviting the attention of this meeting to two matters which might hereafter become questions for the consideration of the Council. They were all now agreed that drainage was the foundation, as it were, of all other agricultural progress, and of late years great facilities for its prosecution had been afforded by means of Government loans. He himself had taken advantage of these loans, and so also had many gentlemen around him: the loans were advanced at  $6\frac{1}{2}$  per cent. for the term of 21 years. It had been objected that the Government ought to advance larger sums for this purpose. He thought the difficulty might be met by private parties advancing money to landowners upon the same terms that were demanded by the Government; and it would be an advantageous arrangement if, instead of repaying the capital by instalments, they paid interest at 4 per cent., and laid by the surplus at  $2\frac{1}{2}$  per cent. as a sinking fund to meet the amount of loan at the end of the term.

The CHAIRMAN said there was nothing to hinder such an arrangement as that to which Mr. Slaney alluded being entered into now. It would be a mere private transaction between individuals, and he did not see how it could be facilitated by that Society (Hear, hear).

Mr. SLANEY was contented with having had the opportunity of mentioning the subject. The other point to which he desired to advert was of a local character. He wished to express his regret that the Smithfield Show, so attractive in itself, should have been held this year in the same week as the Birmingham Show. He thought the Council of the Society might step in and propose some conciliatory course, by which such a coincidence might be avoided in future.

Mr. W. F. HOBBS said: With regard to Mr. Slaney's remarks on the subject of drainage, he wished to observe that the Government had already conceded to private companies the power of investing money in drainage, buildings, and the formation of roads and bridges. There were at that moment at least three great companies at work, which had effected a vast deal of good throughout the country; and it was not reasonable to suppose that the Government would now deprive them of their powers. If Mr. Slaney, or any other landed proprietor, went to one of these companies, he was confident that they would invest their money with great advantage, and that the work would be executed to their own satisfaction. With regard to the Smithfield and Birmingham shows, the question to which Mr. Slaney

referred was not one of which this society could take cognisance—(Hear, hear)—but he understood that it had been stated in one of the Birmingham papers of this week that arrangements were to be made to prevent the collision of the two shows another year (Hear, hear).

A vote of thanks having been given to Col. Challoner for presiding over the meeting,

The CHAIRMAN, in acknowledging the compliment, said he was happy to be able to congratulate the meeting on the fact that the Royal Agricultural Society had never been in a more flourishing state than it was at that moment. The Council had lately removed from the list of members many of those gentlemen who failed to contribute to the funds; but where they had been obliged to remove two from the list, they had generally got three paying members in their place (Hear, hear). Although their numbers were not now quite up to what they were at one time on paper, there had been no period in the history of the Society when there

were so many regularly-paying members; so many members who read the Journal, attended the annual meetings, and evinced a disposition to partake of the advantages which the Society had to offer to them (cheers). With foreign countries the Society had constant communication; and he could assure the meeting that it was held in very high esteem and repute abroad (cheers). In proof of this last assertion he might mention that the Emperor of the French, being desirous of having a cattle show at Paris, at once addressed the Royal Agricultural Society of England upon the subject; and, as was stated in the report they had heard read, the deputation who attended the show were received with every possible attention and courtesy in the French metropolis. It spoke well for a society like theirs that it was received in such a manner in France (Hear, hear).

The meeting then separated.

## THE BIRMINGHAM CATTLE SHOW.

On previous occasions the *Mark Lane Express* has had to impress the advantages accruing to the conductors of the Birmingham Show from the possession of an "open" week for their operations. This year, however, they do not enjoy that good fortune. Their annual meeting, and that of the Smithfield Club, are moveable feasts of the agricultural calendar, the holding of which is governed by the fixtures of the Christmas meat-markets, and the two events are now coincident. Whether this circumstance will really prove injurious to the interests of either or both of these institutions there are just now probably no means of accurately determining. If the affirmative of the question should be clearly established, it will not be very difficult to provide a remedy for the evil. The Midland Society have repeatedly, and we believe with perfect candour, declared that they are actuated by no other feeling towards their metropolitan fellow-workers for the public good than one of friendly rivalry; and should it prove to be the fact, as we understand is not unlikely, that buyers of stock would find their convenience promoted by having an earlier opportunity of making their purchases at Birmingham than at present, we have no doubt that, acting in that judicious spirit which has regulated their proceedings hitherto, they will precede the London gathering, and so prevent any future collision of the kind to which we are now referring. There is ample room for the healthful action of both institutions; and, as we have endeavoured to show, they together enlarge the field of observation, to the cultivation of which it is desirable that those for whose instruction they are designed, should assiduously apply themselves.

Descending from generalities, we find that, although the entries of cattle at Birmingham are below the average, the standard of excellence attained as to quality is allowed on all hands to be of a very elevated order; a change which we certainly regard in anything but an unfavourable light, inasmuch as it points in the direction of improvement, and will tend to stimulate the efforts of future contributors; while it is of itself an evidence that some who might be expected to enter the lists, but have failed in their preparations, have that just appreciation of the essentials to success which prevents them from proclaiming their shortcomings. If, therefore, the axiom that "the knowledge of a disease is half its cure" is true, a consciousness of deficiency, should it have deterred some parties from exhibiting who would otherwise have done so, will,

we may hope, exercise a salutary influence on those who have been the subjects of it. The falling-off, however, is more apparent than real; for the absentees from disease—which extensively prevailed twelve months ago—or casualty are fewer than heretofore.

The Shorthorns, which have usually the numerical lead in Bingley Hall, did not appear in their accustomed force, the muster-roll containing only 18 against 43 in December last; but some other classes were in excess of that period. Whether this thinning of their ranks, coupled with that in Baker-street, is to be accepted as an indication of a waning popularity on the part of the breed, or as only the result of temporary causes, we do not pause to inquire. Within the narrowed limits we have specified, some first-rate specimens were to be found. That of Colonel Pennant, for instance, which received a first prize, was a very symmetrical animal, in colour a rich red, with all the credentials of distinguished blood, and was no despicable antagonist for the gold medal for the best ox or steer in the yard, which, as will be seen hereafter, went in another direction. The cows formed an extraordinarily good class, the chief prize in which fell, and very deservedly so, to the lot of Lord Hill, for a roan beast, well up in all her points, and having such a back and flank as are seldom met with at her age, which verged upon six years. We were not surprised to learn that it was only after long deliberation that the judges awarded the other gold medal to Mr. Price. Her second in the race was an exceedingly good cow, whose principal defect was extreme gaudiness in the rump. Among the heifers, that of Lord Howe was conspicuous for its good form and fineness of touch, qualities that gained for it the distinction which it enjoyed against large competitors.

The strength of this department of the hall undoubtedly lay with the Herefords, which received the highest distinctions which the judges had to confer. Mr. Heath's ox far outstripped the best of his competitors; and though his victory in the contest for the gold medal was not so easy, the coveted distinction was unmistakably his due. He was a most remarkable animal, of great weight for his age (under four years), perfect in his build, even in growth, and, as far as condition is concerned, leaving nothing whatever to be desired. Lord Hatherton was a second prize-taker in the same class, with a much smaller but very handsome steer,

displaying the clean white and beautiful eye and mellow-looking hide, which are constant and attractive features of his lordship's herd. The few steers in Class 2 were praiseworthy; that of Mr. Naylor noteworthy as an example of that early maturity which is now regarded as the grand desideratum to be constantly sought for, and which it is one of the principal objects of the Birmingham Society to encourage. He was especially good in his back and fore-flank, and carried a large amount of roasting beef. The cows also did their full share in maintaining the credit of the breed, and a better specimen than the one which carried off the first prize has been seldom, if ever, seen. With the exception of the rump being a trifle too low, and the tail not very well set on, she was a model upon which it would scarcely be possible to improve. The statement contained in the catalogue that she bred so lately as the month of January, and was not supplied with any artificial food until June, coupled with her unexceptionable condition, sufficiently attest her feeding properties. Only three heifers were shown, but to one of the occupants of this class the gold medal for the best beast of her sex in the exhibition was accorded, after a close struggle with Lord Hill's shorthorn. Her admirably proportioned contour, excellence of touch, and the possession of the best characteristics of her race, were the theme of general remark as being worthy of the eminent position as a breeder of Hereford cattle which Mr. Price has achieved.

The Devons are never very abundant, nor were they so here. They were, however, represented in a creditable manner. There were only two claimants for the premiums offered for oxen and steers, namely, his Royal Highness Prince Albert and Mr. Heath; but the pretensions they advanced were of a valid kind, and they were very properly allowed, the Prince having the precedence. He was less fortunate in his endeavours to gain the first place in the competition with the steers, and, in the opinion of many, deserved a better fate. Adopting the criterion of the butcher as the one which should be followed in arriving at decisions of this kind, Mr. Halse's ox should have stood second; but the judges, we believe, gave it the preference on account of its derivation from a pure North Devon stock, though it was the smaller of the two, and had to be debited with nearly six months in respect of age. The other was of the kind known as the "Somersetshire," larger and coarser in style, and lacking, perhaps, a little that air of high breeding and elegance of form which the true Devon possesses. The Prince's cow, in the next section, fared better than, in the opinion of many persons, she deserved, in receiving the second prize, which would have been better bestowed on that of Mr. Heath, which, considering her age and the number of calves she had produced, together with her excellent form and condition, was an animal of uncommon merit. Lord Leicester could claim only a commendation.

The old, and, as we are inclined to think, unjustly despised Long-horns, though apparently dying out, are not yet extinct in the midland districts, to which they are supposed to have been indigenous before deep drainage and artificial feeding had been thought of, and where an animal was required which could brave cold and wet, and thrive on short commons. This the picturesque and native breed were capable of; but they have had to give place to more rapid and kindly feeders, and are now accordingly following the dodos, and other creatures of the past. Some of the surviving specimens were exhibited at Birmingham last week, and the best did their constant friend, Mr. Burbery, of Wroxall, great credit. Those who advocate crossing as a means of greatly increasing the supply of animal food, for which there is so constant a demand in this country, would have found in Bingley Hall some weighty arguments in their fa-

our—Mr. William Wilson sending an ox, the offspring of a Devon and a Short-horn, which united the quality of the former with the bulk of the latter; Mr. Hawkes, of Hunscombe, one scarcely less praiseworthy, bred between a Long-horn and a Short-horn; and Mr. Cox, of Spondon, a cow, having much the appearance of a Short-horn in outline and character, and of most imposing dimensions. There were also some other crosses, which have not been unfrequent of late years, between the Brahmin and our own native races, one of two such hybrid heifers sent by Lord Derby being commended. It was considered by the judges to be a very useful butcher's beast. Two other contributions of a similar sort were forwarded from Wales, a number of these having been received from the Principality in former years. In the same division of the show were found two seemingly as good Short-horns as any in the hall, which, though under the necessity of consorting with their miscellaneous associates, from the inability of their owners, we suppose, to vouch their parentage. The class for Scotch and Welsh oxen or steers was the largest of the whole, and very efficiently was it filled. The first prize was given to a very good Galloway Scot, the property of Mr. Heath, and the second to a West Highlander, belonging to Mr. Campbell, of Monzie Castle. Colonel Penant showed one of the largest and finest Welsh oxen we have yet seen, and which was stated to have been sold for as much as £60 before leaving home. He, however, had no alternative but to succumb to both of his Northern neighbours. And here we may remark that the propriety of separating the Welsh from the Scotch beasts as the only means by which justice can be done to each has been mooted; some of those who have discussed the subject going the length even of saying that two breeds so dissimilar in size and weight, and in the ages at which they arrive at maturity, as the Galloway and West Highland, should not be classed together, as they obviously cannot compete on equal terms, and that so one or other will receive the palm, just as the personal predilections of the judges may dictate.

The entries of sheep exceeded those of last year, and their aggregate quality was decidedly superior. The Leicesters, as may be gathered from the commendations inserted in the prize-list, participated in this improvement, but not to an extent sufficient to retrieve their declining popularity, an universal deficiency in the necks betokening the loss of constitutional vigour. From their symmetry and great weight, those of Mr. George Turner were the most deserving of attention. The display of Cotswolds was small. Some very good Southdowns were exhibited by Lord Walsingham, who received all the prizes. They were uniform in character, and carried a large amount of excellent mutton. The Shropshires, as might be expected in this neighbourhood, were present in great force; those of the Earl of Aylesford, in Class 28, having a due proportion of muscle to recommend them.

There was an augmentation, likewise, of the pigs; the leading feature of which was the class for animals of a small breed, of which some highly useful examples were shown. The first prizes in both the divisions appropriated to breeding pigs were given to the Berkshire sort.

The Council of the Birmingham Society have made an excellent addition to their exhibition in the shape of a systematically arranged department for roots adapted to feeding purposes; and the result of this year's display—the first of its kind—with the information given in the catalogue as to the manner in which the various articles brought together were grown, cannot fail to prove exceedingly beneficial.

We have left ourselves but little space to speak of what is usually a very attractive portion of these Bir-

mingham exhibitions, more especially with the ladies—the poultry—of which this year no fewer than eighteen hundred and eight pens were entered. One of its salient points was an unequalled array of game birds. The Polish, also, were plentiful and excellent, the cultivators of them having been put upon their mettle by the offer on the part of Mr. Ottley, the medallist to the exhibition, of a gold medal of the value of ten guineas, in addition to the ordinary premiums given by the Council of the institution, for the best pen of that description of fowls in the hall. The Spanish were of first-rate merit, as were the Dorkings; and the Hamburgs are improving. The Cochins, in the language of the market reports, are “looking up;” but the Malays are still neglected; and the Bramah-pootras appeared to be declining in public estimation. The Sebright bantams were admirable; the geese and turkeys very good; there being among the former some interesting examples of the “Swan” and “Canadian” geese, and among the latter of the pure wild American kind. The ducks, both Aylesbury and Rouen, were capital; and the pigeons most meritorious. We should add, that the principal trophies for competition were nine silver cups supplied by Messrs. Mapplebeck and Lowe. The value of each piece of plate is ten guineas. They are very beautiful in design and workmanship; and as a proof that the estimate of their intrinsic value is not exaggerated, we may state that the weight of each is twenty ounces.

#### JUDGES.

OF CATTLE.—Mr. William Bartholomew, Goltho, near Wragby, Lincolnshire; Mr. Henry Chamberlain, Desford, near Leicester; and Mr. Benjamin Swaffield, Pilsbury, near Ashbourne.

OF SHEEP AND PIGS.—Mr. Valentine Barford, Foscoate, near Towcester; Mr. John Moon, Hurstbourne Priors, near Whitchurch, Hants; and Mr. Edward Gough, Gravel Hill, near Shrewsbury.

OF ROOTS.—Mr. J. Mathews, Edgbaston House, Birmingham.

REFEREES FOR THE AGES OF PIGS.—Professor Simonds, Royal Veterinary College, London; and Mr. William Hollingsworth, Bilston.

VETERINARY INSPECTOR AND GENERAL REFEREE.—Mr. R. L. Hunt, New-street, Birmingham.

#### PRIZE LIST.

##### HEREFORDS.

CLASS 1.—OXEN OR STEERS.—1st prize £10, extra prize £20, and gold medal, as best Ox or Steer of any breed or age in the exhibition, and silver medal to breeder, Mr. William Heath, Ludham Hall, Norwich; breeder, Mr. Thomas Roberts, Ivington Bury, Leominster, Herefordshire. 2nd, £5, Lord Hatherton, Teddesley, Staffordshire.

CLASS 2.—STEERS.—1st prize £10, and silver medal to breeder, Mr. John Naylor, Leighton Hall, Welshpool, Montgomeryshire; breeder, Mr. Walter Maybery, Brecon. 2nd, £5, Mr. Edward Longmore, Adforton, near Ludlow. Commended, Mr. John Carwardine, Stockton Bury, Leominster, Herefordshire.

CLASS 3.—COWS.—1st prize £10, and silver medal as breeder, Mr. Samuel Walker Urwick, Leinthall Starks, Ludlow; has had 4 calves. 2nd £5, Mr. Joseph Smith, Shelsley Walsh, Worcestershire; had 1 calf. Highly commended, Mr. Richard Thomas, Ryton, near Dorrington; had 3 calves. Commended, Mr. Edward Farmer, Stanton Lacy, Ludlow; had 2 calves.

CLASS 4.—HEIFERS.—1st prize, £10, extra prize, £20, and gold medal, as best Cow or Heifer of any breed or age in the exhibition, and silver medal as breeder, Mr. Edward Price, Court House, Pembridge, Herefordshire. 2nd, £5, Mr. George Pitt, Chadnor Court, Dilwyp, near Leominster.

##### SHORTHORNS.

CLASS 5.—OXEN OR STEERS.—1st prize, £10, and silver medal as breeder, Colonel the Hon. E. G. D. Pennant, Penrhy

Castle, Carnarvonshire. 2nd, £5, His Royal Highness Prince Albert, Windsor Castle.

CLASS 6.—STEERS.—1st prize, £10, and silver medal to breeder, Mr. John Thomas Robinson, Leckby Palace, Thirsk; breeder, Mr. Quinton Clark, Bilton, Wetherby. 2nd, £5, Lord Leigh, Stoneleigh Abbey, Warwickshire.

CLASS 7.—COWS.—1st prize, £10, and silver medal to breeder, Viscount Hill, Hawkstone, Shropshire; breeder, the late Hon. Captain Pelham, Appuldurcombe, Isle of Wight—had one calf. 2nd, £5, Mr. Edmund Herbert, Powick, Worcestershire—had 3 calves. Commended, Mr. Henry Ambler, Watkinson Hall, Halifax, Yorkshire—had one calf.

CLASS 8.—HEIFERS.—1st prize, £10, and silver medal to breeder, Earl Howe, Gopsall Hall, Atherstone; breeder, Mr. Richard Roberts Jee, Hartshill, Atherstone. 2nd, £5, Viscount Hill. Highly commended, Mr. Benjamin Wilson, Brawith, Thirsk.

##### DEVONS.

CLASS 9.—OXEN OR STEERS.—First prize, £10, and silver medal to breeder, his Royal Highness Prince Albert; breeder, Mr. Richard Corner, Torweston, Williton, Taunton, Somersetshire. 2nd, £5, Mr. William Heath.

CLASS 10.—STEERS.—First prize, £10, and silver medal as breeder, Mr. John C. Halse, Molland, South Molton, Devon. 2nd, £5, his Royal Highness Prince Albert.

CLASS 11.—COWS.—First prize, £10, and silver medal as breeder, Mr. Abraham Umbers, Weston Hall, Warwick—has had one calf. 2nd, £5, his Royal Highness Prince Albert—has had 4 calves. Highly commended, the Earl of Leicester, Holkham Hall, Norfolk—has had 4 calves. Commended, Mr. William Heath—has had 5 calves.

CLASS 12.—HEIFERS.—First prize, £10, and silver medal to breeder, his Royal Highness Prince Albert; breeder, Mr. Thomas Miller, Castle Farm, Sherborne.

##### LONG-HORNS.

CLASS 13.—COWS OR HEIFERS.—First prize, £10, and silver medal as breeder, Mr. Samuel Burbury, Wroxhall, Warwickshire—has had 3 calves. 2nd, £5, Mr. Phineas Fowke Hussey, Wyrley Grove, Walsall, Staffordshire—has had 3 calves.

##### OTHER PURE BREEDS AND CROSS-BRED ANIMALS.

CLASS 14.—FAT OXEN OR STEERS.—1st prize £10, and silver medal as breeder, Mr. William Wilson, Whitacre House, Coleshill, Warwickshire (cross between Devon and Short-horn). 2nd, £5, Mr. Richard Hawkes, Hunscoate, Charlecote, Warwickshire (cross).

CLASS 15.—FAT COWS.—1st prize £10, and silver medal to breeder, Mr. William Thomas Cox, Spondon, Derbyshire; breeder, Mr. John Johnson Meakin, Spondon, Derbyshire (had two calves, cross). 2nd, £5, Mr. Richard Timms, Branston, Northampton (had one calf, Lincoln).

CLASS 16.—FAT HEIFERS.—1st prize £10, and silver medal as breeders, the Moira Colliery Company, Moira, Ashby-de-la-Zouch (cross). 2nd, £5, His Grace the Duke of Beaufort, Badminton, Gloucestershire (cross between West Highland Scotch and Gloucester). Commended, Earl of Derby, Knowsley (Brahmin and Short-horn).

##### SCOTCH OR WELSH BREEDS.

CLASS 17.—OXEN OR STEERS.—1st prize £10, Mr. William Heath (Galloway). 2nd, £5, Mr. Alexander Campbell, Modzie Castle, Perthshire, N.B. (West Highland). Highly commended, Mr. Ralph Sneyd, Keele Hall, Staffordshire (West Highland). The whole class commended.

CLASS 18.—HEIFERS.—No prize awarded.

##### EXTRA CLASSES.

For animals not qualified to compete in any of the preceding.

CLASS 19.—OXEN OR STEERS.—Prize, silver medal, Mr. John Chater, Great Bowden, near Market Harborough (Short-horn).

CLASS 20.—COWS OR HEIFERS.—Prize, silver medal, and silver medal as breeder, Mr. William Fletcher, Radmawthwaite, near Mansfield, Nottinghamshire (Short-horn). Highly commended, Mr. Edward Bird Guest, Ivy House, Broadwas, Worcestershire (Short-horn). Commended, Mr. William Heath (Short-horn).

## SHEEP.

CLASS 21.—LEICESTERS.—Pen of 3 Fat Wethers, not exceeding 21 months old. 1st prize £10, and silver medal as breeder, Mr. G. S. Foljambe, Osberton-hall, Worksop. 2nd, £5, Mr. Robert Lee Bradshaw, Burley-on-the-Hill, Oakham, Rutlandshire. Highly commended, Mr. Lawrence Willmore, The Newarke, Leicester. Commended, Mr. Charles Marriott Caldecott, Holbrook-grange, Rugby; and Mr. Robert Lee Bradshaw, Burley-on-the-Hill, Oakham.

CLASS 22.—LEICESTERS.—Pen of 3 Fat Wethers, exceeding 22 but not exceeding 34 months old. 1st prize £10, silver medal for the best pen of long-woolled sheep, and silver medal as breeder, Mr. George Turner, Barton, Exeter. 2nd, £5, the Marquis of Exeter, Burghley-house, Stamford. Commended, the Marquis of Exeter.

CLASS 23.—LONG-WOOLLED SHEEP, NOT BEING LEICESTERS.—Pen of 3 Fat Wethers, not exceeding 22 months old. 1st prize £10, and silver medal as breeder, Mr. William Slatter, Stratton, Cirencester (Cotswold). 2nd, £5, Mrs. Sarah West, Green-hill-farm, Bletchington, Oxfordshire.

CLASS 24.—LONG-WOOLLED SHEEP, NOT BEING LEICESTERS.—Pen of 3 Fat Wethers, exceeding 22 but not exceeding 34 months old. 1st prize £10, and silver medal as breeder, Mr. Robert Breman, Moreton-in-the-Marsh (Cotswold).

CLASS 25.—SOUTH AND OTHER DOWN SHEEP.—Pen of 3 Fat Wethers, not exceeding 22 months old. 1st prize £10, silver medal for the best pen of short-woolled sheep, and silver medal as breeder, Lord Walsingham, Merton-hall, Thetford, Norfolk (Southdown). 2nd, £5, Lord Walsingham (Southdown). Commended, Mr. John Tucker, Abbey Print-works, Stratford, Essex (Sussex Southdown).

CLASS 26.—SOUTH AND OTHER DOWN SHEEP.—Pen of three fat Wethers, exceeding twenty-two but not exceeding thirty-four months old.—First prize, £10, and silver medal as breeder, and second, £5, Lord Walsingham, Merton Hall, Thetford, Norfolk. (South Down.) Commended: Sir Robert George Throckmorton, Bart., Buckland, Berkshire.

CLASS 27.—SHROPSHIRE AND OTHER BLACK OR GREY FACED SHORT-WOOLLED SHEEP.—Pen of three fat Wethers, not exceeding twenty-two months old.—First prize, £10, and silver medal as breeder, Mr. J. B. Green, Marlow, Herefordshire. Second, £5, Mr. Henry Smith, jun., Sutton Maddock, Shiffnal. (Shropshire.) Commended: Mr. Henry Smith, jun., Sutton Maddock, Shiffnal (Shropshire), and Mr. W. Foster, Kinver Hill Farm, Stourbridge, Worcestershire. (Shropshire.)

CLASS 28.—SHROPSHIRE AND OTHER BLACK OR GREY FACED SHORT-WOOLLED SHEEP.—Pen of three fat Wethers, exceeding twenty-two but not exceeding thirty-four months old.—First prize, £10, and silver medal as breeder, the Earl of Aylesford, Pakingham, Warwickshire. (Shropshire.) Second, £5, Mr. William Masfen, Norton Caines, Walsal. (Improved grey-faced.) Highly commended: Mr. William Foster, Kinver Hill Farm (Shropshire.) Commended: The Earl of Aylesford (Shropshire.)

CLASS 29.—CROSS-BRED SHEEP.—Pen of three fat Wethers, not exceeding twenty-two months old.—First prize, £10 and silver medal, and silver medal as breeder, Mr. Adam Corrie Keep, Wollaston, Northamptonshire. (South Down and Cotswold.) Second, £5, Mr. Adam Corrie Keep. (South Down and Cotswold.) Highly commended: The Earl of Leicester (Down and Leicester.) Commended: Mr. William Gillett, Southleigh, Oxfordshire. (For two entries.)

## PIGS.

CLASS 31.—FAT PIGS.—Pen of three Fat Pigs, of one litter, not exceeding ten months old.—1st prize £10, and silver medal as breeder, Mr. Clement Cottrell Dormer, Rousham, Oxfordshire; 2nd £5, Mr. James Wyley, jun., Longdon Rugeley. Disqualified, Mr. Joshua Hopkins, 39, Dale End, Birmingham (for two entries).

CLASS 32.—FAT PIGS.—Pen of three Fat Pigs of one litter, not exceeding fifteen months old.—1st prize £10, and silver medal as breeder, Mr. George Turner, Barton; 2nd £5, the Duke of Sutherland, Trentham, Staffordshire. Commended, Mr. Thomas Alkin, Grendon, near Atherstone. Disqualified, the Duke of Sutherland; Mr. Edward Lowe, Cumberford Mill, Tamworth; Mr. Richard Benyon, Englefield House, near Reading, Berkshire; Mr. Thomas Studholme Wilkins,

Peddemoor Hall, Sutton Coldfield; and Mr. Edward Mills, Shenstone, near Lichfield.

CLASS 33.—FAT PIGS.—Fat Pig, exceeding fifteen months old.—1st prize £6, and silver medal to breeder, Richard Benyon; 2nd £3, Mr. Charles Holland, The Lymes Farm, Seabridge, Newcastle, Staffordshire. Commended, Mr. James Baldwin, King's Norton, Worcestershire; and Mr. James Clews, Aston Road, Birmingham. Disqualified, Mr. Thomas Studholme Wilkins, Peddemoor Hall, Sutton Coldfield.

## BREEDING PIGS.

CLASS 34.—PIGS OF A LARGE BREED.—Pen of five Pigs of one litter, exceeding three and not exceeding six months old.—1st prize £10, and silver medal as breeder, Mr. Joseph Smith, Henley-in-Arden (Berkshire). 2nd, £5, Mr. Edward Harrison, Old Crown, Great Charles-street, Birmingham. Commended, Mr. William Hewer, Sevenhampton, Highworth, Wiltshire; and Mr. Edward Harrison, Old Crown, Great Charles-street, Birmingham.

CLASS 35.—PIGS OF A SMALL BREED.—Pen of five Pigs of one litter, exceeding three and not exceeding six months old.—1st prize £10, and silver medal as breeder, the Rev. Morton Shaw, Rougham Rectory, near Bury St. Edmund's. 2nd, £5, Mr. Robert Harrison Watson, Bolton-park, Wigton, Cumberland. Highly commended, His Royal Highness Prince Albert; Mr. Samuel Wiley, Brandsby, near York, for two entries; Mr. William Bradley Wainman, Carhead, Cross-hills, Leeds; Mr. George Mangles, Givendale; and Mr. William Tyler, Friday-bridge, Birmingham. The whole class commended.

The following Certificate has been given, in reference to the pens of Pigs disqualified:

" Birmingham, Dec. 10, 1855.

" We hereby certify that we have examined all the pigs exhibited at the Birmingham Cattle Show, and find that the general state of the dentition of the animals in the pens 154, 158, 160, 165, 166, 167, 168, and 176, indicates that these pigs exceed the age as set forth in the certificates of entry, and consequently they are disqualified from competing in their respective classes.

(Signed) " JAMES B. SIMONDS,  
" ROBERT L. HUNT,  
" WILLIAM HOLLINGSWORTH."

## ROOTS.

Best Collection of four different varieties of Roots most suitable for feeding purposes, six Roots of each kind to be shown.—A silver cup, value £5 5s., to Mr. A. H. Johnson, Manor House, Gunnersbury, Acton, Middlesex (long red, red globe, and yellow mangold wurzel, and swedes).

There were many other prizes for Roots, as well as a more than usually good list for the different classes of Poultry.

## THE ANNUAL DINNER

took place on Tuesday evening, at Dec's Royal Hotel. There were about eighty noblemen and gentlemen present, including the Earl of Dartmouth (in the chair), supported by Messrs. Newdegate, M.P., Spooner, M.P., Muntz, M.P., Scholefield, M.P., Holland, M.P., the Mayor of Birmingham, B. D. Webster, W. Mathews, Bright, George Turner (Barton), Howard Luckock, W. James, J. Stubbs, V. Barford, J. B. Hebbert, W. Mathews, jun., Bailey (London), Andrews, Adkins, W. Fowler, Gough, Bartleet, Roh, Halse, Dain, J. Mathews, Alderman Lucy, Alderman Baldwin, &c.

Following the usual loyal toasts, which were well given from the chair,

Mr. MUNTZ proposed "The Agricultural Interest." He believed there never was a dissimilarity of interest that was not the result of a bad system of Government. Over and over again he had seen the commercial class prosperous while the agricultural was in a state of great depression, and *vice versa*; and he was satisfied that all this was an unnatural state of things—a state of things that never would have existed, as it never ought to exist, if to an honest government had been allied a practical knowledge of the subject. Four years ago he had the honour to propose the toast, and then he kicked up a great dust. At that time the agricultural interest was in a very depressed state, and he frankly told them that they would

ere long be much worse, though even then they were not realizing their rents and expenses. He added that the commercial men were exceedingly well satisfied with such a state of things, and had no objection to their remaining in this condition, provided they could always have a farmer for supper. Among others, he fell under the lash and abuse of his very particular friend the *Times*; and this led to a correspondence, which in the end that paper was very glad to run out of somewhat unceremoniously. But how stood the question? It was a fact that at the time to which he referred the commercial interest was benefitting in a great ratio at the expense of the farmers; and had it not been for circumstances quite out of the control of the English Government, one of the luckiest accidents that ever happened, the agricultural interest would have been eaten up. He believed that the same state of things which existed in 1851 would have existed in 1855, but for the extraordinary discoveries of Australian gold. He recollected that while he was speaking at the '51 dinner, some gentleman called out, "California," and he (Mr. Muntz) at once said that if California could produce sufficient gold to supply our deficiencies, the country would recover its balance. But no one then thought of Australia, though its gold did come twelve months afterwards, doing greater wonders than California was ever able to do. At the time of which he spoke, all kinds of produce were so low that they were hardly profitable; whereas now there is hardly a single article that is not increased in value, and the absurd idea that existed up to that time, as to low prices being beneficial, is destroyed. People said, "For God's sake, give us low prices; England can't exist without low prices!" But what has England done? Up to that time England starved under low prices; but since that time she has been revelling in high prices. Has England ever been so prosperous as during the last three years? Then this ought to dissolve the absurd idea that low prices are necessarily advantageous, and high prices the reverse. Low prices are not cheap prices; they may be very dear prices; and it is satisfactory to know that that absurd delusion has left us. Well, here were three consecutive years which had been beyond all doubt prosperous, with prices higher than had ever been known in England since it was a country. This showed that there must be something unsound—something that wanted looking into. He believed there was something shaky in the present state of things. He did not like the re-exportation of gold which was going on. This was the question that wanted settling; and unless it was settled by Whig, Tory, or some one who knew what he was about, they would ere long be in the same state as in 1851, unless it turned out that the supply of Australian gold was to continue for ever. Write as long as people might, they would find that the necessary prices which were to remunerate the different interests of this country would react upon one another; and unless they could support the system by something more definite than they had now, the time would again come when every manufacturer would have a farmer to supper (laughter).

Mr. HOLLAND, M.P., said he congratulated them on that day's proceedings, upon the excellent cattle exhibited; and this was especially remarkable when it was considered that Smithfield Show was doing its utmost to compete with them, and upon the same day. Not only had there been exhibited cattle and sheep of first-rate quality; but there had been a new feature introduced in the Exhibition, which was of great importance, viz., the roots upon which the cattle had been fed. The importance of roots should be well understood when they were considered in connection with artificial manure, upon which so much labour and money was expended, and which was to the British agriculturist what Californian and Australian gold was to the money market. The exhibition of that day showed that the British agriculturist was keeping pace with the rest of the world and with the improvements in manufacture; and he did hope that the two interests would, as Mr. Muntz had said, be always considered as twin sisters (cheers).

Mr. NEWDEGATE proposed "The Manufacturing Interest." He felt that the agriculturists owed much to the great manufacturing metropolis of the midland counties for the noble reception it had given them on that occasion; and as representing both manufacturers and agriculturists, he rejoiced in that practical illustration of the union between the two interests. How could anyone doubt that their interests were identical? What supports our trade now, but the

soundness of the home market? It showed that the strength of the country depended on this; that, if external circumstances are adverse, it has within itself a power of consumption which, if not adequate to keep in motion all the wheels of our industry, yet supported them when markets abroad might be failing, and was in itself a security for the prosperity of our manufactures. He congratulated them upon the metropolitan character which this annual meeting was assuming. Birmingham was every day giving some fresh proof of its title to be considered the capital of the midlands. As one who had been supported by manufacturers at a time when the opinions he held regarding agriculture and its prospects were unpopular, and most unreasonably so, he claimed from the agriculturists present an expression of their best wishes for the success of the manufacturing interests (cheers).

Mr. W. LUCY returned thanks. They knew that their best customers at home were the agriculturists. The days were gone by when it was said the manufacturers were living upon them, as when wheat was 30s. per quarter, or that the contrary would be said now that the price of wheat had risen to 80s. It was quite clear the one could not flourish without the other.

Mr. MATHEWS gave "The Health of the President," who, in responding, proposed that of "The Mayor," which brought a reply from Mr. Hodgson.

Mr. JOHN STUBBS proposed the "Agricultural Implement Makers." Answered by

Mr. LOWE, who had hoped that they would have had a Ransome or a Howard, or some other important manufacturer, to have acknowledged the compliment. It would be unfair to take all the credit of the improvements in their implements, for they were very largely indebted to the practical farmer for very many suggestions which had led to the improvements: and with respect to the plough, nearly all the improvements had been effected on account of these suggestions.

Mr. BARON D. WEBSTER proposed the health of those gentlemen who had been successful in obtaining prizes at that day's exhibition. In looking at it, they must be struck with the progress which Birmingham had achieved since there was eight years ago an exhibition of pigs and poultry in a yard in Worcester-street. They really were acquiring a universal reputation in the character of exhibitions.

Mr. HEATH responded.

At this period Lord Dartmouth left the meeting, having to depart by an early train, and the Mayor subsequently occupied the chair.

Mr. W. JAMES proposed "Mr. Baldwin, and the Unsuccessful Exhibitors."

Mr. BALDWIN replied.

Mr. C. M. CALDECOTE, in proposing "The Judges and Stewards of the Show," referred to the complaint that the show this year clashed with the one at Smithfield. Many exhibitors said it would be of advantage if it were so arranged that the Smithfield cattle might also be exhibited at Birmingham. But their object was to obtain the best show of local produce. He was instructed to say, however, that the committee and subscribers generally were anxious to take the subject into consideration at the meeting on Thursday, and to make any arrangement that might meet with the more general approbation of the exhibitors of stock. Their idea was to have the show a week previous to that at Smithfield, so that the animals coming from the north might show here on their way to Smithfield. If this view met the general wish of the exhibitors, he was sure the committee would wish to adopt it.

Mr. VALENTINE BARFORD responded. He was sorry to see that this year a practice was gaining ground not only in this but in other shows which he attended, of clipping the animals in the fall, and he knew he was speaking the sentiments of his colleagues. Why endeavour to deceive the rising generation by practising deception? He hoped and trusted that when he saw parties disposed to practise deception upon public institutions like that, he should never want the moral courage to expose it. He referred to the late speech of Prince Albert, and commented on the importance of science being brought to bear upon the feeding of cattle.

Mr. GOUGH and Mr. SWAFFIELD also returned thanks, concurring in the observations of Mr. Barford as to the deception practised in the improper shearing of sheep. The practice was also condemned by Mr. Holland, as having a tendency to produce immorality in the servants of those who acted. He recommended a practice adopted in Stow-on-the-Wold, which

required every exhibitor to produce a certificate as to the *bona fide* quality of the sheep from some one of his neighbours.

Mr. CALDECOTE proposed "The Royal Agricultural Society, the Smithfield Club, and the other Agricultural Societies in the United Kingdom;" and after some other toasts of a complimentary kind the meeting separated.

#### THE ANNUAL MEETING

Of the subscribers was held at Dee's Hotel on Thursday, at one o'clock. There was but a limited attendance. Amongst those present were the Earl of Dartmouth, Mr. C. M. Caldecott, Mr. B. D. Webster, Mr. Jeremiah Mathews, Mr. T. B. Wright, Mr. A. Umbers, Mr. Howard Luckcock, Mr. William James, Mr. Lowe, Mr. Allcock, Mr. William Mathews, jun., &c.

The noble Earl having taken the chair, as the last official act of his presidency, it was unanimously resolved, on the motion of Mr. Caldecott, seconded by Mr. James, that the Earl of Lichfield should be requested to accept the office of president for the year ensuing; and the thanks of the meeting were then most cordially passed to Lord Dartmouth for his services during the past year, on the motion of Mr. Luckcock, seconded by Mr. Lowe.—His Lordship, in acknowledging the compliment, said that he could have wished it had been in his power to support the society by showing better stock than he had done, but as at the dinner Mr. Mathews had been pleased to speak of him as a practical farmer, he hoped that in this character he would be able to support the show prospectively (Hear). Family circumstances had kept him from home so long that for three months he had not been within 200 miles of Birmingham; but he was glad to find that the business of the society had not suffered from his absence. He congratulated them upon having obtained for his successor in office a nobleman who was an excellent practical farmer, having farmed for a dozen years with considerable success (Hear). He felt that in this case they had the right man in the right place.

On the motion of Mr. J. Mathews, seconded by Mr. James, a resolution was passed requesting Mr. Shackell to continue to give his valuable services to the society as its treasurer.

Mr. CALDECOTT drew the attention of the meeting to what he considered to be a very important matter. At the dinner, some of the judges expressed an opinion that the way in which sheep sent to the exhibition were trimmed and clipped, ought to be prohibited; and that day he had mentioned the matter to Lord Aylesford, who thought that with the exception of the head, legs, and fetlocks, no trimming should take place. Would it be well to refer the question to the Council for their consideration?

Mr. J. MATHEWS thought it would be difficult to lay down a rule as to how far the clipping might go, or, in other words, where it was to stop.

Mr. WEBSTER said that no judge could be deceived by any such practice, as he examined with his hand as well as his eye. It was the public who were liable to be misled (Hear). Probably the notice thus publicly taken of the practice would be sufficient to prevent its recurrence. (Hear).

Mr. CALDECOTT mentioned a rather curious circumstance. A friend of his attended a ramshow at some known breeding farm in Oxfordshire—he believed it was that of Mr. Large—and happening to go into one of the barns, he saw a large wooden sheep standing in a corner. "What is this for?" he asked. "Oh," was the reply of one of the servants, "that is the pattern we clip our tups by." (Laughter).

Mr. WRIGHT said that both at this show and former shows the Judges had spoken to him regarding it, stating that they were not deceived in the slightest degree, as they could in an instant see where improper trimming had taken place. The only effect it had on them was that it rather prejudiced them against sheep which had been so treated. (Hear). If they did not pass a resolution recommending the adoption of the rule acted on at most store shows, namely, that shearing should not take place after a certain period, they might pass one condemning the practice, and leave the Council to take any further step which they might think proper.

Mr. UMBERS said it was certainly very desirable to put a stop to a practice so unfair as that alluded to. It was not shearing that was complained of, but a process of trimming

the body that was calculated to deceive the public to a great extent. The following resolution was ultimately passed:— "That this meeting unanimously concurs with the Judges in reprobating the practice of trimming the fleeces of sheep for the purpose of exhibition, as being calculated to deceive the public, though it cannot by any possibility mislead the Judges; and requests the Council to direct their attention to this subject with the view of effectually repressing the practice."

Mr. WRIGHT then said that his attention, as well as that of the promoters of the show generally, had been called to the subject of the clashing of interests which was thought to result from the Birmingham Exhibition being held in the same week as that of the Smithfield Club. The matter had been discussed to a considerable extent, and the general feeling of the agricultural interest seemed to be that it would be better if they were held at different periods (Hear). It was urged by the London folks that they were prevented coming to Birmingham, in consequence of there being a great deal to do in London that week. Besides the Baker-street Show, there were committee meetings of the Agricultural Society of England, the annual meeting of the Farmers' Club, several lectures interesting to agriculturists, and on Saturday the annual meeting of the Royal Society. This formed one reason why a change was recommended. Another was, that if the Birmingham Show were held earlier, say a week before that of the Smithfield Club, purchasers from a distance would be very likely to visit it, in order to make their selection for the Christmas market, which now they were in a great measure prevented doing, as hitherto the Birmingham Show had only closed three or four days before the stock was actually required. When the show first started, inquiries were made as to the most convenient time for holding it, and then both breeder and butcher seemed to think that it would be best to hold it so that it might close on the Friday night before the Christmas market in Birmingham; but now it was thought that this arrangement, however convenient to local purchasers, was not so suitable for those at a distance. The argument as to the pressure of business in London had been put very strongly by the *Mark Lane Express*; and all friends of the Birmingham show must feel that many gentlemen were thereby detained in London, whom they should have been glad to have had amongst them this week. Believing that the proposed change would be generally acceptable, he begged to move, "That in the opinion of this meeting it is desirable the show of the Smithfield Club and that held in Birmingham should on no occasion take place at the same time, and that the Council be requested to take into consideration the propriety or otherwise of fixing the Birmingham Show one week earlier than that in London, and if such change appears to them to be calculated to promote the interests of exhibitors of stock, and the convenience of purchasers and visitors generally, to make the necessary arrangements accordingly."

Mr. LOWE seconded the motion.

Mr. UMBERS thought the alteration would prove a benefit not only to the exhibitors who came to Birmingham, but to exhibitors generally.

The resolution was then carried.

Mr. J. MATHEWS said that as the experiment of holding a dinner seemed to have failed so far as the bringing together of tenant farmers for practical purposes was concerned—and this was the principal view with which it was started—he begged to move, "That in the opinion of this meeting it is desirable to discontinue the annual dinner, and to substitute in place thereof a lecture or lectures on some subject connected with agriculture, with a discussion or discussions thereupon, and that the Council for the ensuing year be requested to make the necessary arrangements for such lectures, and that the President be invited to preside."—Mr. CALDECOTT seconded the resolution, which was carried without remark.

A vote of thanks to the noble chairman for his kindness in presiding brought the proceedings to a close.

The members of the Warwickshire Agricultural Society have determined to set apart 100 guineas out of their funds for the purpose of giving a testimonial to Mr. J. Moore for his services to the cause of agriculture in that county

## LAND DRAINAGE.—THE KEYTHORPE SYSTEM.

It appears that there is to be a grand field-day for the land drainers, at the Rooms of the Society of Arts, during this week of the Christmas Show of the Smithfield Club. The question of Land Drainage, we are told, is to be discussed in all its complicated forms. We have no doubt that, as Porson said, there will be a great deal brought forward that is new, and a great deal that is true: we will not pursue the quotation further. There will be many useful, practical, and scientific questions discussed, or, to use the fashionable phrase, ventilated. There will be much that is valuable brought forward, together with no little not so; for there are few subjects on which there is more twaddle talked and written than on land drainage. There is nothing like free discussion, however, for eliciting the truth and reducing lofty pretensions to their proper level.

Among other results which we are promised from this discussion, is that of testing the merits of the Keythorpe system of drainage, which was brought before the public about two years ago, and after a tolerably long slumber, is now again revived. We hope the speakers will confine themselves as much as possible to the real questions at issue. As respects the Keythorpe drainage these appear to be the following:—

1st.—Is the estate of Lord Berners effectually drained, or is it not?

2ndly.—Are the soil, subsoil, and substrata such as they have been described?

3rdly.—What are the conditions on which the success of the Keythorpe system depends? Are they of general application? or are they local and peculiar?

4thly.—Does the system really possess those advantages in point of economy which have been asked of it? Does it save from one-third to one-half of the cost of draining by what are deemed the best methods of the most experienced practical and scientific drainers?

These are questions of great importance. We have seen it stated that by this method the expense for labour in draining does not amount to much above 32s. 6d. the acre. This is so extraordinary a statement, that it is used as an argument against the system. Is there, we would ask, no mistake, no lurking fallacy here? By reference to the map put in by Lord Berners as evidence before the Committee of the House of Lords on the Improvement of Land, it appears that there are two measures called an acre in Leicestershire—namely, the statute acre, and a local linear measure in draining also called an acre, and containing 24 linear yards. Is there no confusion between the two measures in this extraordinary statement respecting the small cost per acre for labour.

5thly.—Another, and a very important question, is this: Granting, for the sake of argument only, all the advantages which are ascribed to the system in point of economy, and admitting the land to be

effectually drained, is there any real economy in it after all?

Lord Berners, it seems, has been many years in draining his estate, and bringing this system to its present state. He has drained it with his own capital, we are told, by appropriating a certain sum annually to that purpose. Is there any real economy in this? Would it not have been eventually cheaper to have borrowed a large sum, and have drained it out of hand, even at a greater expense?

Among the advantages of draining land with borrowed capital, we have heard the following enumerated. The sooner land is drained, it is said, the sooner will the rent-charge in liquidation of principal and interest commence, and the sooner will it terminate. The rent-charge, while it continues, is not paid by the landlord, but by the tenant. The improvement of the land is such as to render it worth more than the present rent, with the addition of the rent-charge; and the sooner the work is done, the sooner will the landlord be able to avail himself of the improvement. This weighty objection against cheap, even if effectual, drainage is well worthy of the serious consideration of landlords and tenants, particularly the latter.

We have no doubt that in this discussion at the Society of Arts we shall have many new expositions of the laws of gravitation and hydraulics. As an example take the following, which we extract from the correspondence of one of our contemporaries, on the drainage question (the writer is arguing for making the direction of the drains coincide with the fall of the ground):—"The water in the soil," he says, "till set in motion by draining, is in a state of rest, and then does not flow on the face of a plane, or like rain over a surface, but rises into the drain, and takes a course down the line of greatest descent. If the drains take that course, the water follows the drains; but if the drains cross the line of descent, the water soaks from the lower side of the drains into the soil below; for the drains are not like gutters, or such channels that catch the water on the upper side, and hold it, and do not admit of a passage across, but are always of materials that afford the like facility of escape as of entry."

It is difficult to illustrate what we suppose to be the meaning of the above passage without a diagram, but as we understand the course of the water thus described, it is the following. It comes originally from the atmosphere—we suppose that to be admitted. It then sinks perpendicularly into the soil till it gets below the drain, when it rises into it, then flows along the line of fall if the drains coincide with that line; if they do not, it works its way out of the drain on the opposite side. Why then, we would ask, did it, on this supposition, ever enter the drain at all? Why did it not pass over it, or under it, and get into the line of greatest descent, in order to come to a state of

rest again? To our limited comprehension this appears to be mere perversity on the part of the water. The writer, moreover, does not say what declivity is necessary to prevent water from being in a state of rest in the soil, nor how he accounts on that supposition for springs, nor what amount of fall in a drain is necessary in order to induce the water to flow along a conduit instead of working its way across it; nor why, if it works its way out of the conduit on one side, it did not work its way in on the other, but dived under it and came in at the bottom, only to get out at the side.

The discussion at the Society of Arts is not likely to suffer in point of animation from geology having been pressed into the service of this mode of drainage. It will probably be attended by several of the most eminent members of the Geological Society, delighted to see any new attempt to turn their science to practical account. They were once described by Sir Roderick Murchison as a fraternity united for great purposes, and knit together by lofty and enduring sympathies. Be this as it may, there never was a fraternity in which the organs of pugnacity were more strongly developed. If one announces a new fact, or draws conclusions from facts already known, some other geologist denies his facts or disputes his inferences. Thereupon issue is joined; *saxa et tela volant*, as Virgil would say—in plain English, they have recourse to sticks and stones. Others take part in the discussion, the battle becomes general, and thus all the established truths of geology have been fought out, hand to hand, and foot to foot, by this the most loving and united brotherhood which ever existed on the face of the earth! Thus it is that all those which remain to be investigated will be fought out. The contradictions among geologists, however, are nothing compared to those of agriculturists. It is little more than fifty years since the speculations of cosmogony were abandoned, and geology became a science of observation and induction. During that time many disputed points have been settled to the satisfaction of the whole fraternity, and not only of them, but of men the most eminent in the exact sciences—of astronomers, who accept only mathematical demonstration in their own science; and of chemists, who test the accuracy of their conclusions by weight and measure, who aim in all their researches at proving analyses by synthetical operations; that is, by making a substance from the materials of which they find it to be composed by reducing it to its elements. In agriculture, on the other hand, we could point out many questions which were matter of discussion fifty years ago, and are as much matter of discussion still, with every probability that in the way they are treated by some, they may continue matter of discussion for fifty years to come.

#### MR. B. T. BRANDRETH GIBBS.

The *Illustrated London News* of this week gives a portrait of Mr. Gibbs, with which is associated the following notice:—

“Mr. B. T. Brandreth Gibbs (whose portrait we have engraved upon the preceding page) is the youngest son of the late Thomas Gibbs, Esq., of Aupthill, Bedfordshire, and of

Brompton Lodge, Old Brompton, Middlesex, and has now been known for some years in the agricultural world as one of the most zealous promoters of this branch of national industry.

“Having studied under the Rev. H. S. Pollard, M.A., and subsequently under the Rev. M. Marcus, M.A., he was about to enter St. John's College, Oxford (in which college the family had a claim to founder's kin fellowship) with the intention of eventually going to the bar, but he was suddenly induced to turn his attention to agricultural pursuits in consequence of a death in his family having opened a field of immediate action for his energies in that direction. Hence the origin of our finding him at an early period of his life actively engaged in carrying out the proceedings of the Smithfield Club, and of the annual shows of the Royal Agricultural Society of England, and more recently of the Agricultural and Implement Department of the Great Exhibition of 1851, and Paris Universal Exhibition of 1855.

“As connected with agriculture, he acted as one of the stewards of the yard (in lieu of a steward who was disqualified from being an exhibitor) at the first meeting of the Royal Agricultural Society of England, held at Oxford, in 1839, and he continued to act with his brother in the management of the succeeding shows of that society up to 1844; and of the Smithfield Club up to 1843, at which periods he became the Honorary Director of the country shows of the former, and the Honorary Secretary of the latter, to which offices he was unanimously elected at the age of twenty-two, and which offices he still continues to hold.

“The readers of this journal will be aware that the annual meetings of the Royal Agricultural Society of England from 1844 to 1855 have been held in the cities and towns of Southampton, Shrewsbury, Newcastle, Northampton, York, Norwich, Exeter, Windsor, Lewes, Gloucester, Lincoln, and Carlisle—during which period the arrangements of the shows, both as regards live stock and the exhibition and trials of machinery, have been conducted under his direction.

“When the preliminary preparations for the Great Exhibition in 1851 were in progress, the Royal Commissioners, through the late Mr. Pusey, one of their members, sought Mr. Brandreth Gibbs' assistance in the agricultural machinery department, and he undertook the office of superintendent of Class 9, one of the most extensive divisions of the Exhibition, and was afterwards selected as a juror in the same class.

“During the preparations for the recent Paris Exhibition he was engaged for the Board of Trade in superintending the selection of British agricultural machinery intended to form part of that collection, and to which department no less than five of the much-coveted gold medals of honour were awarded.

“The manner in which Mr. Brandreth Gibbs has applied himself to the advancement of the agricultural interest, has been marked by his receiving from the hands of the Duke of Richmond, the President of the Smithfield Club, the above testimonial to his valuable services, most gratifying to Mr. Gibbs and to the numerous friends he already claims in that institution and in the Royal Agricultural Society of England. In private life he is esteemed by a wide circle of acquaintance; and he is not only a good linguist, but accomplished also in music, and different branches of the fine arts.

“The illustration on the preceding page represents the testimonial which was presented to him last week by the members of the Smithfield Club, as the inscription expresses it, ‘in appreciation of the valuable services rendered by him to that society as its Honorary Secretary.’ Mr. Gibbs was enrolled on the list of that club as early as 1837, and was its first life-member.”

## JETHRO TULL'S "HUSBANDRY."

(Concluded from page 349, vol. xliii.)

Besides his surprising view of the efficacy of tillage and comminution in enriching and developing the resources of the soil, Tull had equally elaborate ideas of the manner in which it facilitated the finding and appropriating of the pabulum by roots. Thus "fibrous roots can take in no nourishment from any cavity in the soil, unless they come into contact with, and press against the superficies of that cavity which includes them, for it dispenses the food to their lacteals by such pressure only. . . . Roots cannot have nourishment from cavities that are too large to press against them, except what water, when it is in great quantity, brings to them, which is imbibed by the gentle pressure of the water. But when the water is gone, those large cavities being empty, the pressure ceases; and this is the reason that when land has few other but such large cavities, the plants in it always suffer more by dry weather, than in land which has more minute and fewer large cavities." Hence, the pores or interstices of the soil ought to be very small; and as a guide to the amount of pulverization necessary, he speaks of the "natural pores" as being often *too small* for roots to enter; whereas the "artificial pores," made by tilling can never be brought nearly so fine as to endanger such a stoppage of the roots. "Insufficient tillage leaves strong land with its natural pores too small, and its artificial ones too large: it leaves light land with its natural and artificial pores both too large." These considerations led him to criticise the common tillage operations of his day, and to devise a system of husbandry compatible with the principles which science thus laid down. "The first and second ploughings with common ploughs scarce deserve the name of tillage, they rather serve to prepare the land for tillage." Perceiving, therefore, the want of a better "first implement," he contrived a plough with four coulter instead of one, which served to cut up the furrow-slice into strips, thus facilitating its after-breakage by preventing it from hardening into immense slags (requiring many months' labour for their reduction) as by the old fallowing process. In our day, grubbers and scarifiers have greatly assisted the work of pulverizing hard ground; but on the stiff clays an implement that could cut and crumble into small pieces like the spade would be far preferable for the first breaking, to the squeezing and hardening screw-wedge, called a plough. "Farmers," says Tull, "just when they have brought their land into a condition fit to be further tilled to

much greater advantage, leave off, supposing the soil to be fine enough when with the help of harrows they can cover the seed; and afterwards with a roller they break the clods, to the end that, if a crop succeed, they may be able to mow it without being hindered by those clods." But he insists that the roller used to press in the seed in a properly moist seed-bed rather untills the land, producing a constipation of the ground, and anticipating that subsidence and solidifying which, in strong soils, happens too soon of itself. As he says in Chapter VI. (*Of HOEING*)—"As soon as the ploughman has done his work of ploughing and harrowing, the soil begins to undo it, inclining towards and endeavouring to regain its natural specific gravity [or rather *density*]; the broken parts by little and little coalesce, unite, and lose some of their surfaces. Many of their pores and interstices close up during the seeds' incubation and hatching in the ground; and as the plants grow up, they require an increase of food proportionable to their increasing bulk; but on the contrary, instead thereof, that internal superficies which is their artificial pasture gradually decreases. The earth is so unjust to plants, her own offspring, as to shut up her stores in proportion to their wants; that is, to give them less nourishment when they have need of more. Therefore man, for whose use they are chiefly designed, ought to bring in his reasonable aid for their relief, and force open her magazines with the hoe, which will thence procure them at all times provisions in abundance, and also free them from intruders—I mean their spurious kindred, the weeds, that robbed them of their too scanty allowance." Here we have the *rationale* of *hoeing*, or the breaking and dividing of the soil by various instruments *whilst the crop is growing*, in distinction from ordinary tillage, which is only preparatory to the sowing of the crop. And Tull understood by the term "*horse-hoeing*," something deeper than the common surface-scraping by hand-hoes, which does little more than cut up weeds—an effect which, however useful, does not comprise half the good of *deep-stirring*, which fertilizes the soil in various ways. "There is no doubt," he continues, "but that one-third part of the nourishment raised by dung and tillage, given to plants or corn at many proper seasons, and apportioned to the times of their exigencies, will be of more benefit to a crop, than the whole applied, as it commonly is, only at the time of sowing. This old method is almost as unreasonable as if treble the full stock

of leaves, necessary to maintain silkworms till they had finished their spinning, should be given them before they are hatched, and no more afterwards."

In Chapter IV. (*Of WHEAT*), he further explains the especial use of the process to a crop which remains a long period upon the land. In our climate, wheat must be sown in autumn, in order to give it sufficient start in the spring to insure a plump grain at harvest; and thus "having about *thrice* the time to be maintained that spring corn hath, it requires a larger supply of nourishment in proportion to that longer time: not because the wheat in its infancy consumes the stock of food during the winter proportionably to what it does afterwards; but because during that long interval betwixt autumn and spring seed-times, most of the artificial pasture is naturally lost, both in light and strong land. For this very reason is that extraordinary pains of fallowing and dunging the soil necessary to wheat; though, notwithstanding all that labour and expense, the ground is generally grown so stale by the spring, and so little of the benefit of that chargeable culture remains, that if part of the same field be sown in the beginning of April upon fresh ploughing, without the dung or year's fallow, it will be as great or a greater crop in all respects—except the flour, which fails only for want of time to fill the grain. . . . If wheat be sown very early on strong land, though rich, well tilled, and dunged, the crop will be worse than on poor light land sown early; so much do the long winter's rains cause the earth to subside, and the divided parts to coalesce, and lock out the roots from the stock of provision which, though it was laid in abundantly at autumn, the wheat has no great occasion of until the spring; and then the soil has become too hard for the roots to penetrate; and therefore they must starve (like *Tantalus*) amidst dainties, which may tempt the roots, but cannot be attained by them."

His practice, therefore, was to drill wheat in straight rows, in order that he might be able to stir and pulverize the ground between them during the spring and summer. After a perplexing number of detailed trials, we find that double rows at ten inches apart are stated as being the best arrangement, and between the sets of double rows he left fallow intervals a few inches less than five feet in width; thus allowing no more room than was sufficient to work his horse-hoe, which he calls a "hoe-plough," and required all this great breadth because (unlike our modern ones) it turned over a furrow-slice. He considered that the great proportion of ground uncovered was only apparently so, and that if the vacancies between the plants on the old broadcast system could be reckoned up, they would come to a greater area when the crop was lighter than his. He showed what advantages for extir-

pating weeds he possessed, over those farmers whose plants stood "on the ground in a confused manner, like a rabble;" and what a preservative it was against different species of blights, and against the "lodging" or prostration of the crop towards harvest, when every individual stem had space and air, and root-food enough to make it grow stalwart and healthy. The same system he applied to many other sorts of crop, and with similar success as regards the great development and superiority of the separate plants. In Chapter XIII. (*Of LUCERNE*), he speaks of lucerne being forced to a gigantic size; a plant of this, "when pampered by the hoe, making a produce more like a tree than an herb." "The same frost that kills a faint languishing plant of lucerne will be despised by a robust one, which, being well fed by the hoe, becomes a giant clothed and fenced with a thick bark that renders it impregnable against all weather; its rind is to it a coat of mail or buff, impenetrable by frost. But the unhoed is generally small and weak: its thin tender bark exposes it almost naked to the frost."

And his hoeing-tillage procured a supply of *moisture* to the roots of his crops in the driest weather, although one of the main objections alleged against the practice was that it "let in the draught." This came from the dews, which are most plentiful in dry weather, and these "seem to be the richest present the atmosphere gives to the earth. . . . They enter in proportion to the fineness and freshness of the soil, and the quantity that is so made fine and fresh by the hoe. . . . To demonstrate that dews moisten the land when fine, dig a hole in the hard dry ground in the driest weather, as deep as the plough ought to reach, beat the earth very fine, and fill the hole therewith; and, after a few nights' dew, you will find this fine earth become moist at the bottom, and the hard ground all round will continue dry. Till a field in lands; make one land very fine by frequent deep ploughings, and let another be rough by insufficient tillage alternately; then plough the whole field cross-ways in the driest weather, which has continued long; and you will perceive, by the colour of the earth, that every fine land will be turned up moist, but every rough land will be as dry as powder from top to bottom. Although hard ground, when thoroughly soaked with rain, will continue wet longer than fine tilled land adjoining to it, yet this water serves rather to chill than nourish the plants standing therein, and to keep out the other benefits of the atmosphere, leaving the ground still harder when 'tis thence exhaled.

. . . There is yet one more benefit (he adds) hoeing gives to plants, which by no art can possibly be given to animals. For all that can be done in feeding an animal is to give it sufficient food, meat and drink, at the times it has occasion for them; if you

give an animal any more, it is no manner of purpose, unless you could give it more mouths, which is impossible [unless the cramming of turkeys be an exception]; but in hoeing a plant the additional nourishment thereby given enables it to send out innumerable additional fibres and roots [as seen in his before-mentioned experiments], which fully demonstrates that a plant increaseth its mouths in some proportion to the increase of food given to it."

Tull's principles obliged him to reject the common doctrine of rotations, or changes of crops, being expedient in husbandry. Not that he meant to deny the existence of a fact everywhere looking him in the face, that, according to the prevailing methods of culture, farmers found it necessary to alternate the succession of certain kinds of cropping on the same land, in order to get a fair yield from each; and could not repeat one sort of crop (as cereal corn) more than twice or thrice without resting and reinvigorating the exhausted soil by a fallow. He simply contended that, upon his theory, and by cultivation in strict conformity to the details of his practice, such change or inactivity was not indispensable. In Chapter XIV. (*Of CHANGE OF SPECIES*) he discusses the following propositions:—"1. That plants of the most different nature feed on the same sort of food. 2. That there is no plant but what must rob any other plant within its reach. 3. That a soil which is proper to one sort of vegetable onee, is, in respect of the sort of food it gives, proper to it always." In a general sense, each one of these propositions is true; but, when we confine the language of the first too strictly, it does not agree with the now well-ascertained fact that, though all vegetation partakes more or less of the same sort of food, each species in the general feast does more especial honour to its favourite dish. But if in error, arising from partial knowledge, Tull, as far as he went, was nearer the mark than the naturalists whose views he thus controverted; for they taught that "plants of different natures are fed by a different sort of nourishment; from whence they aver, that a crop of wheat takes up all that is peculiar to that grain; then a crop of barley, all that is proper to it; next a crop of peas, and so on." They affirmed that plants had the sense of taste, and that "they feed as differently as horses do from dogs, or dogs from fish." But Tull had a great many reasons for refusing this notion. From his experiments with mints, he inferred that roots will imbibe liquors, nourishing or poisonous, without distinction. He observed that the same portion of soil maintained quite opposite kinds of vegetation, when under different conditions of heat and moisture, as when thyme and rushes thrive respectively on the same earth, according as it is in a dry or watery situation. He could not believe that utterly different sorts of particles of pabulum were needed for a plant

of thyme and for an apricot tree, when he found that "as the fine particles of oats will nourish an ox, so they will nourish a tom-tit, or a mite." Further, he had seen in the foreign vineyards, where horse-hoeing was practised, "the stems are planted about four feet asunder, chequerwise; so that they plough them four ways. When any of these plants happen to die, new ones are immediately planted in their room, and exactly in the points or angles where the others have rotted; else, if planted out of these angles, they would stand in the way of the plough. These young vines, I say, so planted in the very graves, as it were, of their predecessors, grow, thrive, and prosper well, the soil being thus constantly tilled." No change or rest was evidently required there. He had demonstrated that both "trees and weeds starve some plants, by robbing them of their provision of *food*, not of their *room*, as some authors vainly imagine." In Chapter VII. (*Of WEEDS*), he says, "Let three beds of the same soil, equal, and equally prepared, be sown with the same sort of corn. Let the first of these beds be kept clean from weeds; in the second, let a quantity of weeds grow along with the corn; and in the third, stick up a quantity of dead sticks, greater in bulk than the weeds. It will be found that the produce of the corn in the first will not exceed that of the third bed; but in the second, where the weeds are, the corn will be diminished in proportion to the quantity of weeds amongst it. The sticks, having done no injury to the corn, shew there was room enough in the bed for company to lodge, would they forbear to eat; or else (like travellers in *Spain*), bring their provisions with them to their inn, or, which would be the same thing, if weeds could find there some dish so disagreeable to the palate of the corn, and agreeable to their own, that they might feed on it without robbing." Pastures require no change of grasses, as long as they are supplied with a sufficient amount of food from the atmosphere, and from the cattle that graze on them. Meadows yield hay every year as long as their productive power is maintained by manuring, flooding, or natural richness. Woods continue to flourish "beyond memory or tradition," without changing their sorts of trees, the earth's fruitfulness being kept up by the rotting of leaves and old timber, and by what descends in the atmosphere, "the trees shadowing the soil, to prevent the reascend of what that brings down." His foundation principle was, therefore, safe: only fertilize sufficiently, and you may grow what succession or repetition of crops you like. But, according to his third proposition, he was not going into the region of nostrums and universal specifics; he said this not of *any soil*, but of such soil and situation as was found to suit the constitution of the particular plants cultivated.

How, then, did he account for the peculiar success

or failure with which some crops invariably followed others in common husbandry? The cause lay, he conceived, in the different tillage required. White corn could be made to follow its own kind very well, because the upper stratum of the soil could be readily pulverized for the benefit of its horizontally-spreading roots; but clover, sainfoin, and other tap-rooted plants would not succeed well after their respective species, because they took great part of their nourishment from the under part of the staple, below the reach of frequent tillage. Some plants are said to enrich the soil, others to impoverish it; but Tull remarks, "I think it may be observed that all those plants which are usually hoed are reckoned among the enrichers; and though it be certain that some species are, by the heat of their constitution, greater devourers than those of another species of equal bulk, yet there is reason to believe that were the more cormorant plant of them all to be commonly hoed, it would gain the reputation of an enricher or improver of the soil."

We have not space here to detail the more recent views of Decandolle, Liebig, and others, upon this still unsettled theory of rotations in cropping, but may add that modern chemical researches tend to confirm the feasibility of Tull's practice in a modified form being continued in perpetuity, *without any danger of exhausting the elements of vegetation locked in the soil*. Tull must necessarily in time have abstracted from his ground all its available mineral nutriment, which could not be restored by his process of stirring and aerating without help from manure, because his rule of "never plow below the staple" shut him out from all the treasures existing in profusion in the subsoil. Now, we do not detract in any degree from the credit which Mr. Smith has justly earned of *first* opening up these deeply-buried stores to the action of Jethro Tull's tillage—in fact, of having combined the system of perfect surface pulverization for atmospheric enrichment with deep culture in search of the earth's hidden fertility, when we say that in Tull's book there are indications that, had his trials continued, or had he practised upon a more suitable soil, he would have himself found the advantage of deeper manipulation. Nowhere, we believe, does he dictate as a *principle* that land should never be ploughed deeply; that we ought never to increase the thickness of soil worked by our implements, provided that the subsoil be of a nature that can be so used. On the contrary, he declares that the benefit of deep ploughing is "very great;" and that while on the old plan of sowing wheat under furrow, shallow ploughing was unavoidable, one of the merits of the new husbandry was that they could plough not only a deep furrow, but *two furrows deep* where the land would allow it. He even mentions an instance in which deeper tillage than usual was

actually put in practice. A portion of a field being thinner land than the rest, he pursued at first a shallower tillage in that part; but "when the land became of a more equal depth the fifth year, the plough and hoe-plough *went deeper*, all the piece being taken together;" and the consequence of this gradual deepening, he tells us, was an increased yield from that part. However, he expressly limits this deep ploughing to the thickness of the existing staple; and it has been reserved for Mr. Smith to advocate the creation of a further stratum of mould out of the subsoil with which Jethro Tull dare not meddle.

In Chapter IX. he says—"In *shallow* land we cannot make the furrows so deep, nor the ridges so high, as in deep land; for we must never plow below the staple." And a foot-note explains that the reason why we *must not* plow below the staple is, because there would be "a *deficiency of mould*" in the hollow between the lands or high-backed ridges of which he is speaking.

In Chapter XVII. he writes—"We not only plow a deep furrow, but also plow to the depth of two furrows; that is, *we trench-plow where the land will allow it*, . . . . ; and two-plowed furrows (that is, one plowed under another) are as much more advantageous for the nourishing a crop, as two bushels of oats are better than one for nourishing an horse." And he excepts the case "when the *staple* of the land is too thin or shallow," explaining, by the following note, what he means by the word "staple," as being the upper crust previously accustomed to be ploughed, or the whole available stratum of good soil; for "very little of my land will admit the plow to go the depth of two common furrows without reaching the chalk; but deep land may be easily thus trench-plowed with great advantage."

The "indications" we spoke of are as follows:—Tull threw up his ground in ridges, not only that the wheat might be dry and warm, but also that there might be a greater thickness of good soil for the plants to vegetate in. And his reason for obtaining this artificial depth of staple (for he did nothing without a reason) was that, if wheat roots be carefully examined in the vigour of summer in a friable soil, "they may be seen to descend *as deep as the pulverized mould reacheth, though that should be a foot in thickness*." This knowledge must inevitably have led him to feed the deeply burrowing, as well as the side-long branching roots; although his practice never advanced further than to lay bare the subsoil in the "intervals" by gathering the staple-soil into the wheat ridges. Tull perceived, also, that the cavities between large clods were as "sinks to convey what rain and dew bring too quickly downwards to below the plow'd part;" that "the under earth" is replenished by the rain's sinking through it. Here was the very ground-fact for subsoil ploughing,

trenching, and deep culture; and a logical mind like Tull's must have followed out the idea in practice *had he lived long enough to find, by the failure of surface tillage, that such heavy and expensive work was necessary.*

In concluding our outline of Jethro Tull's husbandry, we may observe that one reason why it had to be laid aside after the trials of his immediate disciples, again to be revived in our times, was its being in advance of the mechanical skill of his time. Improvements in field machinery have now enabled his operations to be carried out with comparative ease by ordinary farm labourers; and the progress of subsoil drainage has rendered its adoption practicable where it is best suited to the land—namely, on the clays, rich with mineral nutriment, and voraciously active in absorbing riches from the atmosphere. But Tull could not recommend his system on such land; for “intractable wet clays,” he says, “are the most improper for it.” However, the reader may find in his sixteenth chapter (*Of RIDGES*) how he discovered that, while stagnating water ruined a soil, water slowly passing off through it was positively enriching; and how he devised a method of cutting off springs by covered drains, as well as by open trenches. Perhaps the most erroneous of Tull's views was, that manure furnished no nourishment to plants except so far as it assisted in pulverizing the soil—operating mechanically in preparing the food of plants, but not comprising in itself any of that food. Imperfection of chemical knowledge suffered Tull to ride his hobby too far; but, taking him as one among a generation of farmers, to whom our recent chemical discoveries were equally hidden, he had arrived at a far more sensible conclusion than his neighbours. They continued to regard the bulk of their farmyard and other manure as direct food for their crops, when, in fact (as we now know), only a mere essence of it was of any practical value; he having found out the needlessness of such an expensive application, because the soil itself, when properly tilled, supplied all that plants require, condemned their shortsightedness in expending “three or four pounds in the buying and carriage of dung for an acre; but thinking themselves undone, if they afford an extra eighteen-pennyworth of earth” to the same area, earth itself being not only the best but cheapest manure, if valued, as it should be, by the rent paid for it.

We must now advert, for the sake of completing the subject, to Mr. Smith's well-known revival or rather adaptation of Tull's system as regards wheat growing—a practical experiment on a large and long-continued scale, which has created a greater amount of inquiry and discussion, among all classes interested in the theory or business of cultivation, than any other contemporary subject, unless we may except the liquid-

manuring system of producing green cattle-food. The patriotic motives which induced Mr. Smith to publish his studies to the world, the most full and clear details of his method, and the scientific explanation of its results, are contained in the “Word in Season,” which is also interesting as being a model of good writing on agricultural topics. “My plan,” he says, “is this: I divide my field into lands 5 feet wide. In the centre of each land I drop or drill my seed in triple rows one foot apart, thus leaving a fallow interval of three feet between each triple row. When the plant is up, I trench the intervals with the spade or fork, easily taking my spits about three inches from the wheat, and at spring, and during summer, I clean them with the blades of the sharp cutting horse-hoe, and keep them open with the tines of the scuffer. Every year, in short, I trench and cultivate  $2\frac{1}{2}$  feet out of the 5 for the succeeding crop, and leave the other  $2\frac{1}{2}$  for that which is growing.” The next year the wheat is sown on these fallow intervals, and the stubble is broken up in like manner for the fallow process. Thus, the soil is freely opened to the action of the atmosphere; and to insure a sufficiency of mineral food, the thickness of the cultivated staple is *very gradually* increased by digging a few inches deeper each time, ultimately nearly a depth of 2 feet. And, by the system of trenching or double digging alternate halves of the ground in alternate years, the result is, that the two-foot stratum is biennially inverted, the upper and lower halves taking their turn of summer pulverization and aerial manuring. Without an ounce of farm-yard manure, or any artificial fertilizer whatever, Mr. Smith has been able to produce, by tillage alone, ten successive crops of wheat on the same field, of an average yield exceeding that of the neighbourhood. The calculations and estimates as to the pecuniary economy of the system we cannot now advert to; but Mr. Smith abundantly demonstrates that, even with a low price of corn, the farmer may by it derive a very handsome profit. The system is not to be limited to wheat only: it may be modified for the production of any crop, and by no means excludes the application of manures. But this grain is taken to be the most important of all crops, and on suitable land Mr. Smith shows that it can be prolifically produced without manure. Knowing the various mineral ingredients, and the precise proportions of them, required by the wheat, the first question is, Does the particular soil proposed for this culture contain all these in sufficient quantity? If not, they must be supplied in the form of manure—of such composition as is best adapted to make up the deficiencies. With our present facilities for obtaining cheap manufactured manures, this is an easy matter. The chief inquiry then is, Can the atmosphere supply to the soil as much organic matter as the crop will remove?

This point is one occupying great attention among agricultural chemists. The only doubt left seems to be in the case of ammonia; but the recent researches of Professor Way, added to the preceding labours of other chemists, seem almost conclusive as to the fact that soils can absorb from the air, and the rain and

dew bring to it also in solution, a superabundance of this invaluable constituent. So that the process continued for several years in succession, without any signs of failure or weakness, may be confidently expected to prove perpetually self-maintaining.

### THE DIVISION OF LABOUR, MANUAL AND MECHANICAL IN IRELAND.

In a former article we adverted to the impediments opposed to improvements in cultivation by the smallness of the farms in Ireland, particularly in the growth of green crops and their consumption by stock. We proposed to remedy this in some degree, and to economise capital by the introduction of such a division of labour between farmers and stockmen, and between farmers and dairymen, as has been found to work well in some parts of Scotland and England. We propose on the present occasion to inquire whether by similar means the advantages to be derived from improved implements may not be placed within their reach. In this, again, we can appeal to practice, in favour of the system which we advocate. The first example which we shall cite will be the employment of hired drill-men. These generally consist of well-conducted labourers, who have saved or borrowed money enough to purchase a drill, and who go about from farm to farm with their implements, which they work themselves—the farmer finding horses, and paying the drill-man by the acre, for putting in the crop, a price which does not exceed that paid to a good broad-cast seedsman who sows by the job. We have known this done even on farms of 300 acres, when the occupier preferred hiring to purchasing a corn-drill, which was then more expensive than some of the modern implements of that description.

Again, we have our travelling steam thrashing-machines, which go about thrashing by the day or the quarter. These are hired, even on large farms in some parts of England, where the buildings are not central enough to admit of a fixed thrashing-machine, or where the farmer from other causes prefers having his ricks scattered about his fields. In Ireland the corn is often thrashed in the open air, from want of a barn, and not unfrequently on the public road, as affording a firm floor.

When we have suggested in Ireland the use of travelling thrashing-machines, it has been objected that it would never do to put within the reach of Irish tenants the power of thus rapidly converting their crop, and cases have been mentioned in which they were known to have thrashed the corn and restacked the straw, in order to deceive the land-

lord, and to abscond without leaving him anything to distrain. We can only say, that the landlord or his agent must have been very easily deceived, who could not distinguish between a stack of straw and a stack of corn. To thrash corn, moreover, clandestinely, by means of a travelling thrashing-machine, whether driven by steam or horse power, would be next to impossible, so that their general use would obviate this supposed difficulty.

In Ireland the division of labour which we advocate might be extended to the commoner implements which, in England, are possessed even by the smaller tenants; such as rolls, scufflers, horse-hoes, broadshares. Why should there not be on an Irish estate a man possessing a collection of the best of the ordinary implements, and working them for hire on the lands of the small farmers? Are our modern implements of real use to the farmer, or are they merely playthings for the amateur? This doctrine was held some twenty or thirty years since, with regard to the commonest of these implements, by men who have now adopted them as part of their practical routine. If the former alternative be admitted, if these implements abridge labour and reduce the cost of production, it follows that he who uses them must produce at a cheaper rate, and be able to under-sell those who use them not; since in the same market, and at the same time, there cannot be two prices for the same articles, the quality being equal. The popular argument against the employment of machinery in the processes of cultivation as tending to displace labour and increase pauperism, has fallen to the ground. It has lost its influence even among the labourers. They see plainly that the man who saves labour by the use of machinery in one department of the process of cultivation expends more labour on another. He who drills his crop, hoes them, slices his turnips, cuts his hay and straw for his horses, and employs labour in a variety of other ways, in which, but for the aid of machinery, it would not have been employed at all. The labourers see this, and it would now be extremely difficult to get up a riot for the destruction of thrashing-mills, even in those counties of England formerly most subject to agrarian outrage. We were never more struck with this

change of opinion among farming men, than at a trial of the American reaping-machine, when it was yet a novelty, in the presence of numerous farmers and labourers assembled at a ploughing match, in a county not the most advanced in the adoption of innovations on established agricultural usages. Some reapers, who were watching the experiment with considerable interest, were rallied on their occupation being gone, by a gentleman desirous of eliciting their sentiments. They only replied, with a laugh, that they were not afraid of that; let the farmers and machine makers do what they would, the harvest could not be got in without hands. They expressed, at the same time, their doubts whether any reaping process could be discovered for wheat superior to that of mowing it. Now, against this same mowing of wheat there was just as much outcry a few years ago, among well-meaning persons, who are very fond of talking about what they do not understand, as there was formerly against thrashing machines, and as there is now amongst the same class against reaping by machinery. With respect to reaping machines, it is obvious that if they effect no saving of money, they must still be invaluable to the farmer in the command which they give him over his crops, and the power of securing them in favourable weather. We could mention a district where the practice of broadsharing the stubbles immediately after harvest, or even while the shocks are standing, has long prevailed, and where we have repeatedly seen nearly as much shed corn coming up on the broadshared land as would have sown the ground. The true way to make reaping machines popular among the peasants is to put them in the light of an aid to the labourer rather than a saving

of labour to the farmer—to make an agreement with them by the acre, at a liberal price, letting them have the hire of a reaping machine, and charging them a moderate amount by the acre, or the day, for the use of it. But to return from this digression on the use of machinery in England, to its use among the small farmers of Ireland, it must be obvious, on a little reflection, that on such small holdings it is impossible, even by the division of labour which we have proposed, to give them the full benefit of the use of machinery in cultivation. Even on large farms there is often a waste of time in the use of hired machines. They must be bespoken beforehand for a particular day; when that day and the implement arrives, the weather may be unfavourable to the use of it. Oh, but, says the farmer, that loss does not fall on me, I am a better hand at a bargain. I hire the implement subject to these casualties: they are at the risk of the owner. You pay for them notwithstanding, my good sir, for the owner of the implement could afford it so much the cheaper if they did not exist; and if you drive so good a bargain with him that the work is not remunerative, you will soon lose the advantage of being able to hire, and must buy for yourself. If these drawbacks to the use of hired implements exist in England, they must apply with greater force to the small occupations of Ireland; and therefore the employment of hired implements is only suggested as a palliative, as better than the non-employment of them at all; and the only means by which they can be rendered available to the occupiers of such small holdings, so as to give them a chance of competing even in some slight degree with the large farmer.

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#### THE AUTUMN CLEANING OF THE SOIL, AND THE IMPORTANCE OF STUDYING ATMOSPHERIC INFLUENCES.

When our readers are busily engaged in the extension of the autumn cleanings of the soil, and winter fallowing, they are employed in labours of which we seem to be now only beginning to understand the true scientific explanation. Every one, it is very true, readily comprehends the advantages of getting the work forward, and of the great influence which frost has in pulverizing adhesive soils; but, that the atmosphere contained any fertilizing substances, which the rains showered over the farmers' lands, was merely a kind of poetical suspicion of former generations; and yet, as Professor Way remarked, in the last number of the *Journal of the Royal Agricultural Society*, "that the air does in some way materially affect the growth of plants, must

have occurred to every mind that has been directed to these subjects. In the clefts of a rock, or on the ruin of a tower, the seed of a plant is driven by the wind, or dropped by a bird. By-and-bye moisture and warmth, the principal conditions of germination, cause the seed to grow into a plant, which has a more or less perfect existence, produces seed, withers and dies. In the succeeding years a further growth of the same kind occurs under similar but improved conditions; by degrees an accumulation of vegetable matter takes place, from the yearly increase in the number of plants, until, a true vegetable mould being formed, the bed becomes fitted for other classes of vegetation, and, in the lapse of time, the barren rock or the

ruined tower becomes covered with luxuriant growth. So in the great forests of the western states of America, gigantic trees flourishing for centuries, and shedding periodically their leaves and smaller branches, have formed a bed of vegetable mould, which fifty years of the most scourging crops hardly serve to exhaust. Again, covering hundreds of square miles, and of varying but great depth, we have enormous deposits of vegetable matter compressed into coal. No doubt exists of these beds having been formed by the growth and decay of successive vegetations, precisely in the same way that grass and turf give rise to vegetable mould in present experience. Now it can hardly fail to have occurred to thinking men to inquire whence was derived the vegetable matter, which, on the barren rock or the ruined tower, in the great forest or the extensive coal bed, has year by year, and beginning from almost nothing, gradually accumulated:—that the soil does not furnish it, is evident; and that the air must do so, is equally plain.”

Priestley and others, at the very dawn of modern chemistry, showed that plants absorbed carbon from the air—that they absorb their nitrogen from the same great field is still a disputed fact; that ammonia, however, contains nitrogen, and that this alkali is decomposed by plants, is generally known; but that ammonia exists in the atmosphere, that it is brought down in every shower, is one of the recent discoveries of the chemist.

It was a still later ascertained fact that ammonia combines with, is stored up, as it were, in the soil on which it falls, and that consequently those soils, which by being well pulverized afforded the readiest entrance to the atmospheric moisture, were the most benefited. This discovery, too, naturally led us to the conclusion that, as ammonia exists in the rain-water of all seasons, even the super-

abundant showers of winter or the comfortless fogs of November were adding riches to the soil. From such conclusions too we are led to remember that the widely differing depth of rain in a number of years may influence the produce of our arable and grass lands in more ways than in the extent of the mere pure water poured over them. This annual down pouring varies very remarkably in a period of years. At Chiswick, during the last five years, it has been—

	Inches.
1850 .....	18.28
1851 .....	20.79
1852 .....	32.64
1853 .....	24.37
1854 .....	18.92

The present year promises to have as small a rain-fall as any of the previous, as will be seen by the following table, taken from the register of observations at the rain gauge of the Metropolitan Commission of Sewers, on the roof of No. 1, Greek-street, Soho. This shows the amount in inches in each month, from January 1, 1855, to November 13, 1855, inclusive. We have added to this, by way of comparison, the rain-fall of 1854, and the average depth at Greenwich during 25 years' observations—

	Fall		Av. of 25 years	
	In 1855.	In 1854.	at Greenwich.	
January .....	0.087	1.92	....	1.57
February .....	0.550	0.78	....	1.56
March .....	1.322	0.42	....	1.71
April .....	0.140	0.30	....	1.83
May.....	1.283	4.03	....	2.01
June .....	1.082	1.53	....	1.91
July.....	5.060	2.40	....	2.41
August.....	0.975	1.77	....	2.33
September ....	0.820	0.58	....	2.50
October .....	5.187	2.61	....	2.52
Nov. 1 to 13 ..	1.280	1.31	....	2.49
December ....	—	1.27	....	2.25
Total inches ..	17.786	18.92	....	25.09

### THE INDIVIDUAL AS WELL AS GENERAL ADVANTAGE OF AGRICULTURAL STATISTICS.

Farming statistics undoubtedly constitute a subject of vast national importance, and if once well established would, like all other modern institutions, be found divested of those injurious effects that at the outset are anticipated, but in the end seldom found to occur. The apprehensions of the farmers are without any real foundation, as a class. In the words of one of their friends, “they resemble a horse that has been beaten about the head, which renders them suspicious of whatever hand attempts to touch them;” but others of their calling, whose ideas become expanded by frequent intercourse with differ-

ent classes, see in it no cause of alarm; and as these are by far the largest proportion in point of influence, if not in numbers, accustomed to freedom of action without being in any way subject to inquisitorial interference, it renders them exceedingly jealous of any inquiry into their farming proceedings. And whoever may endeavour to coerce them into the measure will find such resistance as may be difficult to overcome; and where landlords take upon themselves to threaten them with expulsion from their farms should they oppose it, as we observed was the case at an agricultural meeting lately reported

in our columns, it tends but to aggravate them to resist in a secret manner; whilst on the other hand, should it be attempted to secure their acquiescence by reasoning, their conviction of its utility might be secured and the measure ultimately carried out with a successful result.

We are quite convinced, from the conversation we have had with numbers of them, that the majority do not at present understand what is the object sought to be attained. Many of them suppose it is for the purpose only of obtaining information by their landlords of the number of acres they have yearly cropped with wheat; whilst others look upon it as a trick concocted by speculators and importers for enabling them safely to carry out their own projects for importing foreign wheat with greater certainty of success!

To us it appears a measure that must ultimately tend more to the advancement of the interests of the farmers than of the merchants or consumers. For admitting that this country produced sufficient wheat for the support of its inhabitants in average seasons, the knowledge before hand of its production might induce speculators so to manage the importation as to reduce the price below its natural level. But when it rarely if ever occurs that sufficient is grown for the consumption, and that quantity is nearly ascertained beforehand, it has a contrary tendency; and when prices are low, importers will therefore become cautious in their transactions, being too shrewdly awake to their own interests to import largely with the certainty thereby of further depreciating prices to their own injury.

Take for example the operation of the statistical information obtained by the French Government. It has been already ascertained that the crop of the last harvest in that country is deficient, and what is the consequence? Every producer of wheat is holding back with the expectation of realizing still higher prices, and Mark Lane has from necessity been largely drawn upon to meet the present exigency. And we may therefore fairly conclude that whenever it becomes ascertained that the crop in this country is also deficient, an expectation of an

advance in price will cause the farmers to keep back their produce in like manner; for it is not with us as with the French: we invariably import to meet our deficiency; and in proportion as our crop is deficient or abundant, so must our importation become extended or diminished to counteract its effects; and as our merchants rarely act upon *pro bono publico* principles, they would be unwise in their generation if they imported to such an extent as to produce any sudden effect upon the market that might consequently entail injury upon themselves.

So long as the produce of this country is not ascertained, and all is uncertain and doubtful, speculation becomes rife; but whenever the result can be safely calculated, men become cautious in their transactions, and are equally instigated to enter our own markets upon the probability of an advance in price, as to rush to a foreign market for the mere purpose of reducing it.

Circumstances will at all times undoubtedly govern transactions, and whenever prices abroad fall greatly below prices here, so long as corn can be imported at a profit, it will be attempted; but this cannot occur whenever the range of prices here is already low, as it would generally be with an abundant crop of our own growth. The probability then of realizing would become more doubtful still, and merchants would move cautiously in their transactions, thereby causing a great stability in prices, tending to the benefit of the farmers, and that at a period when it would be most beneficial to them.

“To be forewarned is to be forearmed” is a proverb as trite as it is true; and admitting that there was once a time “when every rood of ground maintained its man,” in the event of a deficient crop then taking place every one would be prepared for the result by economizing from the beginning. Now, can any one say that what would individually be beneficial would not be so collectively, and that those means which if applied early would ward off starvation to a family, might not be attended with the same result if carried out with the nation at large?

## AGRICULTURAL STATISTICS.

### OPINIONS OFFERED ON THEIR PROPOSED COLLECTION, AT AGRICULTURAL MEETINGS.

There was one subject to which he might draw their attention, because it was now much mooted in agricultural circles—it was a subject worthy of consideration, and on which he would not ask them too hurriedly to make up their minds—he alluded to the subject of agricultural statistics. The object held in view by those who were anxious to obtain those statistics was to ascertain what the country could fairly produce, and that the result should be open for the free information of

the public. He knew there was a feeling abroad that the system would bring the property of farmers too disagreeably under the surveillance of the government (“No, no”). He (Sir J. Buller) would agree with the gentlemen that it would not have that effect; but even supposing that it would, the government was not a despotic government, and what harm could it do to be in possession of the desired information? They were all represented in parliament by members of their (the people's)

own selection, and they (the representatives) would do their duty, and protect the public from any sinister use of the statistics; and if they did not perform that duty, they were amenable to their constituents for their conduct. But it would be desirable that first the subject should be discussed in the country at large—it should, to use a vulgar expression of the day, be “ventilated” throughout the community. They might then candidly weigh the objections against the advantages of adopting the system, and if, as he was inclined to think, they should find that the latter preponderated over the former then they should set about devising some plan by which the statistics might be fairly and honestly laid before the country. He believed it was not too much to say they were encountering a difficulty at this moment over which they would be very much assisted by a system of agricultural statistics, if such were in existence. They found the high prices of corn pressed heavily on the humbler portions of the community. Would it not be well if the minds of the people could be satisfied that there was a just cause for the rise in prices? And that might be done by agricultural statistics, which would have shown this year that we had not had an abundant harvest. It was probable that discontent would evince itself in the manufacturing districts, and that such troubles as they had before seen arise there from short wages and high prices would recur; but it was also probable that if the people of England knew that the commodity they required was not in abundance to render it cheap, their common sense would restrain them from violent outbreaks; they would see it was not the fault of the farmer; and the humbler classes would be more ready to submit quietly to their privations, when they should know that the scarcity was chargeable neither to the government nor to the agriculturist, but was the result of the dispensation of that Great Being before whom they all bowed down. For those reasons he recommended them calmly to consider the question; they should especially think how it would affect themselves, and see if there were any objections that would outweigh the great advantage the country would derive from the government being aware of the quantity of food in the country, so as to be satisfied, beyond doubt, how far the supply would extend. He would not himself express a decided opinion either for or against the system; but he asked them to make up their minds upon it, and when they should state to him their objections, he would consider them, and would then give them his judgment on the whole subject.

—Sir JOHN YARDE BULLER, at Ashburton.

He alluded to the subject of agricultural statistics, and called particular attention to it, because he was firmly of opinion that if the farmers would give their assistance in carrying out the system of statistics they would be greatly benefited. All the great manufacturing interests of the country adopted the plan of statistical information, and by means of the returns published they were enabled to judge of the extent of supply, and consequently of demand. By such a mode the agricultural interest would have the means of ascertaining what the probable price to which their produce would reach. Did they at the present moment know exactly the proper time when to go into the market, or what to take for their grain? It was very well known that many farmers had sold their grain for 60s. or 70s. per qr., when in a few months it had run up to 120s. Now that would not have been the case had the farmers been in possession of proper statistics; and he certainly thought it would be greatly to their interest to supply the statistical information requested by the Government. He believed, as he had said before, that an approximate return would be beneficial to all parties—but he should resist to the utmost any attempt to pry into the private concerns of

any man, or anything like being subject to compulsory measures.—Mr. M. G. BENSON, at Much Wenlock.

On agricultural statistics I must say I think, and no doubt you think, that it is rather too much to require you to open your books to everybody. How would Mr. Bright like for us to go into his office, and after ascertaining what he gave for every pound of cotton bought from American slave states, dictate to him his prices for goods. I look with jealousy on the subject; I would not allow any to come over my farm and hold an inquisition on my profits, and in asking for this I think that they ask for too much.—Sir MONTAGUE CHOLMELEY, at Donington.

Alluding to the subject of agricultural statistics, he did not approve of the system adopted by the government in Scotland, to ascertain how much per acre was grown on every farm; but he threw out for their consideration whether it would not be advisable for the agriculturists to make a return of how many acres, of every sort of crop, was produced on every farm which would let them know the average, and whether there was more or less of any particular kind of grain sown one year more than another.—Mr. B. STANHOPE, M.P., at Horncastle.

He referred to the gathering of agricultural statistics. He did not agree with the noble lord who had been offered the Secretaryship of the Colonies that the gathering of these averages would be of the slightest use to the community. He differed because it was proposed to compile a blue book of some thousands of pages. The reason why he differed from the noble lord was, that it would take some two months to “tabulate,” and he believed that speculators in corn would obtain their information much earlier, and thus render them useless. And if such were not the case, he doubted whether a farmer would read through such a mass, although he might read the report, which was a condensation of this blue book in three or four pages. Unfortunately, this report would be coloured according to the colour of the spectacles through which the gentlemen who compiled the report read the book. The blue book would contain nothing but estimates; Mr. Caird gave estimates, and they might judge by his statements of the correctness of those estimates. It was his opinion that these agricultural statistics would be of no use—at any rate the benefit could not be of the value which it was hoped to derive. He knew that the farmers were willing to take a fair price for their wheat, and did not wish to keep up the present prices.—Mr. WM. HODGSON BARROW, M.P., at Collingham.

Government would compel them (the farmers) to supply statistics, in order to ascertain how much corn was grown in the country, so as not to be dependent upon foreigners for a supply. He believed that if the land were properly cultivated, it would produce more than enough for the population. When Sir Robert Peel brought in his free trade measure the farmers said they should be ruined, and that it would be no use to cultivate their lands, as they would have to sell their wheat at 4s. or 5s. per bushel. It was true there was a fall in the prices at first, but that was owing to the large quantities then in store, and not to the amount imported. An American merchant, who paid a visit to North Devon, told him that the New York merchants at first only sent off supplies to England in order to keep up their own market, and not with a view to obtain profit. This they soon found a losing game, and wheat was now selling at New York at 9s. to 9s. 6d. per bushel. It was, therefore, desirable they should ascertain how much they could grow in their own country. The kingdom was computed to contain 77,000,000 acres of land, of which only 47,000,000 were in cultivation; the remainder consisted of 15,000,000 acres, which could be reclaimed, and 15,000,000 irreclaimable. In addition to the land which could be reclaimed, the

47,000,000 acres could be made to produce much more than at present. The quantity of corn supposed to be imported was 5,000,000 quarters; and, as it was calculated that the lands to which he had referred could, if properly cultivated, produce three times their present yield, there could be no doubt that that quantity could be obtained in this country, whereby we might become independent of the foreigner.—Mr. JOHN EDWARDS, in North Devon.

He wished to correct a statement which he was understood to have made at a meeting a short time ago. It was understood that he, in speaking of the yield of wheat, had said that there was an average acreage yield. What he did say was that there was an average crop of wheat in the country: there was more wheat than usual sown this year, and barley was up to the average. But the next question was—what is an average? He recollected when three quarters were considered as fair an average as four quarters were now. There had been,

during the past five years, about 12,000 acres of land, averaging 10 acres a mile, taken for railways. A gentleman of France went through England, and also through the French empire, and he had come to the conclusion that the English farmer produced double the quantity of corn, meat, and milk, and three times the number of sheep on the same quantity of land, as is produced by the French farmer; but he also found that the cost of producing this increase was ten times more to the English than to the French farmer. He denied that the farmer was wishful to keep up the present prices. Ever since harvest the farmer had thrashed out, and some grain was even thrashed out on the field. It had been said by their president at one of these meetings at Gloucester, that "He should be glad to hear of corn being again imported from the Danubian provinces." He would rather that the corn should be produced by the British farmer.—Mr. CHOWLER, at Collingham.

### THE COLLECTION OF AGRICULTURAL STATISTICS IN SCOTLAND.

SIR,—I am induced to address a few words to you in consequence of your leading article relative to the discussion on agricultural statistics at the Caistor Ploughing Match.

At Caistor, parties seemed pretty well agreed that a return of acreage was unobjectionable, the opposition having reference principally to estimates of produce; these had apparently no supporters, and the plan, followed in Scotland, met with general condemnation. It appears to me, however, that that plan was misunderstood by the meeting. Mr. Banks Stanhope said, "But I confess that the plan which has been tried in Scotland, and which will no doubt be tried here, of calling upon the farmers to make a return of the produce per acre, is objectionable, because I think it impracticable." And again, "To ask any person to give the exact quantity of corn grown on his land, is, I think, next to impossible."

I have from the first opposed the idea of calling on individual farmers to state their produce; such an inquiry is inquisitorial, and would, if tried in Scotland, have marred the success we have met with. We carefully avoid such questions, endeavouring to arrive at a knowledge of the produce by means of general estimates for districts, and the machinery employed for this purpose is assuredly neither unpopular nor impracticable, while the results are, I think, more valuable and less deceptive than allowed by the Caistor speakers.

The whole management is in the hands of the Farmers, of whom there are at present above one thousand occupied in preparing such estimates. The country is parcelled into districts; for every district there is a committee, comprising a Farmer from each parish within it, with a chairman, also a Tenant Farmer, who acts as my immediate correspondent. The members are all selected on account of their experience and knowledge; their attention, before and after harvest, has been directed to the subject; and now, that there has been some thrashing, they are being called together over Scotland, and each committee, within its own district, decides and reports to me what, in their opinion, is the average number of bushels or tons per acre of the different crops.

Surely such reports, emanating from practical men who have been for months studying the subject, and who answer only for their own localities, are more valuable than the dictum of any one individual speaking for the empire at large, however well-informed and intelligent he may be, or than the circulars of the best-informed Corn Factors, who can only ga-

ther their information, at the best, in a like manner, but from parties irresponsible and unknown,

I observe that at Caistor Mr. Torr condemns estimates, and says he did so before the Lords' Committee. But his estimates refer to the produce of *standing* crops valued for out-going tenants; and in committee he advocated an estimate under the heads of "Full," "Average," "Short," which necessarily involve the pre-determination of an average. Our estimates are not taken till the crop has been cut, stacked, and partially thrashed. I have perfect faith in the honesty and care with which they are prepared; and as they exhibit the average acreable results of considerable districts, no man is asked to divulge his produce, and, in the publication, no man's profits or losses are divulged.

I have written this letter very hastily, in a desire to put you right regarding the manner in which the results of the harvest are arrived at in Scotland.

I enclose one of my circulars to Enumerators and Members of Committee, and I am,

Faithfully yours,

6, Albany Place, Edinburgh.

J. HALL MAXWELL.

Nov. 20th, 1855.

The following are the circulars referred to by Mr. Maxwell:—

#### AGRICULTURAL STATISTICS.

DEAR SIR,—Government having resolved to continue the Statistical Inquiry, and the Society being in hopes that you will consent again to act as the enumerator of your district, the approach of harvest makes it necessary I should write to you in reference to the measures for collecting the statistics of this year.

The machinery to be employed is precisely what has already been in operation; but I have every reason to believe that it will now work with greater ease to you, and to all others officially connected with the inquiry.

The schedules will have shown you in what respects the inquiry has been simplified, and I am glad to say that the returns are coming in with a promptness which leads me to hope that the task of collecting arrears will be light in comparison with last year.

The principal duty will be the preparation of the estimates

of produce, and on this point I have sent to all members of committee a letter of instructions, of which I annex a copy.

I have only further to express my hope that, betwixt this and November, you will endeavour not only to inform yourself as to the crops in your district, but, as far as in your power, direct the attention of your committee to the same object.

I am, dear Sir, faithfully yours,

JN. HALL MAXWELL, Sec.

Highland and Agricultural Society,  
Edinburgh, 1st August, 1855.

### CIRCULAR TO MEMBERS OF COMMITTEE.

DEAR SIR,—As I anticipated, in my letter addressed to you in May, the labour connected with the Statistical Inquiry will this year be comparatively trifling, and this will, in a great measure, be owing to the manner in which the lists of occupants have been revised and corrected. I am glad to say, also, that the schedules are being returned with an alacrity which promises a material saving of trouble in the collection of arrears. Your duties will, therefore, be chiefly confined to estimating the yield of the different crops; and, from the ample time this year allowed for that purpose, I hope that this may be done without much inconvenience to yourself. It has been arranged that these estimates shall be made between the 15th and 30th of November, with the view of securing—1st. That they shall be taken all over the country within one fortnight; 2nd. That sufficient time shall be allowed for testing the produce of the crops. The enumerator of your district, therefore, will not

prepare his report before the 15th of November at the earliest, and you have till that time for ascertaining the averages of the parish which has been placed under your charge.

While I leave to your own intelligence the determination of the best means for obtaining accurate information in reference to the crops, I may mention that, last year, some members of committee, in their anxiety thoroughly to discharge their duty, put themselves to trouble which I did not contemplate imposing on them. Some thought it was necessary to collect the acreage of the crops in their parishes, forgetting I accomplish that by means of the schedules. Others thought it incumbent on them personally to inspect each field on every farm, a course which served as a pretext for complaint on the part of the few farmers who were inclined to treat the inquiry captiously. I am anxious not only to avoid such grounds of offence, but to save my committee all unnecessary trouble, and I therefore do not think that so rigid an inspection is in every case requisite, but that you may come to correct conclusions before the end of October by general observation and inquiry. As I have already remarked, however, I must leave to your own discretion the means to be employed, simply asking you to obtain the best information, at the least possible risk of giving umbrage to any one.

The successful results of last year's inquiry, and the satisfaction they afforded to Government and the public, must, I feel assured, have been gratifying to you, and will strengthen your hands in giving further effect to the measure.

I am, dear Sir, faithfully yours,

JN. HALL MAXWELL, Sec.

Edinburgh, 1st August, 1855.

### MANAGEMENT OF SHEEP.

On Saturday, the 3rd Nov., the members of the Reading Farmers' Club met at their Reading Room. Mr. Hicks read the following very interesting and instructive paper: Having been requested by the committee in my turn to open this day's discussion, and being fully persuaded of the great benefit we derive from the friendly interchange of opinion upon practical subjects connected with our business, I venture to appear before you, not so much, believe me, with the idea of offering instruction, as of learning something myself from the observations which I trust my opening remarks will call forth. I have therefore chosen a subject exceedingly simple in itself, but intimately connected with our well-doing as agriculturists, as forming one of our principal sources of yearly profit, but upon which a great diversity of opinion exists, and therefore I have thought it well worthy of an hour's discussion by the members of a farmers' club. The value of the sheep as a domestic animal has been well known from the earliest ages, and we read in almost the first pages of Holy Writ that a man's possessions or wealth were computed by the number of his flocks and herds, but it seems to have been principally valued on account of its fleece, and it is only at a very much later period that its true value as an article of food seems to have been fully appreciated; indeed, at the present time, on some parts of the continent, it is held in very low estimation; in some parts of Russia it is never eaten, and in Spain it is only used by the lowest orders. It does not appear that the sheep was much known in this country until after the invasion of the Romans, who established a woollen manufactory at Winchester, thereby offering, of course, a great inducement for the production of the raw material, and for a long course

of years it continued the great emporium of the woollen trade. In later years, as the feudal system declined, the quantity of sylvan game decreased, and greater care was given to the raising of the domestic animal, better laws were made for the protection of property, and the attention of the flockmaster was directed more to the carcass than the fleece. It has been proved by authentic documents that the number of sheep in the United Kingdom has more than trebled within the last 150 years, affording a conclusive proof of the rapid strides that have been made in agriculture within that period. How has this been managed? The quantity of ground under cultivation has been increased; lands before thought worthless have been brought into cultivation for the production of sheep-keep, when, after the introduction of the turnip crop, it was found that a regular supply of food could be produced for every season. The fact of the sheep living and thriving in climates and situations where other animals would scarcely exist, its cost being within the means of the smallest occupier of land, render it, if not the first, at least one of the most valuable animals on the farm. But I am somewhat running away from my subject, viz., the management of sheep. The two great points which present themselves to my notice, are the breed best adapted to this peculiar locality, and the speediest and most economical means of bringing the same to early maturity. To attempt to go into the merits of each separate breed would, I think, be quite unnecessary. It will be readily allowed that the one best calculated for our use is the Hampshire Down; for although the Sussex is undoubtedly a superior animal as far as regards the quality of its flesh, yet nothing can beat the former for

the strength of its constitution, the quantity and quality of its wool, and the great weight to which it may be brought at a very early age. There are some men who prefer the cross-bred animal—the best I believe to be between the Hampshire Down and Cotswold; but having tried the two sorts side by side for two years consecutively, I must give a decided preference to the thorough-bred. I have always been of opinion that, in this branch of our business, quality will always beat quantity; and as I think it will be allowed that down mutton will at all times command 6d. per stone above the others, the increase of weight not making up for the deficiency in price, the only way in which I should use the half-bred would be as fat lambs. The down has been much improved within the last few years, not by crossing, but by a judicious sorting, of flocks; and to such perfection are they now arrived, that, upon seeing the beautiful specimens of rams exhibited at the late fairs for sale, one is almost tempted to exclaim—Can there be any further improvement? The next point for our consideration is the feeding. The old plan of keeping flocks until six-toothed is become quite obsolete; or at least such are only to be met with in parks, or on the farms of such as farm only for amusement. Since it has been found out that by extraordinary means the sheep may be brought to perfection at twelve months old, and even by ordinary means at twenty-four months, the system of early feeding has been universally adopted throughout the country. An old friend of mine used to say, when talking on this subject, in raising and feeding any animal, “Always remember never to allow them to lose their sucking flesh,” or, in other words, always keep them in a thriving condition. Remember, what is lost in one month takes two to regain; and here we who buy in our lambs at the fall have a great evil to contend against. The breeders, for the purpose of course of making as much profit as possible, at the same time to get credit for their stock, spare neither trouble nor expense, so that we find it extremely difficult to keep them up to the mark. To effect what I said just now, a regular succession of food is required; and not only that, but the quality of each should be superior to the one preceding; but here we have sometimes the season to contend with, and this year is an instance of it, in many places the turnips being superior to the swedes; such being the case with me, the plan I have adopted has been to purchase only a sufficient flock to feed off my best roots. It is a great mistake which many of us make in overstocking, obliging us, as in the last season, when the frost did so much damage to the late crops, to get rid at a disadvantage. The sheep being a ruminating animal, the great business of its existence is to procure

its food and take its rest: during the latter period only it is gaining flesh. The greater opportunity therefore that you give him in procuring the former, the sooner you will arrive at the result at which you aim. The great secret of feeding, after all, is to give the animal the food it likes best at the proper times, and as much, and only as much, as it requires; and here the great benefit of the turnip cutter presents itself to our notice, enabling the shepherd to carry this out to the letter. Where it is not used, a much larger quantity of turnips must be given than is necessary for their consumption, and as a matter of course much must be left behind to be consumed by an inferior flock, exposed to all weathers, and consequently losing much of its feeding property, offering conclusive proof that although the system of trimming and cutting appears at first sight expensive, yet in the end it will be found the most economical plan. The same argument may be applied to the cutting of hay into chaff, as with care not a particle ought to be lost, and especially with hay of an indifferent quality; it helps to get quit of the mildew dust, which is highly detrimental to the health of the animal. It enables you to use a mixture of malt dust, of which sheep are particularly fond, and you thus are able to consume a part of your produce which otherwise would be almost useless. With regard to feeding stuffs, I certainly prefer linseed cake to all others, as being perfectly safe, not only producing flesh and fat, but it acts upon the system generally—acting upon the bowels and digestive organs (from whence all its ailments spring) in a slightly aperient form, and producing a natural and healthy flow of the blood. It is also of great importance to the flock-master to have some slight knowledge of the ailments to which the sheep is liable, to enable him to treat in its first stage anything of the kind that may occur; above all others, that which for some years past has been so detrimental to the interests of the farmer, but which is happily becoming less prevalent, viz., the lameness or foot-rot, seems to me to be less understood than any other. Of the many compositions which I have met with, I have never found anything to entirely remedy the evil. I think that the error which we fall into is, that we try to get rid of the effects without ascertaining the cause. If an animal affected with this complaint be thoroughly examined, it will be found in a high state of fever. This impressed me with the idea that before applying anything of a caustic nature to the part affected some aperient medicine should be used. I have therefore tried Glauber salts in small doses of three ounces, with very great success, having for the last two years had very little to complain of.

## THE IMPROVEMENT OF TURKISH AGRICULTURE.

In a former article on corn supplies from Asia Minor and demand for agricultural machinery, &c., our observations only embraced a general view of the subject; let us now confine ourselves to the agricultural—the improvement of Turkish agriculture and her land-statutes, or the introduction of British agriculture into the Ottoman empire, so modified as to suit its climate, soil, produce, and political state.

The first step would obviously be a firman securing to occupants the full enjoyment of proprietary and tenant-rights, with all the privileges which the improved state of things contemplated demand. And in order the

more effectually to enlist foreign capital and enterprise in the work, the Sultan might propose and conclude, taking the initiatory himself, a treaty with foreign governments—especially Britain, more deeply interested in her prosperity than any other—guaranteeing in all time coming the execution of such a statute, and the enjoyment of its provisions, by those permanently settling in Turkey as Turkish subjects, or agricultural engineers and others, only engaged for specific periods to perform certain improvements.

At the same time an agrarian law might be made by Turkey, dividing one or two millions of acres among

the soldiers of the Allies now in her service, along with her own army, and the heirs of those who are purchasing with their blood her political existence as a nation. In doing so she would only be discharging a duty which she can never otherwise fulfil. And there is no doubt, were it done, that it would be thankfully received and honourably fulfilled, while it would enable England to increase the strength of her foreign legions, such as to overwhelm Russia herself single-handed. The land she can easily spare, without sustaining any territorial loss or revenue arising therefrom, but the contrary. This is manifest, for a large revenue would be obtained directly from the increase of produce or taxes to which such would give rise, while indirectly many advantages would flow from the improved agriculture thus introduced.

With these arrangements, therefore, properly understood, there would be no fear of enterprise and capital to cultivate the much-neglected soil of Turkey, restoring her agriculture to the highest position of any in the world—that which it once held, and doubtless will again occupy when the Mahommedan era has expired or changed its political economy; indeed, the reformation proposed is that alternative change just mentioned. We are aware that, according to the interpretation which some put upon divine prophecy, Islamism must fall by the sword of Russia, and an end be put to the Ottoman empire; but they who thus conclude appear to overlook the fact that the Mahommedan existence of Turkey has already fallen to pieces by the warlike aggression of the "King of the North;" that half the population of Turkey, about to receive their emancipation, are not Moslems; and that nowhere does prophecy say that Asia Minor and Turkey in Europe shall become subject to the Muscovite domination; but the contrary, for although it is said that "He shall enter also into the glorious land," elsewhere termed the "glorious holy mountain," which must mean Palestine, if any part of Turkey; and that Egypt, Lybia, and Ethiopia, "shall be at his steps," "yet he shall come to his end, and none shall help him." It would thus appear, therefore, putting a literal interpretation upon the sacred text, that Russia, anxious to secure possession of Jerusalem and the Holy Sepulchres—those objects of superstition which at present enlist and bind together her enslaved soldiers with the covenanted tie of religion in her long-cherished crusade—would march in the most direct line from Georgia and the shores of the Black Sea bordering thereon, to Palestine, taking possession of Armenia and the "countries" along the Euphrates to the province of Damascus, and from thence to Jerusalem, so as to secure her prize, and entrench herself as strongly among the mountains of Judea as she now is in the Crimea, before the Western Powers have time to throw any barrier in her way. It is possible that Turkey and Russia may sign an ignoble treaty of peace, such as that proposed at Vienna, which neither intends to fulfil, and that the former may be the first to "kick" at the latter; but this, while it would be the literal fulfilment of another portion of the sacred text, would only also be

the dying struggle of the power of the Mufti and Ulemas, whose sun has already sunk below the horizon of political existence—the conclusion of that change already referred to, when the government of Turkey will pass into the hands of its people, as in England—those who can best wield its sceptre, and direct the progress of science. No objection, therefore, can be brought against our proposal on the score that it runs counter to prophecy: on the contrary, the reformation it proposes is in perfect harmony with what has been long-promised, and consequently must prosper eventually, whatever obstacles may be experienced in the outset—the prosperity of the arts and sciences, nationally speaking, going hand-in-hand, as they have done in this country.

In carrying out the details of this important national work, the Turkish Government would have two plans—one or both of which it might adopt. *First*, it could employ a staff of agricultural engineers from this country, give each a fair sized farm, located so as to suit the different districts; and to avoid speculation, let them be engaged on the self-supporting system, each farm not only paying all its own expenses and redeeming interest on capital, but also a small rent to the Government, or those who might be proprietor: and *second*, it might sell large or small estates to suit capitalists, making no distinction between purchasers, but treating its own subjects, and those who might settle and become so, alike: or both these plans could be adopted. But before either could be so profitably, the immense irrigation resources of the country would have to be developed, so as to rouse into action the dormant energy, no less of the soil than inhabitants, especially on the Mediterranean seaboard, where the drought of summer is so severely felt. In the northern provinces, on the shores of the Black Sea, the climate is sufficiently moist, and the soil so well watered naturally, that hundreds of thousands of acres could be broken up immediately, and sown with wheat, with every prospect of plentiful harvests. At the same time, an abundant supply of water at command would everywhere be invaluable, and such works should be laid off, and the necessary steps taken to collect water before any land was sold, as such might throw unforeseen obstacles in the way of subsequent improvement. Moreover, this supply of water would enhance the value of land, and thus stimulate sales, increasing the revenue arising therefrom to the Turkish Government.

These irrigation works, from being of immense magnitude, would require not only an engineering staff for their execution, but a special department of government to protect and control them. The reasons for forming such departments are many and pressing. For new mines of gold and silver, or even salt discovered, branches of the executive would soon be formed for their management; and no Moslem soldier would grumble at being called upon to defend them unto death, if necessary. But here is a source of wealth, far greater than all the gold mines of the world put together, utterly neglected. Yet why should it be so, since neither Islamism, nor any other *ism* else, stands in the way of its being farmed for the public weal? The national interest, therefore,

which Turkey has at stake here, is such that her government can no longer overlook and neglect it with impunity; for if she continues to do so, the world itself will rise up against her, were her own subjects to be silent.

Much of the success of such works would depend upon how they were planned and executed, so as to irrigate the country most effectually at the least expense. For this purpose it would have to be surveyed, and the works planned by men of the highest talent and integrity; while the necessary steps would have to be taken effectually to exclude the selfish jobbing of Pashas, and the hostility of insubordinate Tartar tribes, who might damage the works, or check their execution. The best plan with the latter would be to give them an interest in the prosperity of the works within their territory, on condition of their protecting them, and complying with the arrangements necessary for their construction. And with regard to Pashas, works of such a character ought never to be under the arbitrary government of any individual, but of a jury of some collective body, so circumstanced as to guarantee the general welfare of the community. No doubt before such political machinery could be successfully set in motion, the Oriental character of society would have to undergo a certain change; but with the termination of the present war such a change will be all but completed. In other words, Turkey is at present undergoing a political metamorphosis. The man who imagines that the war is to have no influence upon the social and political state of Turkey is blind indeed to what is now going on in the East, both morally and politically. The present war, therefore, is removing the principal objections which now stand in the way of such improvements, while it is at the same time giving rise to the necessity of their execution.

Like railroads, they may be the property of Government, public or private companies, and individuals, and, like them, executed on contract. Before advertising for estimates, the quantity of water which could be brought to bear upon the soil would be known, and also the results or increase of produce which such would effect, so that when the estimates were received it would at once be known what interest on capital the investment would return; and there can be no doubt but something far more liberal than what railroads return would be realized. To guess at the magnitude of results in a case of this kind would be highly presumptuous; at the same time, it would be still more deserving of blame to overlook the effect of water on the parched soils of the East.

Independent of aqueducts and reservoirs, a vast amount of hydraulic machinery in the shape of centrifugal pumps, pipage, steam-engines, &c., &c., would be required for raising and supplying water in the most successful and economical manner. All these could advantageously be received from this country, in exchange for corn, leaving a long balance in favour of Turkey as national profit.

Water could be rented to farmers, graziers, and gardeners at so much per tun. In agreements of this kind the Turkish farmer would know better how to act than we do, from his present experience; for water is already raised in almost every province of Asia Minor by means

of bullocks, at more than double the expense they could have it at from the public companies we propose, leaving the latter a fortune-making profit. There would be no fear, therefore, about the letting of water; for even at the price which it now costs, any amount of it could be sold, if a supply could only be had. This is the most cheering prospect of the plan—that which practically recommends it to the Ottoman Government with so much force as a national measure of necessitous importance for the improvement of the empire.

Next in importance to irrigation works, are railways. These are not only required for the removal of produce, but for bringing machinery, &c., in return to bear upon the soil. So necessary are they, that it is almost impossible to commence agricultural improvement successfully without them, unless on the immediate seaboard; for the expense of conveying even hydraulic machinery any distance inland would be enormous, owing to the almost entire absence of everything like roads and canals. In England, before the era of railroads, our rivers, canals, and roads enabled us to send our produce to distant markets, and to procure in return the many articles which every farmer requires from the capital and our large manufacturing towns; but let him figure in his mind the English farmer without these, and he may form a pretty correct idea of the position of the Turkish farmer. And the case of the latter is even worse than that of the former, under such circumstances; for, from the mountainous state of the country, many of the rivers are not navigable beyond a few miles from the sea. No doubt, river navigation could be greatly improved at very little expense, especially that of Kisil Irmok, Sakaria, and other large rivers of the north; and thus far might be prudently effected in the outset, to give a general stimulus to the work of improvement. But a country so situated as Anatolia opens up a promising field for railway traffic, there being no opposition almost, and therefore the opening up of it by "iron ways" is the most judicious plan.

With a country being opened up by railroads, and irrigated from its numerous rivers, and possessing a soil and climate the finest in the world, little doubts can be entertained of it as a promising field for agriculture; and with a prosperous agriculture, doubtless a corresponding state of manufactures and commerce would arise. Not even the proverbial indolence of Moslems could withstand the march of progress once in full advance, much less the energies of the Christian population emancipated from the enslaving thralldom of that bondage which has reduced both them and their country to their present servile condition. No! for were they once to see fertilizing rivers flowing along the headlands of their thirsty soil, and railway trains, groaning under cargoes of corn and machinery, snorting past them with untiring activity, they would rise up together in triumph over their present degradation, elevating themselves and their country to that position which they ought to occupy in the world. Our numerous Greek readers, in connexion with the corn trade, must sympathise with these remarks, if they cannot bear witness to their soundness. It is no doubt possible that some of them may

think that progress on the part of many Moslems is not very likely; but granting, for the sake of argument, what we otherwise deny, that such is fact, yet it must not be forgotten that many who are now Moslems for political privileges will be so no longer under the tolerant system which the Ottoman Government must of necessity now adopt; so that were industry and merit to receive its due reward, as it would then do, Islamism, according to such an hypothesis, would, like the morning dew, soon cease to exist, and the country once more be restored to the bosom of Christendom.

How far British skill and capital would become involved in such an enterprise cannot with certainty be said: much would depend upon the political freedom enjoyed. So far as the formation of railroads and construction of works for irrigation are concerned, and also agriculturists for good farming, and practical schools of

agriculture for the instruction of the rising generation, there would be no want of enterprise; for our provinces would soon give birth to men who would make themselves masters of the Turkish language, so as to lead successfully the onward march of things with no less satisfaction to themselves than to their employers.

And with regard to what our rulers or readers may think of these speculative remarks, they obviously embody a great reality, without which the Eastern question, now costing us so much blood and treasure, can never be permanently settled.

NOTE.—Since the above was written, Turkey has taken several initiatory steps in the opening up of the country by railroads and canals, thus proving that Islamism is to be no barrier in the way of those improvements contemplated.

### AN APPEAL TO THE PATRIOTISM OF THE FARMERS.

I cannot allow this season to pass without enforcing again upon the farmers of England, and particularly the young farmers, the duty that rests upon them of instructing their work-people; more especially the male adults and the boys.

It is indeed encouraging to note the change of opinion that has occurred latterly with respect to this subject. A few years ago the general cry was, "Let the Government organize a plan for National Education, and let there be a Minister of Public Instruction, as there is in Prussia and France;" but people are becoming wiser, and they discover that individual untrammelled effort must work out the problem of education.

Instead of looking helplessly on, while the engine of the State ponderously toils for the accomplishment of this Herculean labour, the people of this country are preparing, I hope, to exclaim, "We are the only persons practically responsible for this mighty achievement." There were three measures for national education introduced during the past session. They were the elaborated designs of perhaps the three fittest individuals in Parliament for such a work. Two only need be mentioned: one proposed by Lord John Russell, a man eminently qualified by his experience to deal with, and provide for, the exigencies of the case; the other, upon which Sir John Pakington had worked with unremitting care and great integrity. Sir John's came first before the notice of the House, and proved by the opposition it met with, that it was beyond the ability of its author to provide for those complications that arise out of the involution of conflicting claims. Lord John Russell then, with manifest trepidation, proposed his measure. Like its predecessor, it aroused a storm; but the loudest voice in

that storm was Sir John Pakington's. Indeed, that gentleman, not satisfied with demolishing those principles upon which his Lordship's bill was constructed, demolished those that supported his own too, and the consequence was that they both fell into oblivion. And this is but an illustration to prove the impossibility, looking at the present state of parties in the country, of there ever arising such a thing as an organized scheme of national instruction. The architects may raise a picturesque elevation upon paper, but they never can submit working drawings to the builders.

We have here a pretty-widely acknowledged fact. Huge organizations are too cumbersome—too inoperative. It is requisite that delicate instruments be used, to probe and dissect the great body of ignorance. *Individual effort* is the only means that can accomplish the work both of public *instruction*.

Indeed, such great engines do manifold injury. Men are satisfied because of the existence of such and such a *system*. They point from one school-house to another, saying with proud complacency, "See how education flourishes." The very title of "instruction for all" is calculated to deceive a miscalculating public. They are apt to fancy, that by having the semblance, therefore they have the substance—a common, though not a profitable mistake, truly.

Instead of the semblance of education for the whole, it should be our fervent desire to see that there be the substance of it. This substance exhibited in one part will at length spread and propagate its own likeness over all the other parts. It never would be permitted to stand a barren and solitary memorial. Other men would soon feel a responsibility in other quarters, who now feel none at all.

A large share of this paramount duty to their country's highest interests should be accepted by that influential body of men—the landowners. And there are many noble examples amongst them of thorough self-devotion to this cause. The motions of the army may excite great attention; all the fighting is not to be done, however, with Russia: there is fighting at home, for “the foes of a man's house” are more to be feared than they on the tented plain! We battle against ignorance, and the results of ignorance abroad; but God forbid we should ever have to arm at home to suppress civil commotion, and to keep the peace—a necessity that may arrive to us if we, too, neglect, and by our neglect foster the same fatal cause. There is a more certain way of routing this enemy, of dispelling this evil genius: the “book and bell” are symbols to the potency of which he ever surrenders.

This work mainly, however, must be seen to, and executed by those who come into close contact with the uneducated classes. It is in vain for the farmers to strive to shirk the onus of this responsibility. And when once they see it in the light of a duty—to their country—to their labourers—to themselves, they will, I am convinced, deal manfully with it, and, though with many self-sacrifices, discharge it like true patriots.

Nothing is more true than that the poor of the rural districts have it not in their power to educate, or to provide the means to educate, their children: though the schoolmaster may go to their doors, and beg them to send their children free of all charge, they cannot comply. The deplorable circumstances of the labouring population render it the necessity, not so much the economy, of the parents to make every child self-sustaining, so soon as the poor little thing becomes a verb active, and precocious development endows him with the sad ability “to do, and to suffer.”

The significant words with which he has been familiarised from the cradle, “work, work, work!” are the in-all and the end-all of existence to him. The literal translation of them he has found out to be—the essential “pudding of life,” his highest desire; and while conning this, his first and perhaps only lesson on cause and effect, we may suppose that he wonders now and then why the effect is so untrue to the cause, why such a scant supply of pudding follows upon such an amazing expenditure of strength. This dependence of the working man in reference to capital is not less unjust than the possession of the slave by a master; it is still the continuation of the same fact. And so long as this state shall endure, so long will there be strife, discontent on both sides, reciprocal danger; decline at home, and impotence abroad.

It is perfectly true that the farmers are not to

blame for this state of things. There are some parts of England in which they are to blame; but with these known exceptions, as much wages are given, as, considering the enormous pressure exerted upon them from above, they can afford to pay to their labourers. Under these circumstances the best thing they can do is to enact the *friend*, as well as the master. The poor value sympathy more than they do money, and the bonds of unity may be more indissolubly linked by kindly words, and deeds of amity, than by golden rivets.

It would be well if some hundreds of young men were to engage practically to write an essay during the next four months upon the page which every village in this kingdom affords for such a theme—this being the subject: How is it possible to mitigate the intense pressure of these hard conditions? how raise a class of people upon whose intelligence and morality we are every way dependent? We should then have to boast the most splendid contribution that has yet been made to the sacred cause of human progress to peace and to order.

It is not a small matter to be the benefactor of one's fellow-creatures. The greatest of living historians, Macaulay, has recorded weaker efforts than this would be, to redeem our nation and to raise it in the scale of civilization!

Those great kitchens where the yule-log has burned and shed its merry-making sparks, where the mistletoe has hung, and whose smoked rafters have rung to the hale songs of good cheer which the harvestmen have trolled out with all their mighty force of lungs—yes, these great kitchens must be thrown open once and twice a week, to those earnest bands of men and youths, who are even now awaiting the lifting of the latch and the welcome invitation, “Come in.”

And if the kitchen cannot be so used, or its space be too limited for such a purpose, there is to be obtained somewhere in the village a room large enough, that will serve the occasion, and cost little or nothing. The determined Will never draws back. Is there an obstacle in the way, it is shattered; if it cannot shatter, it goes round; if it cannot go round, it goes over; and if it cannot go over, it tunnels through. Will is omnipotent.

One element of your work, and that the principal, is ready to your hand—the *people to be taught*. When the nation's forms were set, in the time of the good King Alfred, the cry of “All in, all in!” had very little effect. The birch rod had to go out amongst the elders and the youths alike, and bring them with tingling skins to their lessons. You have but to open your doors, and your rooms are filled.

“But when we have them there,” you ask, “what are we to do with them?” Teach them. “Teach them what?” First impart to them the rudiments of all

knowledge, and above all things teach them that you love them, and have their temporal, spiritual, and moral welfare at your heart's core. This latter is a worthy lesson, and though learnt slowly is but the more surely learnt.

Be assured that the work is very easy. Such scholars are not critical; and the teacher, however much his own education may have been neglected,

will have plenty of time to keep far ahead of his pupils. Particular power is not necessary, but particular *painstaking*.

Nor is it with rare and extraordinary talents conferred upon the few, but with habits and principles which may be cultivated by all, that are linked our best securities for the reformation of the world.

F. R. S.

## THE BEST SYSTEMS OF TENURE TO INSURE THE PROPER CULTIVATION OF THE SOIL.

To a country like England, limited in extent, and with a daily-increasing population, rendering her more or less dependent upon wheat of foreign growth, it would appear to be of the first moment that her laws regarding the purchase and letting of land should be as near perfect as legal application and practical requirement would make them. The grand object is to secure the largest amount of produce, by giving all possible scope to the talent and capital of the occupier, and, at the same time, securing the landlord from injury arising from the wilfulness or ignorance of the tenant.

Let us take a cursory glance at the system pursued, with its results. The prevailing mode of letting land in most English counties is by the old system of yearly tenancy, subject to determination at six months' notice, and, too frequently, without any well considered agreement. A yearly tenant has indeed no security whatever for any outlay he may have made for the improvement of the farm. Let him drain, or manure ever so wisely, the benefit is *secured* to him for six months only, from the time of his receiving notice. Upon the arable portion the landlord claims the straw entirely, and the hay and green food for cattle at a slight remuneration only, or compels the tenant to fodder out the whole with cattle, without compensating him for the manure that may be left after such process is ended. In fact, such are the restrictions and the power exercised, that few tenants will be found to advance the cultivation of their occupation by a necessary application of capital and skill, feeling assured that it will only tend to produce one of two results, viz., an advance in the amount paid as rent, or the necessity of quitting the land upon their refusal to comply with this demand.

The other mode generally resorted to is by a demise of the lands upon lease for a term of years, at a fixed or fluctuating rent, dependent upon the price of grain, or other farm produce; and to guard the interests of the landlord, several skins of parchment are usually written over in legal form, making the most absurd restrictions upon cultivation

and management, and inflicting heavy penalties by way of increased rents during the remainder of the term. Any one of these is of itself sufficient to ruin a tenant, should the landlord ever bring them to bear upon him; whilst, on the other hand, whatever improvements the occupier may have made, become as "dust in the balance" when the day of reckoning arrives, and which, whenever he may become obnoxious as a tenant, is pretty certain to be accomplished.

It will be seen, then, that by neither mode is security given to the public for the due cultivation and proper management of the soil. By a bare yearly tenancy, the outlay of capital is restricted, or not secured; neither is the due cultivation of the land provided for; and by lease, the tenant becomes so much restricted by obnoxious covenants, that he is rendered unable to cultivate the land with advantage. Should he attempt to do so upon any system that may appear to him better, he will probably render himself open to expulsion from the farm by ejection, or be subject to increased rents in such amount as to render it impossible for him to continue the occupation.

If a well-defined system of letting and hiring land were adopted for particular districts, no reasonable objection could be taken to yearly tenancies; but in that case, agreements of leases for one year should always be entered into, and which agreements might be so drawn as to remain in force until either party gave to the other six months' notice, computed from the expiration of each yearly hiring. Such agreements should stipulate the course or rotation of the cropping, should provide for the remuneration of *improvements* made by the tenant, in proportion as they might be unexpended, and also for the payment of the straw and hay and root crops, at what they might be worth to expend upon the land, with the value of the manure that would arise therefrom in addition. Or a full market value should be allowed for (less the cost of converting into money) the hay and straw, and such price by valuation as the root

crops would produce if sold to be consumed upon the land. Other restrictions upon the tenant, by way of repairs, ought never to exist under yearly tenancies. The landlord should take them entirely upon himself, and look to the money sum paid by way of rent alone for his compensation.

In leases, an open and unrestricted system of cultivation should be allowed, so far as could be accomplished to secure the landlord from injury, by stipulating that a certain amount of land for fallow and green crops should be annually made; a certain limitation as to the quantity of grain crops to be yearly grown, and their rotation, should be properly defined; and, instead of heavy penalties, or increased rents, some mode of arbitration should be set forth, whereby the landlord might call upon the tenant, at any time during the lease, to pay for

any damage that might accrue to the farm by his mismanagement. And, in the event of his persisting in such a course as, in the opinion of the arbitrators, had become injurious to the property, a certificate from them to that effect being obtained, the landlord should have full power to eject the tenant, by notice in the same manner as when under a yearly tenancy.

We trust that in advancing these propositions our endeavours will be considered and accepted as an attempt to better secure the interests of both landlord and tenant, as well as to insure to the public the largest production of human food from the soil—which we hold will never be accomplished until the tenant feels that his capital is safe, and his occupation secure.

MOLASSES FOR FEEDING PURPOSES.

*The Field* gives the following :—

Last spring, when feeding stuffs became scarce and unusually dear, it became of much importance that every product of the farm, containing nutriment, however small, should be made available. Oilcake was no longer economical, but a necessary evil.

It was in this emergency that some of the farmers in Norfolk, Suffolk, and Essex, availed themselves of their wheat-straw for feeding purposes; for they found it of much greater importance than is commonly supposed; containing, as it does, a considerable portion of nutriment—too much to throw away, but not sufficient to be palatable to stock and profitable for feeding purposes without additional aid.

Hitherto farmers have been too apt to consider straw of little worth, because it was not saleable, and is rarely estimated separately from the yearly produce of the soil. But though seldom saleable, except in the vicinity of towns, it has an intrinsic value; not only for making manure, but as a means of feeding stock.

As the amount of saccharine matter contained in our root crops, hay, &c., determines in a great measure their respective value; and as all animals are fond of sugar and treacle, these articles first suggested themselves as the best combination to turn into account the nutriment contained in straw. On inquiry, however, it was found that the inferior sugar paid a duty of £11 per ton, and treacle £4 5s. per ton; and, considering the composition of each, it was obviously in favour of the latter—the cost, with duty paid, being £16 10s. per ton, or about 1½d. per lb.

We find, from Professor Johnson, that 450 lbs. of good wheat-straw is, in nutritive matter, equal to 112 lbs. of good upland hay; the question then arose, how can 450 lbs. of straw be made of the same value as 450 lbs. of good hay, and at what cost?

It was thought by those who had considerable experience in the use of treacle, that to make 450 lbs. of straw correspond in value to its weight in hay, it would require 18 lbs. of treacle to every cwt. of straw; and the calculation stood thus :—

	£	s.	d.
450 lbs. of good hay .....	1	2	0
450 lbs. of good wheat-straw .....	0	8	0
72 lbs. of treacle, at 1¾d. ....	0	10	6
Expense of cutting the straw into chaff and mixing the treacle .....	0	1	0
	0	19	6
Difference .....	0	2	6

Or about 12s. 6d. per ton in favour of the use of molasses; besides valuing the straw as though the farmer had the advantage of living near a town, and the privilege of selling it off the farm, which few have: indeed, under the most liberal agreements, the farmer is not allowed, at the expiration of his tenancy, more than a consuming price of one-third the value for the straw he leaves.

If this calculation bears the test of a trial, how wonderfully it may add to a farmer's resources at all times, but particularly in a season of scarcity! I must observe here that it was made in April last (1855), but since then the price of treacle has advanced.

It seems to me extremely likely that if the plan of using molasses succeeds, and becomes general, it must come seriously into competition with oilcake, and make it more reasonable in price; because oilcake will be made, whether or not it can be sold at a high price, as long as oil shall be crushed from seed; and, if a high price cannot be obtained for the cake, the oil-crushers will take a much less price rather than keep it. The price of cake either keeps the price of oil lower than it would be, or gives a higher profit to the oil-crushers. Should the price of oil remain the same, after farmers shall have manufactured mixtures at home for feeding their cattle, it will show that oilcake has hitherto realized extravagant prices—which I have for some time suspected to be the case, as I cannot understand why an article that must be made at all events, should realise in the market so large a price as £12 and £13 per ton, unless the demand for it was inordinate.

I believe that the experience of farmers in the eastern counties proves molasses to be a safe and economical method of feeding bullocks, sheep, young stock, and cart-horses, and for milking-cows to a certain extent.

Bullocks have been kept in equally good fattening condition by using 1 lb. of treacle per day with cut straw, thereby saving  $1\frac{1}{4}$  bushels of roots.

It is considered best used with roots, cut small, and a little meal, well mixed together, with cut straw or inferior hay; and it is thought more economical to spend a shilling on a fattening bullock after the following scale—4d. root, 5d. corn or cake, 3d. treacle and chaff—than to give either more root or more corn.

For every description of feeding sheep it answers well; but its probable influence on breeding ewes will be considered afterwards, in its application to dairy cows. It is an excellent mode of rearing young stock: they are found to grow famously. Cart horses thrive wonderfully upon it; but it is thought it can only be used with advantage to horses of slow draught, and not for the race-horse, hunter, carriage-horse, or hack.

Cut straw, with a solution of treacle, is quite equal in value to good or middling hay, in proportion to the amount of saccharine matter added to it, and I should recommend its use for dairy cows up to a certain point; that is, as far as making straw equal in value to hay, during trying springs, and in making inferior hay (of which, I believe, there is much this season) nutritious and relishing. But, beyond this, I recommend that it be used cautiously, from its reported tendency to diminish the secretions of, and cause an incipient disease of, the liver; which, although favourable to the production of fat, is not equally so to milk and cream.

It is a well-known fact, that when ewes in lamb have been

principally fed on root-crops, some time before the lambing season, their lambs are small, and themselves deficient in milk. When ewes are wholly placed upon turnips, abortion is brought on, and particularly so when the turnips have been grown with guano.

These causes are, by some farmers, supposed to arise from an excess of saccharine matter in the roots. And if this be the effect on ewes, I should be afraid of using it too freely to dairy cows, or any other description of breeding animal.

By consuming wheat-atraw, a farmer returns nearly as much phosphate of lime (for which his land is so grateful) as though he consumed meadow-hay; and by using an acre of wheat-straw, he benefits himself more in point of nutritive matter than if he used an acre of oat-straw; for, in an experiment by an eminent chemist, it was found, that the acre of wheat produced 3000 lbs. of straw, which afforded 1250 lbs. of nutritive matter; and an acre of oat-straw, weighing 2700 lbs., gave 1161 lbs. of nutritive matter.

I was told by a leading agriculturist, who had a good deal of experience in its use, that he believed the number of sheep and cattle upon many farms would be augmented by 25 or 30 per cent. at least, by giving roots in diminished quantity, with a liberal supply of sweetened cut straw. With the limited experience farmers have, in the use of molasses, the comparative value of the manure made by using treacle has not, I believe, been ascertained.

W. BECKETT, Agent to the  
Suffolk Estates of — Tollemache, Esq.

## ARTIFICIAL GUANO FROM FISH.

Since the time when a sort of premium was offered for the discovery of a manure equal, or approaching in its fertilizing power, to good imported guano, it became an object of importance with me to urge forward the progress of investigation. I proposed, in quarters more or less influential, to employ the refuse of fish, everywhere wherein it could be found in quantities; and now, in consequence of having met with an article tending, though not directly, to bear upon the subject, I shall bring the substance of it before the readers of the *Mark Lane Express*. They who hope to manufacture a home compost that can compete with that costly manure, which now has risen in price to £11 and £12 per ton, must not be content with employing fish alone; the fecal excretæ of birds are required to contribute those substances, urinary and alvine, that pass together from poultry and birds of all descriptions. With this remark I come to the article named above.

The salmon—that king of fish—with its congeners, are losing ground with us; their numbers have long been on the decrease, and unless some counter efforts be speedily resorted to, their extinction may be more than threatened. An artificial means of increase has lately been proposed, particularly by our neighbours, and now allies, the French, which has excited great attention. The annexed passage from an article upon fish-culture (*"Pisciculture,"* Fr.), can scarcely fail to startle those readers who are interested in a discovery that will tend to promote very general comfort in the first place, and then lead to a corresponding agricultural profit.

"About the middle of last century salmon abounded in many of our northern rivers; we have an authenticated account of no fewer than 2,500 having been caught at one haul in the river

Thurso. For many years the decrease has been general and rapid, so as to give rise to the apprehension that if the fisheries do not become altogether ruined, they will cease to be of great national importance. While the rental on the Tweed in 1814 amounted to £20,000, we now find it as low as £5,000; and in 1846 only 3,000 boxes were sent from Berwick-upon-Tweed, whereas in 1804 the number was 13,000. A somewhat similar ratio of decrease has taken place in most of the great salmon rivers."

Space is not at command to enter upon the details of the numerous processes employed in France to multiply in profusion the species of the salmon family; they must be deferred to another opportunity, as it would be unjust to slur over the leading facts which are already patent. If the ever-varying prices of salmon be of little moment to those who can afford to purchase it as a luxury, at from 25 to 300 per cent. above that of butcher's meat, so far well; but if the interests of the lower and working classes be worthy of consideration, the more than thorough renovation of the exhausting sources, and the adoption of means which could ensure an abundance far surpassing that of by-gone times, ought to be undertaken as an imperative duty.

Wherever fish abounds, its offal would be at hand; and thus a quantity of decomposable organic matter would come within reach of the agricultural interest, in a condition more appropriate to the desired object than when the sprat and herring were thrown over arable land, as some twenty or thirty years ago they used to be, to the great annoyance of a whole neighbourhood.

Croydon.

JOHN TOWERS.

## MEETING OF THE GLOUCESTERSHIRE AGRICULTURAL SOCIETY AT CIRENCESTER.

If proof were wanting of the growing popularity of agricultural meetings, it would be found in the gratifying result of that which was held on the 6th Dec., at Cirencester. For a long series of years two local societies have existed in this county—the Cirencester and the Gloucestershire—between which some little jealousy was maintained. This is now happily quite overcome by the amalgamation of the two: thus, the farmers of the hills and the vale are brought together in a spirit of the most unqualified concord. It has been our good fortune to attend many local agricultural meetings, but we never remember one the success of which has been more decided than this has been.

The meeting was held in Oakley Park, under the patronage of Earl Bathurst, the president of the society for the year. His lordship took the chair at the dinner (held at the King's Head), which was well supported, more than two hundred guests being present, among whom were Viscount Emlyn, M.P., the Honourables W. Bathurst, A. Ponsouby, M.P., the Hon. and Rev. G. Talbot, Messrs. E. Holland, M.P., J. R. Mullins, M.P., T. W. C. Master, J. H. Elwes, E. Bouley, F. Cripps, T. C. Hayward, D. Niblet, J. J. Mechi, and many other gentlemen of the county and neighbourhood. Many able and interesting speeches were made on the leading agricultural topics of the day. As will be seen by the list of awards, Mr. Stratton, as usual, carried off the prizes for shorthorns; and it is only an act of justice to the unsuccessful competitors to observe that his were most superlatively fine animals. There were some good specimens of the Cotswold sheep, and the pigs were worthy of general commendation. The show of horses was the weakest feature of the exhibition, and with the exception of a remarkably clever hunter, the property of Mr. Plummer, we cannot eulogise the others in the terms we should wish. The show of poultry was excellent, and the pen of Dorkings to which the first prize was awarded were most splendid birds.

Several additional premiums were proposed for next year by gentlemen having a local interest in the welfare of the neighbourhood, among which we must notice in the highest terms the offer of Mr. D. Fullerton, for the most promising colt or filly, four years old, adapted for hunting; an example which we hope to see followed at many other meetings.

## LIST OF PREMIUMS.

We, the under-signed, the Judges appointed to determine and award the several premiums offered by this Society, do make our award as follows:—

SHORT-HORNS AND OTHER BREEDS, EXCEPT  
HEREFORDS AND DEVONS.

For the best bull above two years old, 10*l.*, J. H. Langston, Esq., M.P., Sarsden; second best 5*l.*, Mr. Richard Stratton, Broad Hinton.

For the best bull above one and under two years old, 10*l.*, Mr. William Hewer, Sevenhampton; second best 5*l.*, Mr. Thomas Morris, Maisemore.

For the best bull, cow, and offspring, 10*l.*, Mr. Richard Stratton, Broad Hinton; second best 5*l.*, Mr. William Slatter, Stratton.

For the best breeding cow, 6*l.*, Mr. Richard Stratton, Broad Hinton; second best 3*l.*, Edward Bowly, Esq., Siddington.

For the best pair of breeding heifers under three years old, 10*l.*, Mr. Richard Stratton, Broad Hinton; second best 5*l.*, Mr. Thomas Mace, Sherborne. Commended: Those shown

by E. Bowly, Esq., of Siddington; Mr. John Beach, Redmarley Park.

For the best pair of breeding heifers under two years old, 8*l.*, Mr. Richard Stratton, Broad Hinton; second best 4*l.*, Edward Bowly, Esq., Siddington.

## HEREFORDS AND DEVONS.

For the best bull above two years old, 10*l.*, Mr. William Perry, Cholstrey; second best 5*l.*, W. Styles Powell, Esq., Hereford.

For the best bull above one and under two years old, 10*l.*, Mr. W. Raesterd, Thringhill; second best 5*l.*, Robert Bidulph, Esq., Ledbury.

For the best bull, cow, and offspring, 10*l.*, J. E. Lloyd Hewer, Esq., Hereford; second best 5*l.*, Mr. William G. Bennett, North Cerney.

For the best breeding cow, 6*l.*, James Ackers, Esq., Prinknash Park; second best 3*l.*, Mr. John Smith, Sevenhampton.

For the best pair of breeding heifers under three years old, 10*l.*, Mr. William Raesterd, Thringhill; second best 5*l.*, Mr. John Smith, Sevenhampton.

For the best pair of breeding heifers under two years old, 8*l.*, Mr. Edward Price, Pembridge; second best 4*l.*, James Ackers, Esq., Prinknash Park.

## FAT CATTLE.

For the best fat steer, 6*l.*, Right Hon. Earl of Radnor, Coleshill; second best 4*l.*, Mr. R. Stratton, Broad Hinton.

For the best fat cow, 6*l.*, Mr. R. Stratton, Broad Hinton.

We highly commend the cows shown by Mr. John Lane as extra stock.

## SHEEP—LONG WOOLS.

For the best 10 breeding ewes, not more than 35 months old, 10*l.*, Mr. William Smith, Bibury; second best 5*l.*, Mr. W. G. Bennett, North Cerney.

For the best 10 breeding theaves, not more than 23 months old, 10*l.*, R. A. College, Cirencester; second best 5*l.*, Mr. William Smith, Bibury.

For the best 10 ewe lambs, not more than 11 months old, 5*l.*, Mr. Thomas Porter, Baunton.

## SHORT WOOLS.

For the best 5 breeding ewes, not more than 35 months old, 5*l.*, Mr. G. N. Hulbert, Bagendon.

For the best 5 breeding theaves, not more than 23 months old, 5*l.*, Mr. G. N. Hulbert, Bagendon.

## CROSS BREED.

For the best 5 breeding ewes, not more than 35 months old, 5*l.*, Edward Bowly, Esq., Siddington.

For the best 5 breeding theaves, not more than 23 months old, 5*l.*, Mr. Charles Randell, Chadbury; second best 2*l.* 10*s.*, Edward Holland, Esq., M.P., Dumbleton.

## FAT SHEEP—LONG WOOLS (of any breed or cross).

For the best 3 shearhogs, not more than 23 months old, 6*l.*, Mr. William Slatter, Stratton; second best, 3*l.*, Mr. William Hewer, Sevenhampton.

For the best 10 wether tegs, not more than 11 months old, 5*l.*, Mr. James Newman, Calmsden.

For the best 3 fat ewes, 5*l.*, Mr. William Slatter, Stratton.

We highly commended Mr. W. Smith's ewes as extra stock.

## SHORT WOOL (of any breed or cross).

For the best 3 shearhogs, not more than 23 months old, 6*l.*, Mr. Samuel Davis, Roves Farm; second best 3*l.*, Mr. Charles Randell, Chadbury.

Commended—extra stock—Mr. William Smith, Bibury, 3 ewes.

## PIGS.

For the best fat pig, 3*l.*, Mr. E. Ruck, Down Ampney. We commend all the pigs in this class.

For the best boar pig under a year old, 4*l.*, Mr. Charles Randell, Chadbury.

For the best boar pig more than a year old, 4*l.*, J. C. Bengough, Esq., The Ridge.

For the best sow pig under a year old, 3*l.*, Mr. E. Drew. We highly commend Mr. W. Hewer's, Sevenhampton. Commended, Mr. Thomas Blandford.

For the best sow pig over a year old, 3*l.*, Mr. W. Hewer, Sevenhampton

We commend all in this class. We particularly commend eleven pigs, the produce of the prize sow in this class.

#### HORSES.

For the best mare and foal (her own offspring) for agricultural purposes, 8*l.*, Mr. Samuel Bidmead, Bisley; second best, 4*l.*, Mr. William Hayward, Kemble.

For the best stallion for agricultural purposes, 10*l.*, Mr. John Duck.

For the best filly for agricultural purposes, 5*l.*, Mr. Samuel Bidmead, Bisley; second best, 3*l.*, Edward Holland Esq., M.P., Dumbleton.

For the best horse or mare between the ages of four and six years (got by a thorough-bred horse) adapted for the road as a hack and in harness, and also for hunting, 10*l.*, Mr. Stephen Plummer, Siddington, highly deserving the prize.

#### ROOTS.

For the twelve best swede turnips, drawn from a field of not less than four acres, 1*l.*, Mr. R. Stratton, Broad Hinton.

For the twelve best mangold wurtzel, drawn from a patch of not less than one acre, 1*l.*, Mr. W. J. Sadler, Purton.

For the twelve best carrots, drawn from a patch of not less than one acre, 1*l.*, Charles Lawrence, Esq., Cirencester.

For the twelve best cabbages, drawn from a patch of not less than one acre, 1*l.*, Charles Lawrence, Esq., Cirencester.

#### WHEAT.

For the best sack of red wheat grown in the year 1855, taken from a winnowing of not less than sixty bushels, 2*l.* 10*s.*, Mr. G. N. Hulbert, Bagendon.

#### CHEESE.

For the best hundred-weight of thick cheese, not more than six cheeses to the hundred-weight, 2*l.*, Mr. W. Surman, Maisemore.

For the best hundred-weight of thin cheese, 5*l.*, Mr. W. Surman, Maisemore.

We must express our surprise at the small number of sheep shown, especially in the breeding classes, in this sheep district. Some of the animals in the breeding sheep classes we consider to be in too high condition.

JAMES WALKER,  
HENRY MANN,  
WILLIAM COTHER, } JUDGES.

### THE WIRRAL AGRICULTURAL SOCIETY ON AGRICULTURAL STATISTICS.

RESOLUTIONS ADOPTED AT A MEETING OF THE WIRRAL AGRICULTURAL IMPROVEMENT SOCIETY, CALLED FOR THE PURPOSE OF DISCUSSING THE MEASURES HITHERTO ADOPTED BY THE GOVERNMENT FOR COLLECTING THE STATISTICS OF AGRICULTURE IN ENGLAND, AND HELD AT THE MONKS' FERRY HOTEL, BIRKENHEAD, ON THE 6TH OF NOVEMBER, 1855.

This meeting having had brought before it, and having considered, the following documents, viz. :—

- 1.—The Reports of Sir John Walsham and Mr. Hawley on the Agricultural Statistics of Norfolk and Hampshire, 1854;
- 2.—The Reports of Poor-Law Inspectors on Agricultural Statistics (England), 1854; and
- 3.—The Report from the Select Committee of the House of Lords appointed to inquire into the best mode of obtaining accurate Agricultural Statistics from all parts of the United Kingdom, and to report thereon

to the House, together with the Minutes of Evidence and the Appendix, 1855;

#### HAVE RESOLVED—

1.—That the legitimate purpose of the proposed system of agricultural statistics is to inform producers of, and dealers in, agricultural produce, as frequently and as rapidly as may be, of variations in the quantity produced, from time to time, in the United Kingdom.

2.—That this information, to be trustworthy, must be complete; and that to be complete, it must be gathered at one time into one place, and issued thence in such a manner as to be readily accessible to, and easily understood by, all who may think proper to avail themselves of it.

3.—That the only valid objections which have been or are offered by the producers to all or any of the schemes for collecting agricultural statistics, resolve themselves into an unwillingness on the part of individuals needlessly to expose their affairs to other persons.

4.—That this unwillingness, when duly inquired into, will, in most cases, be found to be justified by an unsatisfactory state of the relation of landlord and tenant; and occasionally, though less frequently, by other circumstances.

5.—That whether this unwillingness to furnish the required information be or be not justifiable, there can be no doubt that it exists to an extent likely, if it be not duly cared for, to vitiate, more or less, the results of the inquiry.

6.—That no compulsory enactment will be sufficient to overcome the effect of this unwillingness, so long as it takes the form referred to in the third resolution.

7.—That it is not essential to a complete collection, classification, and publication of the required statistics, that any such disclosure of the affairs of individuals as is objected to, should take place; and hence, that those who candidly entertain such objection are justified in resisting the operation of any scheme which shall not at least render such disclosure improbable.

8.—That whatever the method employed, the information demanded cannot be put into a shape adapted for its sole legitimate use—the use of the public at large—until it has all been collected into a single office in London.

9.—That the less it is meddled with, in point of form, from the time it leaves the hands of the producer, till it passes into such an office, the more likely is the result to be correct.

10.—That it is not the end, but the method of attaining it, that is objected to; and that this method will continue to be objectionable to the producer so long as he shall be required, in rendering the information called for, to submit it, against his will, to the scrutiny of any person whatever in his own locality.

11.—That the interference of local officers should therefore, and especially in the present state of things, be limited to the distribution of the necessary forms, the instruction of those who may need instruction in filling them up, and any assistance the authorities in London may need, after the returns have been sent in to the head office, in ascertaining (1) that each person required to make a return has made one; and (2) whether, where suspicion of error or fraud exists, the suspicion is well or ill-founded.

12.—That it is not denied, or even doubted, that a local inspection of details would tend to check fraud or error as sources of inaccuracy. And were the position of the tenant-farmer, in general, in a more satisfactory state, the application of this check would not be objected to. But this Society is strongly of opinion that, as things are, all who are interested in the formation of a sound system of agricultural statistics—and none can be more interested than the tenant-farmer him-

self—and shall, in a candid spirit, take the trouble to acquaint themselves with the facts, will not only see that this check is at present inapplicable, but will also recognize in its non-applicability, and the probable consequences, an additional reason, on behalf of the public interest, for every effort that may be made to place the tenant-farmer in a position better adapted to the increased wealth and intelligence of the class, and more in accordance with the spirit of the age.

13.—That in order to obviate all reasonable objections on the part of the tenant-farmer, this Society would suggest that each occupier, having received his schedule, and such instructions for filling up as he may think proper to require of the district enumerator, shall be at liberty either to hand the schedule, when filled up, to the enumerator, or to send it, by post, direct to the Board of Trade. And that in order to enable the officers appointed to examine and classify the schedules in London to detect omissions or errors, the enumerators be required to send to London, with such schedules as may be handed to them, a list of the occupiers to whom they had delivered schedules, with the number of acres in the occupation of each, to be taken from the local rate-books—a measure this Society believes would be practicably efficient, and satisfactory in its results to all parties.

14.—That these resolutions be published, in such a manner as the Committee of Management may deem most likely to render them useful.

Signed on behalf of the meeting,  
 J. T. DANSON, Barnston, Chairman.  
 W. B. BURNHAM, Spital, Hon. Sec.

DRY DRILL v. WATER DRILL.

SIR,—The water drill has now ceased to be a novelty. Since last year its use in this neighbourhood has been very greatly extended; and opinions relative to its value on our *fen* soils have undergone a thorough change. Many who last year regarded it with a good deal of suspicion and apprehension, have since been led to acknowledge its merits, and have pronounced favourably of its effects where it has been submitted to a trial; and I feel fully persuaded that the more extensively the water drill is used, and the more thoroughly and impartially its worth as compared with the dry drill is tested, the more largely will it gain esteem and favour; and whatever a man's sentiments may be, and however formidable his prejudices may appear, they must of necessity yield to the force of *facts* acquired by actual experiment. Hence it occurs that a simple narrative of *facts* is always far more fruitful of conviction than a mere statement of *opinions*, however well formed or well expressed. But to ascertain *facts* with correctness, experiments require to be carried out with the utmost care and fairness. This I endeavoured to do last year, and gave to the public the results with every needful particular. And again this year I have been induced to make a similar series of experiments, and throughout have endeavoured to observe the strictest impartiality. I append a table showing full particulars of these different trials, the whole of which were made with mangels.

But I may here observe, that this year I also made a precisely similar class of experiments with *colesseed*, and although I cannot furnish *actual results*, as such a crop cannot be tested by the *weighing machine*, as the mangels can, I may however state that the water drill produced from 30 to 50 per cent. more feed than the dry drill, all other things being equal. I ought also to remark that all these several experiments, as well

as those of the mangels, were inspected and carefully examined by several practical farmers, resident in the neighbourhood, and who can bear testimony to the perfect accuracy of my statements.

Upon referring to the table below, it will be seen that in Nos. 1, 2, and 3 there is considerably less produced per acre, from both drills, than in Nos. 4 and 5. This arises entirely from the fact that in Nos. 1, 2, and 3 the soil is of a very hot, gravelly nature, and consequently much less adapted for the growth of mangels than Nos. 4 and 5, where the subsoil is cool and moist, and the land necessarily much less affected by drought. But notwithstanding this, Nos. 1, 2, and 3 are soils of greatly superior quality to Nos. 4 and 5 for general farming purposes. I feel it important to offer these few explanatory observations, although the relative merits of the two drills are in no degree affected by these peculiar circumstances.

No. of experiment.	When sown.	When weighed.	What drill used.	What artificial manure used.	Cost per acre for artificial manures.	Farm-yard manure per acre.	Produce per acre.
1	April 26	October 16	Water drill	1½ cwt. Lawes' super-phosphate of lime	S. D. 11 3	13 loads	Tons cwt. st. lb. 18 2 4 0
2	April 25 and 26	October 16	Dry drill	1½ cwt. Lawes' super-phosphate of lime	11 3	13 loads	8 10 5 10
3	April 24 and 25	October 15	Water drill	1½ cwt. Lawes' super-phosphate of lime	11 3	13 loads	19 2 6 12
4	April 21	October 17	Dry drill	2 cwt. Lawes' super-phosphate of lime	15 0	13 loads	19 2 6 12
5	April 27 and 28	October 17	Water drill	1½ cwt. Lawes' super-phosphate of lime	15 0	13 loads	12 15 5 10
			Dry drill	1½ cwt. Lawes' super-phosphate of lime	11 3	13 loads	27 5 5 10
			Water drill	1½ cwt. Lawes' super-phosphate of lime	11 3	13 loads	16 10 0 0
			Dry drill	1½ cwt. Lawes' super-phosphate of lime	11 3	10 loads	30 0 0 0
			Water drill	1½ cwt. Lawes' super-phosphate of lime	11 3	10 loads	20 13 4 8

I must thank you for your kindness in permitting me to trespass so largely upon your space.

I am very truly yours,

ALFRED S. RUSTON.

Wenny Road, Chatteris, Nov. 8, 1855.

## STEAM CULTURE.—THE PLOUGH.

In a former article we found considerable difficulty in the way of steam culture on the rotary principle. At present we propose investigating a few of the objections to steam ploughing.

Of late it has become fashionable, with a certain section of the public mind, to condemn—though revered by our forefathers with a sort of religious veneration—the plough, as possessing all the bad qualities imaginable. “Squeezing,” “screwing,” “wedging,” “consolidating,” &c., have become as familiar to the ear as “household words.” With perfect cultivation it has nothing to do. The baron’s hall and the ploughman’s cabin, as well as the fireside of the farmer, have rung with the ever-welcome toast of “Speed the plough;” but the mechanical progress of steam-going times is about to proscribe all this. In short, to enumerate all the imperfections of the plough would fill a volume.

That conclusions of this kind are premature, is a proposition which hardly requires proof; for though “there is nothing perfect under the sun,” it is always prudent to observe the well-known practical maxim, “Throw not aside a bad tool until a better is found.” It will be high time to condemn plough cultivation when mechanical science has given the agricultural world something better to supply its place.

The objections to the plough are not only thus easily set aside by a general sweeping refutation as above, but when taken up individually will be found much less tenable at the bar of practice. For example:

(1). The first we have to notice is “squeezing.” The mould-board or “turnover” squeezes the furrow-slice, and thus (we are informed) injures the soil.

Now, those who arrive at this conclusion must never have answered the question, What is squeezing? or they would have discovered that, instead of doing harm, it produces the opposite effect by breaking the furrow-slice, and thus permeating it for aëration. One of the principal characteristics of a good ploughman is, that he squeezes the furrow-slice equally from headland to headland; whereas a bad one turns over parts of it unsqueezed, leaving them behind him “flat” in the furrow like a brick from a brickmaker’s mould. In a similar manner, in horticulture, the intelligent gardener, when digging, squeezes the clods rather roughly with his spade, chopping them with its edge where this is insufficient. With him, squeezing is one of the great realities of successful culture, the imaginary spell of evil never entering his mind. On the contrary, were any one to tell him squeezing did harm, he would briefly answer, “No squeezing, no crop.” The idle, slovenly horticulturist, again, takes it easy in seed-time, and reaps accordingly in harvest.

If any of our readers will examine the work behind a good and bad ploughman, and compare the properly-squeezed furrow-slice with the parts not squeezed at all, he will

readily perceive the important work which the heel or back part of the mould-board performs. In the former, for example, it breaks the furrow-slice into innumerable pieces with a crushing, drawing action, leaving it so full of cracks and fissures that it cannot be lifted whole; whereas in the latter the furrow-slice either falls from the fore-part of the mould-board, or if it reaches the back-part, escapes, owing to its dimensions or position of the plough, imperfectly squeezed, and often scarcely touched at all after it is turned over; consequently it is left behind the plough comparatively free from fissures, having no more than what were effected by the share and fore-part of the mould-board, so that large lumps may be lifted, with scarcely a crack in them.

Between the fissures thus made by the fore part and back part of the mould-board, there is a characteristic difference deserving of special notice. In the former, for instance, the fracture is made without any longitudinal displacement of parts, so that the two sides readily adhere together again, forming an unbroken whole behind the plough. The crushing action of the back part, on the contrary, displaces the two sides of the fracture, so that they are united again with greater difficulty even in the case of clay soils, while on those of a friable character a union seldom takes place at all. Between the two, it will thus be seen there is a wide difference in favour of the aëration of the soil—one of the most important conditions required to effect successful culture, especially of clay lands.

During wet weather, in winter, when tenacious soils are full of water and in a poachy state, an objection to squeezing may be raised on the grounds that fissures are not then made; but the best refutation of this is a practical one, for clay lands in such a state ought never to be ploughed unless under circumstances of the most extreme necessity; and even then the question resolves itself into one of comparison between rectilinear and rotary action. Now, it is manifest that when crushing by the back part of the mould-board will not produce fissures, rotary action can produce no improvement.

One of the great advantages to be realized by steam culture is obviously this—that the farmers of clay lands may then profitably keep a sufficient strength of steam engines to cultivate their farms between the wet and dry, in which condition the squeezing of the plough is the most effective. Those who have any experience in the cultivation of this class of soils must be familiar with this fact, and the benefits arising from it, and therefore will readily appreciate the importance of steam power in comparison with that of horses; for an engine when idle costs nothing, whereas our teams when not in harness soon eat off their own heads.

(2). The objection—“Screwing”—has obviously reference to the action of the middle part of the mould-board—that which inverts the furrow-slice. First, the share and fore part with the coulter separate the sod

from the unploughed land, elevating it gradually more and more on the "land side;" secondly, as the plough advances, the middle part turns it over in a screwing or twisting manner, depositing it in the furrow on its edge; and, thirdly, the back part squeezes the furrow-slice into its proper position, keeping the open furrow-tract of the implement at a uniform width. Now the effect produced by this screwing process is, less or more, to break the furrow-slice, especially on the upper two sides; consequently, instead of doing harm, the reverse is produced.

(3.) The wedging action of the plough is one of the greatest objections brought against it. First, the sole or heel compresses the subsoil, counteracting the work of drainage; secondly, the deposit from the wearing of the iron forming the immense wedge poisons both the soil and subsoil with the protoxide of iron; thirdly, from the large surface of soil in contact with the wedge, and from the lever action of the beam and handles working less or more against each other and this wedge, the draught of the implement greatly exceeds in proportion the work produced. These and many other grave objections of a similar character are brought against the wedging action of the plough. Now, what do they all amount to? Simply nothing; for in steam culture the objectionable parts may be profitably dispensed with; so that the objection is levelled against an implement which may never have existence beyond a few trials at the commencement. Under the improvements contemplated, the share and coulter are the only parts of the plough which would act as wedges, the mould-board being merely an inclined plane or turnover for inverting the furrow-slice; and as the effect produced by the whole of this inclined plane is the cracking and breaking of the furrow-slice, it consequently follows from what we have already said, that, instead of doing harm, it produces the opposite effect.

Those who bring this objection against the plough, obviously overlook the nature of the wedge as a mechanical power; the fact being that all cultivating implements are wedges, and that the majority of rotary ones proposed are more powerful wedges than the plough. The coulter and share, for instances, are more powerful wedges than the mould-board and sole. All the tilling apparatus of harrows, grubbers, scarifiers, and cultivators are wedges; and the wedging action they produce is far greater than that of the plough, incurring a greater waste of iron, and consequently deteriorating the soil by protoxides of that metal in a greater degree.

(4.) Consolidation of the soil. This objection also falls to the ground, as there is no probability of it having any existence in connexion with steam culture. The horse's feet are doubtless great compressors, and so is the sole of the plough; but one of the greatest advantages of the steam plough is, that neither will be required. Hence, What objections can be brought against them?

Under this head many erroneous conclusions are drawn. In making comparisons, for example, between the soils of gardens cultivated by the spade, and lands adjoining by the plough, "the latter" (it is said) "are

in a more consolidated state than the former; and, therefore, the plough is the more consolidating of the two implements." But although we have long advocated spade husbandry, in preference to the plough with horses, we cannot admit that the above conclusion is legitimate; for the system of cropping and manuring, as well as culture, is so very different that a comparison can hardly be made between the two. In the former, for example, the character of the soil is soon changed by manure, while it is cultivated to twice the depth, and sometimes more. Now this depth of culture and greater quantity of vegetable matter does more to prevent consolidation than the mere mechanical process of digging with the spade; so that the question has yet to be solved—Can the steam plough by similar means produce similar effects?

(5.) The next objection we shall notice is, the imperfect inversion of the furrow-slice. The plough does not invert the soil it cultivates, but only wedges, screws, and squeezes it to one side, in a manner better calculated to transplant surface weeds, grass of grass lands, &c., than bury them to undergo decomposition, and increase its fertility!

The question here raised is one of comparison between ploughs and rotary implements. Now as in our opinion the latter do not invert the soil so well as the former, the objection falls to the ground. It will be high time to raise objections against work done by the plough when that done by rotary cultivators is superior in quality. "Practice with science," or science founded on experiment, does not permit of conclusions being otherwise drawn.

In making this objection it ought always to be borne in mind that there are only two modes of inverting the soil—either by the reciprocating action of the spade, or "turn over" action of the plough. Several patents have been taken out for reducing both principles to practice under steam culture; but as yet the reciprocating movement of the implement has not been crowned with success. On the contrary, farmers have long been familiar with the practice of inverting the soil by trench-ploughing, *i. e.*, one plough following another, the first turning the top spit into the bottom of the furrow, and the second throwing the bottom spit upon the top of the last. This old practice involves an important principle which may yet play a successful part in steam culture.

(6.) The last objection to which we shall refer, is the imperfect work of comminution which the plough effects. A much finer state of pulverization is required by plants than what can be had by ploughing. The plough only commences the work, leaving the harrow and roller to finish it.

The shortest refutation of this objection is perhaps to state the question in a practical form. Does any intelligent farmer, after ploughing his lands in autumn or winter for spring sowing, yoke the harrows and roller? There may, no doubt, be found exceptions where lands are so full of weeds, that the cleaning of them at this season is the least of two evils; but in such a state they must always be accounted slovenly managed, and there-

fore under proper cultivation the exception. But where they are in a healthy state for cropping, no practical farmer would yoke the harrows under such circumstances, for the rougher the winter furrow so much the better. Gardeners who have stiff soil are familiar with the beneficial influence of the winter, frost, &c.; hence how they ridge up their beds in unbroken spits.

No doubt, in wet seasons clay lands are too difficult to reduce to a proper mould; but would they be otherwise with rotary cultivators? Certainly not.

In these cursory remarks we have rather answered objections to the plough than discussed its *modus operandi*. This is rather reversing the usual mode of treating the subject; but from our limited space, number of opinative writers opposed to us, and unsettled state of the agricultural mind, this course, after all, may not prove the least profitable in the end, as it may remove unfounded prejudices out of the way, and prepare the minds of those who will listen to what we shall next say on steam ploughing.

## THE WOOL TRADE.

BY AN OLD NORFOLK FARMER.

(Continued.)

The restrictions and penalties heaped upon the runnage of wool by the Government, proved a dead letter. In spite of the risk of being treated as felons, if detected, France and Holland were so amply supplied by smugglers, that the price in those countries was nearly on a par with our own. The only injury inflicted by the measure fell upon the English manufacturers, who could not obtain a supply, or dispose of their goods; and the English landowners, who suffered by a reduction in their rents, to the extent of from 20 to 30 per cent.

During the Commonwealth, the cultivation of wool made a great progress in Ireland. The first sheep introduced into that country were taken thither by the English, who had settled on the Plantation in Ulster; the Irish themselves having never attempted it, believing it would throw the land out of cultivation for corn, and convert it into sheep walks. Under this impression, they heartily cursed both the sheep and their English owners, praying that the rot or some other fatal disease might take the former, at least, if not the latter. The enterprise, however, prospered notwithstanding, and large quantities of wool were soon exported to England, which reduced the price still further. The civil wars of that country proved a great drawback to the growth of wool, and the price in England consequently soon rose gradually, so that, after the Revolution of 1688, three several acts of Parliament were passed for preventing the exportation of wool; and at the same time, to encourage its growth and manufacture, liberty was given to all persons to export woollen goods into any foreign port whatever. The diminution in the growth of wool was greatly aggravated by the rot in England (instead of Ireland), by which tens of thousands of sheep were destroyed. The price of wool was equally high in foreign parts as in England; and the demand went so much beyond the supply on the Continent, that foreign factors resorted to England in great numbers (in spite of the laws to the contrary), and purchased large quantities of drapery. As an evidence of the ignorance prevailing at that period, of the true principles of trade, I may mention that the writers of the day lament this inundation of foreign buyers as a heavy calamity!

It was during William's reign that the attempt was made to suppress the Irish woollen manufactures, which had begun to compete with those of England, and the manufacturers of the latter petitioned for a law to prohibit the exportation of woollen goods from Ireland to foreign parts. This most unjust petition was followed by as unjust a law, the avowed object of which was to discourage all manufacture in Ireland, except that of linen goods, "lest in time they should be able to work up all their own wool, by which England would be deprived of the supply!" The infamous measure passed both Houses, and was sent up to the King, with an address from them, praying "That he would use his endeavours to discourage the exportation of wool from Ireland to any other country than England, and to discourage the woollen, and increase the linen manufacture." All this his Majesty promised, and performed; and the Irish House of Commons were so satisfied with the liberty of retaining and extending their linen trade, that they themselves imposed a heavy duty upon their own woollen manufactures, "to the end that the same might not be injurious to those of England." Such was the wording of the Irish act, and it affords a fair specimen of the patriotism of Ireland's representatives, whether in the native or the imperial parliament.

But the English manufacturers still had their grievances to complain of. An immense contraband trade was carried on between Ireland and the Continent, both in raw wool and manufactured goods; and, what was still more heinous, in the importation of silks and other French goods. They therefore clamoured for more stringent enactments, which were at once granted, for a sweeping law was passed, "That no person should export from Ireland wool or woollen goods, except to England and Wales." They forgot to prohibit the exportation of the Irish themselves; consequently a great number of the Irish woollen manufacturers emigrated to France, Germany, Spain, and the Netherlands, carrying with them their skill, industry, capital, and connection, to the prejudice of the country whose Government had compelled them to expatriate themselves.

Notwithstanding these drawbacks upon their prosperity, for such we must ever consider them, the woollen manufactures of England made steady advances during the reign of William the Third. In that of Charles the Second, the whole exports of the kingdom did not exceed two millions sterling per annum, of which £900,000 only were woollens. In 1699 the exports had risen to seven millions, of which nearly three were woollen; and the average export of woollens in that reign exceeded two millions sterling per annum.

The same impolitic system was pursued in the following reign, at the beginning of the eighteenth century. The export of wool continued to be prohibited *by law*; but the smugglers found means easily to evade it, and their trade was conducted with more daring than ever. England being at war with France, the latter was supplied with our wool through Holland; and so large was the quantity thus abstracted from this country, that the price rose to 1s. per pound. By a treaty of commerce with Portugal a new market was opened for English woollens, in the furnishing of which Scotland largely shared. The growth of wool in that country had greatly increased, and all kinds of woollen goods were also manufactured there, nearly equal in quality to those of England.

Although the peace of Utrecht opened fresh markets for the British manufacturers, it had no effect in either changing the system of the British Government, or arresting the smuggling trade in wool. In 1714 ten thousand packs were thus exported, which caused so great an advance in price that the manufacturers became more clamorous than ever for more stringent enactments, which were at once granted, as a matter of course. The duty also imposed upon Irish wool imported into England was remitted, whilst that on yarn was retained. The runnage, however, continued as great as ever; and it is amusing to see how the complaints of the manufacturers appear to have increased in intensity, almost in equal proportion with the increased severity of the laws for their protection. "Bad legislation," says a modern writer, in reference to this period, "continued its work, until it had paralyzed the trade."

Nothing, however, appears to be able to frustrate the energy and perseverance of the British merchant. To this, rather than to Government or Legislative patronage, is to be ascribed the steady progress made in the trade in woollen goods during the last century. From 1718 to 1722 the exports of woollens averaged three millions; for the ten years ending 1748, three and a-half millions; and the five following years, four millions two hundred thousand pounds. From that period (with one trifling exception in 1753) the growth and manufacture of wool have steadily advanced, and the price of the raw material has also risen, increasing importance being attached to the trade by the various monarchs who have swayed the British sceptre.

During the reign of George the First, and his successors of the same name, great improvements were effected in the manipulation of wool. The spinning machine was invented in 1733 by Wyatt, and afterwards improved by Lewis Paul, in 1748. The spinning-jenny

was produced by Arkwright in 1768. But it was during the reign of that great farmer,\* George the Third, that the growth of wool began to assume that importance and magnitude which it exhibits at the present day. The decidedly economic and utilitarian character of that monarch, and especially his well-known attachment to agricultural pursuits, to which he daily paid a personal attention—which his habit of early rising enabled him to bestow, without infringing upon his duties as sovereign—gave a stimulus to all branches of rural industry, and particularly to the breeding of sheep, which was a special subject of his attention, the beneficial effects of which our manufacturers are reaping to this hour.

At an early period of this reign (1765) all the laws for regulating the woollen manufactures were submitted to Parliament, and confirmed; and inspectors were appointed in the woollen districts, to examine, measure, and seal all cloths at the fulling mills. Registers were kept of the cloths and the manufacturers, and the names of the latter were affixed to each piece of cloth in legible letters. The drying grounds also were under the eye of the inspectors, who were bound to see that the cloths were not improperly stretched upon the tenters. Various other duties of a similar troublesome nature devolved upon these functionaries, which, whilst they did little good, proved a serious annoyance to the fair trader, but did not prevent fraud, connivance, and imposition with the ill-disposed.

The folly and ignorance of the Legislature, however, were insufficient to check the onward march of England's manufacturing energies. Her woollens were superior to those of all her competitors, and gave her the ascendancy in all the continental markets. Even in America, and during the War of Independence, a singular circumstance occurred, in illustration of this: "The French Government had granted the American Congress a large sum of money to purchase clothing for their troops. Mr. Lawrence, who was entrusted with the expenditure of this money, instead of doing this in France, went to Holland, and purchased English cloths, which he forwarded to America. The French minister justly complained to the Congress of this ungrateful act; but Mr. Lawrence justified it on the ground that "the English cloths were much superior to the French, at the same price, and he was bound to lay out the money to the best advantage." And such was the preference given to English goods, and so great the quantity imported into the United States, that the French minister repeatedly remonstrated against it to Congress, and threatened to withdraw the aid of his Government, if means were not used to prevent it. This threat, being seconded by Franklin, and the other American commissioners in France, an act of Congress was passed, inflicting heavy penalties on those who imported any kind of English goods, and some seizures took place; but the cessation of the war caused a repeal of the prohibition."

About this period, (1774) more rational views began to be entertained by public men respecting the utility of

\* Lord Byron says:

"A better farmer ne'er brushed dew from lawn."

those prohibitory enactments, so long depended on for the security of trade. Upon a demand from the manufacturers of a more stringent law to prohibit the exportation of wool, Mr. Pownal, the ex-Governor of Massachusetts's Bay, published a pamphlet, shewing that the assertion of the manufacturers, that English wool was absolutely required to make good cloth, was untrue, for that almost every country in Europe grew as good wool; and that the prohibitory duty of sixty per cent., so far from preventing the export of wool, acted as a bonus to the smuggler to that amount; "and that all their contrivances of law and the terror of punishment were just as efficacious as attempting to 'hedge in a cuckoo.' And although the prohibition had lowered the price in the home market, the only effect this had was to injure the wool grower, and give a further advantage to the smuggler, by offering an additional bounty; whilst the manufacturer reaped little or no benefit from it, the quantity surreptitiously exported being thereby greatly increased. He therefore recommended the repeal of all the laws prohibiting the exportation of wool."

Sir John Dalrymple also wrote most correctly on the subject: "It is indisputable," says he, "that no manufacture can be beneficial to a state that stands in need of a monopoly of the produce of the land, or any part of that state, for its support. The woollen manufactures of England neither do nor ever did stand in need of such support. It is a false ground to attribute the flourishing condition of that manufacture to the prohibitory laws respecting the exportation of wool. Whenever the trade is flourishing the manufacturer is able to give an adequate price for his material, and thus the prohibitory law becomes nugatory, since when there is a market at home for a commodity, there is no fear of a foreign market being sought for."

The good sense and sound policy of the sentiments of these men will now be universally appreciated; but it is evident that they were more than half a century in advance of their age, although the French cyclopædists had already disseminated these principles on the subjects of trade and commerce. But neither the French nor the English *savans* could indoctrinate their respective Governments with their sentiments on these subjects, or induce them to alter a system which evidently acted as a clog upon the buoyant spirit of British commerce. The following statement will show how futile was the prohibitory enactment. In 1782 the number of sheep in England, according to Arthur Young, was 25,589,214, which yielded an annual profit of 10s. 6d. each on an aggregate of £13,860,824 sterling. The wool produced was estimated at 726,981 packs, or 174,475,440 lbs. And another writer affirms that of this quantity France alone obtained 500,000 packs, or more than one-half, in spite of the prohibition!

Having brought our short and rapid history down to our own times, we shall pause to consider some of the characteristics of the article of which it treats. One of the most remarkable of these is its tendency to improve in quality in proportion to the poverty of the soil on which the sheep are fed. It is well known that the finest wool produced in the British Isles during the last cen-

tury, and probably at present, was grown in the Highlands of Scotland. The city of Aberdeen was then the great mart for the Scotch woollen manufactures, and the perfection to which their stockings in particular had been brought is worthy of special remark. The following anecdote, from Anderson's "Observations on National Industry," published in 1777, will not be read without interest:—

"About the beginning of the late war, the magistrates of a considerable town in the north of Scotland, famous for its manufacture of worsted stockings, desirous to express, in some measure, the esteem they bore for their countryman the late Marshal Keith, resolved to make him a present of a pair of stockings of their own manufacture of an uncommon degree of fineness. With this view, they commissioned from London some of the finest wool that could possibly be found, without any limitation of price. In consequence of this, some pounds of the very finest Spanish wool, picked out by very good judges of this matter, were sent to them.

"When it arrived, the magistrates sent for the women who were to manufacture it, and told them what they wanted, showing them the wool they had got for the purpose. But when the women had examined it, they complained of the quality, saying it was so coarse that they could not undertake to draw above 'forty heeres'\* from a pound of it; but added, that if the magistrates would wait till the Highland wool came to their own market in the month of June, they would then pick out wool for themselves that they would undertake to spin to the fineness of seventy heeres to the pound.

"As they were entirely unanimous in this opinion, the difference appeared so great, that the magistrates agreed to their request, and waited till the Highland wool came to the market, when the women provided themselves with wool that they spun to the fineness they had promised. The stockings, when finished, were valued at upwards of five guineas the pair, being so fine that they could with ease be drawn through an ordinary thumb-ring together, although they were of the largest size. They were sent, in a box of curious workmanship, to Marshal Keith, who thought them such a curiosity as to be worthy of the acceptance of the Empress of Russia, to whom he afterwards presented them."

However extravagant the above may appear to us, who can procure a pair of the finest stockings at one-tenth of the price, it was no uncommon one at the beginning of the last century. In 1707, the Earl of Aberdeen presented to his father-in-law, on his wedding day, a pair of woollen hose that cost him four guineas; and in 1733, Mr. George Keith, of Aberdeen, an advocate, purchased a pair of fine woollen hose, for which he paid five guineas. All these were made of Highland wool, brought for sale to the Cross of Aberdeen. Some of this is mentioned as having been spun by the women of the city into a hundred heeres to the pound—upwards of sixty thousand yards, or about thirty-four miles in length. "I remember," says the authority, "to have

\* The Heere is a thread measuring 600 yards in length.

seen three pairs of woollen gloves knitted for Lady Mary Drummond, one of the Duke of Perth's family, for each pair of which the maker was paid three guineas. And afterwards, Lady Mary sent for as much yarn as would make a pair, and also for some of her knitting wires." Anderson, from whose work the above is taken, adds that within a few months of the time when he wrote (in 1777), "worsted stockings sold at Aberdeen at two guineas a pair."

All flock-masters are aware of the fact that a poor soil with short and sweet herbage, and a cold, clear atmosphere, produce the finest wool; and that, on the contrary, a rich soil and warm climate deteriorate the quality. Thus, sheep sent from England to the West Indies soon exhibit hair rather than wool on their backs; but when brought back to England, it recovers its quality in one season.

In Spain, the flocks of sheep formerly belonged to the kings of Spain, and amounted to many millions. They were computed by Ustariz at eight millions, and required forty thousand shepherds and others to tend them. In the summer months they ranged over the mountains, and in winter descended into the plains. Attempts were made, under the patronage of George III., about the close of the last century, to introduce the Spanish sheep into England, for the purpose of improving the quality of the wool; but it was found that the change of soil and pasture deteriorated the Spanish far more than the cross improved the English wool; and, on the other hand, the deterioration of the mutton was still more decided and fatal. In fact, an English farmer would consider Spanish mutton little better than carrion. Under the auspices of the late Earl of Leicester, the Spanish breed was crossed, in all degrees, with the Southdown and Leicester, but soon lost its character in the wool, whilst it invariably ruined the carcase.\* These sheep were first imported in 1786, and the number was very small, owing to the jealousy of the Spanish Government. But six years after, the then British ambassador at the Court of Spain, Lord Auckland, obtained five rams and thirty-five ewes of the best breed (the Nigrette), in exchange for a steed of eight fine English coach-horses. These sheep were placed with those of the king's previous stock, amounting to sixty, under the care of Sir Joseph Banks, who had paid particular attention to the breeding of sheep, and the quality of wool. They were kept at Oatlands, and, under Sir Joseph's management, increased rapidly, both in numbers and condition. But, whilst the quality of the flesh was an insuperable objection with the grazier and butcher, the quantity of the wool was too small to make

\* The writer remembers Mr. Coke relating the following anecdote of George the Third:—"The King had invited Mr. C. to visit his farm at Oatlands, to inspect his Spanish sheep. Whilst looking over the specimens, the King abruptly said to him, 'Look, look here, Coke,' pointing to some sheep in a pen, 'these sheep are for you, I have selected them on purpose. You must take them, and make the best you can of them; see what you can do with them.' Of course Mr. C. was very grateful for this mark of royal favour, thinking it a handsome present. The sheep were carefully sent to Holkham; but, behold! in a few days came a letter from his Majesty's steward, in the shape of an account for the sheep, at the rate of some twenty or thirty pounds per head."

up for the inferiority of the carcase in weight and quality. The writer has seen these pure Merinos from the King's own stock, and did not wonder at the disfavour they met with at the hands of the British farmer. And besides this drawback, it was found that when transferred to the rich pastures of England, the wool was deteriorated in its fibre, and lost that characteristic quality which gave to it its value in Spain.

The predilection for agricultural pursuits, and especially that branch relating to the breeding and improving of cattle and sheep, of the late King George III. forms an era at once in the annals of national rural industry, and in the history of the wool trade. To a practical knowledge of the subject, he united an earnest desire to promote both its prosperity and its improvement. Stimulated and encouraged by his hearty co-operation, a vast number of men of talent and scientific knowledge sprung up in every part of the kingdom, and brought their attainments to bear upon the subject of agriculture and grazing. Societies and institutions were established, by which correct and useful information was disseminated throughout the country, on all subjects connected with rural affairs. A host of eminent men came forward both as agriculturists and graziers, by whom changes and improvements in the breeds of cattle and sheep were effected, which have raised the character of the live stock of the United Kingdom above those of any other part of the world. Amongst these men the names of Bakewell, Coke, Young, Anderson, Culley, Sinclair, Banks, and many others, all *practical* men, will be handed down as the patriarchs of agricultural life, who laid the foundations of those societies which have at length consummated what they so happily began—the reduction of agriculture to a science, and the direct application of chemistry to the cultivation of the land.

We must not omit to speak of the agricultural gatherings which annually took place at Holkham and Woburn Abbey, the former the seat of T. W. Coke, Esq. (afterwards Earl of Leicester), and the latter that of the Duke of Bedford. These "sheep-shearings," as they were called, were held in June, at which time, for four days, the noble mansions and grounds were thrown open to the public, who were hospitably entertained to the number of five or six hundred. Men from all parts of the world appeared at these gatherings, which spread the knowledge communicated by the eminent men who, as agriculturists, were specially invited far and wide. The improvement of the breeds of cattle and sheep was an object of peculiar attention at these meetings, and the list of prices obtained for the rams, at the sales which took place in the afternoon of each day, shows the estimation in which the improvements effected by the noble hosts were held. The following rates were obtained at Woburn sheep-shearing in 1800, at which the writer was present:—

PURE SOUTHDOWN RAMS.	
1 .....	10 guineas.
2 .....	25 do. each.
2 .....	30 do. do.
2 .....	40 do. do.
1 .....	50 do.
1 .....	80 do.
1 .....	120 do.

## PURE LEICESTER RAMS.

1	.....	10	guineas.	}	shearlings.
2	.....	15	do. each		
2	.....	12	do. do.	}	two-shear.
1	.....	15	do.		
1	.....	20	do.	}	three-shear.
2	.....	15	do. do.		
1	.....	20	do.		

The sheep-shearings were discontinued at Woburn soon after the death of Francis Duke of Bedford, at the beginning of the present century; but those at Holkham were continued with undiminished spirit and interest until advancing years admonished the noble owner that repose was desirable. The generation which witnessed those festive occasions has almost all passed away from the stage of life; those who remain, delight to trace to them the high eminence which agriculture has now attained. From thence, in fact, have originated all the agricultural societies in the United Kingdom, as well as all the improvements in the economy of rural pursuits, and especially the superior quality of the mutton and wool of the present breeds of sheep, the latter of which has brought our woollen manufactures to the highest pitch of perfection.

The increase in the exportation of woollen manufactures towards the end of the last century was extraordinary. Notwithstanding the war in which we were then involved with France and its dependencies, they amounted in 1799 to £6,876,939 sterling, nearly three millions of which went to the United States of America. In 1800 the entire value of all woollens manufactured in the United Kingdom was estimated at £19,000,000 sterling; the number of persons employed in their manufacture, including women and children of both sexes, was 3,000,000; and the capital invested in that branch only was estimated at £6,000,000 sterling.

At this period, memorable on more accounts than one, the Act of Union between England and Ireland was effected, by which the manufacturing interests of the two countries were placed upon the same footing, and bounties and prohibition were abolished. The duties retained as between the two countries were mostly equalised, and no exclusive restrictions were held over the Irish manufacturers. A strenuous opposition to this just legislation was raised by those engaged in the trade in, and manufacture of, woollen goods in England, by whom petitions and remonstrances were got up, signed by great numbers, and presented from all parts of the country; and when the measure was brought before the House of Commons, an amendment was moved by Mr. Wilberforce, then Member for Yorkshire, but it was negatived by a majority of 80. The objection to the original measure was, that the exportation of wool to Ireland would injure the British manufacturer by raising the price and contracting the supply. The estimates of the dealers in wool, however, were so extravagant, and unsupported by documentary evidence, that they had no weight whatever with the House, which decided against them.

The result justified the policy of the measure. In 1787 the price of sorted wool in Ireland was nearly double what it was in England; but after the Union the price of all kinds was equalised, and the manufacture

in both countries was stimulated by competition which for a time made both prosperous. In Ireland, however, other circumstances intervened to neutralise the benefit, and to cause the almost entire annihilation of that and every other branch of manufacturing industry, rendering that country dependent on England for a supply. It would be out of place here to go into the history of this decay. In regard to the woollen manufacture of Ireland, it is now the mere shell or nucleus of what it was at the period we are treating of.

Although the introduction of the Merino Spanish sheep into England was unsuccessful so far as the original intention of the Sovereign was concerned, it was attended with a collateral but totally unforeseen consequence, which has produced the most surprising effects upon the wool trade of the United Kingdom. In 1804 the King declared his intention of selling a part of his flock by public auction, and forty-five rams and ewes were thus disposed of at prices ranging from £6 7s. to £44 2s. each. They fell into the hands of eighteen purchasers from different parts of the country; amongst these was Captain M'Arthur, who was then about to sail to Australia, and who bought eight of the sheep with the intention of taking them with him. Before, however, speaking further of that gentleman's experiment, we shall state that in England the competition lay between the Merinoes and the New Leicester and Improved Southdown breeds; and that notwithstanding the prestige of royalty in their favour, seconded by the co-operation of Lord Somerville, the then President of the Board of Agriculture, it ended most decidedly in favour of the two latter, both on account of the value of fleece and carcase. This sealed the fate of the experiment so far as Great Britain was concerned. We believe the rest of the Merinoes were chiefly purchased by continental flockmasters, with whom they succeeded, and from whom we now receive a considerable part of our supply of fine wool, the product of their descendants.

The perfection, indeed, to which the symmetry of the native sheep exhibited at the agricultural gatherings of that period had arrived was extraordinary. The motto of the "father of agriculture," of "Small in size, and great in value," was literally attained, and amply repaid the care and expense bestowed upon its attainment. The writer recollects a little incident illustrative of the feeling it excited in intelligent men practically unacquainted with the subject. He happened to be present at Holkham with the late ex-Chancellor (Lord Erskine), Sir Joseph Banks, and two other persons of distinction, who had stolen away from the rest of the company, to examine more at leisure some Leicester rams. One fine fellow was led out by the shepherd, and whilst Sir Joseph was examining its "points" with all the tact of an amateur well versed in the subject, Lord Erskine stood looking on with unrestrained admiration. At length he exclaimed, "beautiful! wonderful! what a picture!" then gently seating himself on the table-like back of the ram, he continued, "a noble cushion; *I could almost fancy myself on the Woolsack again!*"

(To be continued.)

## RUTLAND AGRICULTURAL SOCIETY.

The twenty-fifth anniversary of this Society was held at Cakham, on Wednesday, Dec. 5, and it will not be saying too much when we state that on the whole a more successful show of stock, both with respect to quality and quantity, was never seen in the Riding House. Many of the animals, especially in the first and second classes for oxen and sheep, were splendid specimens of stock, and to almost every other department of the exhibition the same remarks will apply. A young short-horn bull, in extra stock, shown by Mr. Lynn, of Stroxtan, and which obtained the Duke of Rutland's prize of a silver medal, is a fine animal, and elicited general admiration. In the sheep department, the veteran exhibitor, Mr. Bradshaw, of Tinwell and Burley, carried off all the first prizes in the six classes; such a feat has never before, we believe, been accomplished at that show. The animals were certainly the finest specimens that, in the opinion of competent judges, could be produced; and a practised eye would at once pronounce that they could scarcely be beaten by any competitors. The first prize sheep shown in class 15 will be exhibited at Smithfield, and those in class 16 at Birmingham.—Amongst the pigs there was a fine sow, belonging to R. W. Baker, Esq., which had farrowed 78 pigs in four years; she farrowed eleven in the show-yard on Tuesday.—R. W. Baker, Esq., exhibited as "extra" roots 119 Swedish turnips, weighing 10 cwt., the average of each turnip being 9½ lbs.—A large number of visitors visited the Riding-school during the day, and nearly 19*l.* was taken at the doors. Amongst the visitors we noticed the Rt. Hon. Sir John and Lady Trollope, the Marquis of Huntly, Sir Gilbert Heathcote, Bart., M.P., George Finch, Esq., and the Misses Finch, Miss Lowther, Sir Montague Cholmeley, Bart., John Heathcote, Esq. (Conington), G. H. Heathcote, Esq., M.P., R. W. Baker, Esq., Wm. Baker, Esq., Capt. Doria, Capt. Jones, Jas. Montague, Esq., — Gaskell, Esq. (Somerset), Col. Fludyer, J. Morton, Esq., &c., &c.

The successful competitors in the labourers' classes partook of a substantial dinner, provided for them at the "Red Lion" inn; after which R. W. Baker, Esq., V.P., distributed the prizes, and remarked to them that the Society in offering these prizes wished to show its desire not only to encourage competition amongst the higher and middle classes in the breeding of stock and cultivation of the land, but also to encourage good conduct amongst those who are dependent upon the owners and occupiers of the land, and that these prizes were in fact the united subscriptions of the masters and mistresses. He hoped that those who were unsuccessful that day would still persevere in a good course of conduct, resting assured that if they did so they also would in due time become successful; and especially he wished to warn them against *drunkenness*, which of all vices he held in the greatest abhorrence. He was most happy to see them on that occasion so comfortably clothed, and apparently so well fed, for he considered it was a great duty incumbent upon the employer to take care of those he employed, and as far as possible he (Mr. B.) was anxious that the labourer should be both well employed, and also provided with a comfortable cottage for his family.

## AWARD OF PREMIUMS.

Oxen or steers, of any breed or weight, under five years of age. Open to all England. First prize 15*l.*, to the Most Noble the Marquis of Exeter, K.G.; second, 7*l.*, to R. W. Baker, Esq., of Cottesmore.

Oxen or steers, of any breed or weight, under four years of age. First prize 7*l.*, to Mr. Samuel Wallis, of Barton Sea-grave; second, 4*l.*, to R. W. Baker, Esq., of Cottesmore.

Cows or heifers, of any breed, age, or weight. Open to all England. First prize 7*l.*, to Mr. J. W. Edgson, of Etton, near Peterborough; second, 5*l.*, to Mr. T. Swingler, of Langham.

To the owner, being a tenant farmer, of the best steer, under three years of age. First prize 7*l.*, to Mr. R. Lynn, of Stroxtan; second, 3*l.*, to Mr. T. Swingler, of Langham.

To the owner, being a tenant farmer, of the best steer, under two years of age. First prize 5*l.*, to Mr. T. Swingler, of Langham; second, 3*l.*, to Messrs. Wortley, of Ridlington.

To the owner, being a tenant farmer, of the best heifer, above two and under three years of age. First prize 6*l.*, to Messrs. Wortley, of Ridlington; second, 3*l.*, to Mr. Joseph Woods, of Langham.

To the owner, being a tenant farmer, of the best heifer, under two years old. First prize 4*l.*, to Mr. Joseph Woods, of Langham; second, 2*l.*, to Mr. T. Swingler, of Langham.

Offered by STAFFORD O'BRIEN, Esq.

To the owner, being a tenant farmer, of the best cow in milk. First prize 5*l.*, to Mr. Robert Lynn, of Stroxtan; second, 2*l.*, to R. W. Baker, Esq., of Cottesmore.

Offered by the SOCIETY.

To the exhibitor of the best bull, above two and under five years old. First prize 5*l.*, to Mr. Thomas Suter, Brook; second, 3*l.*, to Messrs. Wortley, of Ridlington.

To the exhibitor of the best in-foaled mare. First prize 3*l.*, to Mr. Wm. Saunders, of Cold Overton.

To the exhibitor of the best yearling gelding or filly. First prize 5*l.*, to Mr. W. Saunders, of Cold Overton.

Offered by the Right Hon. the Earl of GAINSBOROUGH.

TO TENANT OCCUPIERS.

To the owner of the best cow in milk, 5*l.*, to Mrs. Jane Harris, of Langham; second, 2*l.*, to Mr. John Edgson, of Langham.

To the owner of the best heifer, 4*l.*, to Mr. William Hubbard, of Langham; second, 2*l.*, to Mr. Charles Almond, of Langham.

To the owner of the best heifer calf, 2*l.*, to Mrs. Ann Wright, Burley; second, 1*l.*, to Mr. John Edgson, Langham.

Offered by Sir GILBERT HEATHCOTE, Bart., M.P.

To the feeder of the best pen of three long-woolled fat wether sheep, 10*l.*, to R. L. Bradshaw, Esq., Burley-on-the-Hill; second, 5*l.*, to W. de Capell Brooke, Esq., of Gedding-ton Grange.

Offered by the SOCIETY.

To the owner of the best long-woolled fat wether sheep, 7*l.*, to R. L. Bradshaw, Esq., of Burley-on-the-Hill; second, 4*l.*, to Messrs. Wortley, of Ridlington.

To the owner of the best breeding ewes, 4*l.*, to R. L. Bradshaw, Esq., Burley-on-the-Hill; second, 3*l.*, to Messrs. Wortley, of Ridlington.

To the exhibitor of the best pen of five long-woolled theaves, 4*l.*, to R. L. Bradshaw, Esq., Burley-on-the-Hill; second, 2*l.*, to W. de Capell Brooke, Esq., Gedding-ton Grange.

To the exhibitor of the best pen of five long-woolled wether lambs, 3*l.*, to R. L. Bradshaw, Esq., Burley-on-the-Hill; second, 2*l.*, to Messrs. Wortley, of Ridlington.

To the exhibitor of the best pen of five long-woolled ewe lambs, 3*l.*, to R. L. Bradshaw, Esq., Burley-on-the-Hill; second, 2*l.*, to Messrs. Wortley, of Ridlington.

To the feeder of the best fat pig, 4*l.*, to Mr. John Morris, of Oakham; second, 2*l.*, to Mr. Wm. Benskin, of Rearsby.

To the feeder of the best fat pig, 3*l.*, to Mr. John Stimson, of Egleton; second, 1*l.*, to Mr. Thomas Fryer, of Preston.

Offered by the Right Hon. the Earl of GAINSBOROUGH.

To the owner of the best fat pig, 2*l.*, to Mr. Thomas

Henfrey, of Eggleton; second, 1*l.*, to Mr. John Chamberlain Burley-on-the-Hill.

Offered by the SOCIETY.

To the exhibitor of the best in-pigged or suckling sow or yelt, 2*l.*, to Mr. H. J. Rudkin, of Langham Lodge.

First offered by the Most Hon. the Marquis of EXETER, second by the Gentlemen of the Cottesmore Hunt.

To the owner, being a farmer, who shall exhibit the best half-bred four-year-old hunting mare or gelding, 10*l.*, to Mr. Wm. Laxton, of Morcott; second, 5*l.*, to Mr. Thos. Henton.

Offered by his Grace the Duke of RUTLAND.

To the exhibitor of the best beast, shown as extra stock, a silver medal, value 3*l.*, to Mr. Lynn, of Stroxton.

Offered by the Right Hon. Viscount CAMPDEN.

For Swedish turnips, cultivated on any system, 7*l.*, to Mr. T. W. Fowler, of Exton; second, 3*l.*, to Mr. Thos. Franklin, of Uppingham.

For mangold wurzel, cultivated on any system, 2*l.*, to Mr. Wm. Fabling, of Burley.

Offered by the SOCIETY.

For cabbages, cultivated on any system, 1*l.*, to R. W. Baker, Esq., of Cottesmore.

Offered by R. W. BAKER, Esq.

TO COMPETITORS IN CLASSES 26, 27, 28.

For the best specimens of six Swedish turnips, mangold wurzel, and cabbages, 10*s.*, each to R. W. Baker, Esq.

#### PREMIUMS TO LABOURERS.

Offered by Sir THOMAS WHICHCOTE, Bart.

To the shepherd who shall have raised, on the 1st June, 1855, the greatest number of lambs, 30*s.*, to William Cunnington, shepherd to Mr. Lionel Hack, of Stainby Mills, near Colsterworth; second, 10*s.*, to John Gregg, shepherd to the Hon. Col. Lowther, of Barleythorpe.

Offered by the Hon. Viscount DOWNE.

To the labourer who has brought up the greatest number of children, &c., 2*l.*, to George Perry, of Greetham; second, 25*s.*, to William Clements, of Exton; third, 15*s.*, to Wm. Tomblin, of North Luffenham.

Offered by GEORGE FINCH, Esq.

To the farm labourer (whether married or single) who is and has been fully employed the longest time on the same farm, &c., 3*l.* 10*s.*, to John Swann, of Glaston; second, 2*l.* 10*s.*, to John Bottom, of Ashwell; third, 1*l.* 10*s.*, to James Cole, of North Luffenham; fourth, 10*s.*, to Wm. Hibbitt, of Edith-weston.

To the married farm labourer who has lived the longest period on the same farm as a single man and a hired servant, &c., 3*l.*, to John Tebbutt, of North Luffenham; second and third prizes of 2*l.* and 1*l.*, divided between Henry Smith, of Whitewell, and John Tyers, of Wing.

To the servant in husbandry, being a single man, who shall have lived the greatest number of years in the lowest servitudes, &c., 3*l.*, to William Clarke, with W. de Capell Brooke, Esq., of Geddington Grange; third, 2*l.*, to Thomas Bottom, with Mr. T. D. Beadman, of Braunston.

Offered by the Rev. EDWARD BROWN.

To the team-man or waggoner (married or single) who shall have lived with his master or mistress the greatest number of years, &c., 3*l.*, to William Edgson, with Mr. G. Marsh, of Wartnaby; second, 2*l.*, to William Hackett, with Mr. J. Hack, of Eggleton.

Offered by the SOCIETY.

To the servant, being a single woman (not a housekeeper), who shall have lived the longest time in the same service as a hired servant, and is still living with the same master or mistress, 2*l.*, to Mary Warner, of Belton; second, 1*l.*, to Elizabeth Harrold, of Belton.

Offered by the Right Hon. Lord BURGHEY, M.P.

To the widow of a farming labourer, who has brought up, or is now supporting, the largest number of children, &c., 3*l.*, to Jane Hibbitt, of Cottesmore; second, 2*l.*, to Jane Osborne, of Cottesmore.

Offered by the Rev. E. R. EARL.

To the labourer who has attended his parish church most constantly, brought up a family respectably, and paid his cottage-rent regularly, 2*l.*, to Joseph Stokes, of Greetham.

EXTRA STOCK.

To Mr. R. Lynn, of Stroxton, for a bull, a gold medal, given by the Duke of Rutland; W. de Capell Brooke, Esq., of Geddington, a cow, highly commended; Mr. R. Lynn, a cow, highly commended. The other competitors were R. W. Baker, Esq., of Cottesmore; Messrs. Wortley, of Ridlington; the Hon. Colonel Lowther, of Barleythorpe; Mr. Thomas Suter, of Brooke; Mr. Thomas Frankin, of Uppingham, a Scotch bullock, highly commended.

JUDGES OF STOCK.—Charles Bosworth, Esq., of Dishley, Leicestershire; William Sandy, Esq., Holme-Pierrepont, Nottingham; and George Jones, Esq., of Cold Newton, Leicestershire.

JUDGES OF HUNTING HORSES.—The Right Hon. Sir John Trollope, M.P.; Henry Lowther, Esq., Barleythorpe; and Thomas Heycock, Esq., Branston.

JUDGES OF TURNIPS.—Mr. Hardy, Thistleton; Mr. R. Carver, Ingarsby; and Mr. Thomas Woods, Wytchley Warren.

THE DINNER,

Provided by Mr. Barnett, of the Red Lion Inn, took place in the Agricultural Hall. There was an abundance of first-rate viands; if as much could have been said respecting waiters there would have been no fault to find, but in this department, owing to the limited number of attendants and the want of system, some confusion was created. The Rt. Hon. Sir John Trollope took the chair shortly before three o'clock; he was supported by Sir Gilbert Heathcote, Bt., M.P.; G. H. Heathcote, Esq., M.P.; the Hon. Henry Noel; Richard Westbrook Baker, Esq.; W. H. Baker, Esq.; — Ainsworth, Esq. (from Lancashire); Thomas Heycock, Esq.; Clarke Morris, Esq.; Orlando Edmonds, Esq.; R. L. Bradshaw, Esq.; Thomas Syson, Esq.; Wm. Sharrad, Esq., &c., the company numbering upwards of 100. Mr. J. G. Bosworth, of Greetham, occupied the vice-chair. The only clergymen present were the rev. J. W. Eagleton, and the rev. W. Sykes: grace before and after dinner was said by the first-named rev. gentleman. After the cloth had been withdrawn,

The CHAIRMAN gave "The Queen," and "Prince Albert and the rest of the Royal Family." These toasts were enthusiastically received.

The CHAIRMAN next gave "The Allied Armies and Navies" (applause). He said some of them present had, no doubt, old sympathies; for his own part he deeply sympathised with the Army and Navy: he began life as a soldier, and he saw beside him an hon. friend (the Hon. Henry Noel) who had served some years in the army, and when he retired from that branch it seemed he retained a liking for his old servitude, for he was now a commander in the Rutland militia (Hear). He was sure they would not fail to acknowledge the services rendered by the allies—French, English, and Sardinians, not forgetting the poor Turks—who had undertaken and performed nobly the perilous task of bearding the lion in his own den. Those brave soldiers had, during last winter, endured a vast amount of suffering; many homes there were that had lost relatives; he had lost one himself; still it was gratifying to think that there were others ready and willing to serve their country. They might depend upon it that while such soldiers had the sympathies of agriculturists and others, they would not fail to fight for their country with all heartiness (Hear). The toast he had to propose was one that he doubted not would go deep to all hearts, and whatever the results of the war might be, he hoped when peace was declared that that peace would be an honourable and lasting one—a peace that would not be disturbed for many years (Hear and applause).

The Hon. HY. NOEL said it might seem that he was strutting in peacock's feathers, when he rose and assumed the responsibility of responding to the toast of the Allied Armies and Navies—(No, no)—but he would merely observe that he had been some years in the army, and retained a love for his old profession: what the army was in his time he was sure it was now—loyal, dutiful, and always brave in discharge of its duties (Hear). The army and navy deserved well of the country, and he was sure there was no class so ready to acknowledge their services as the agriculturists. He was glad to see that, at a recent meeting of the Royal Agricultural Society, it had been resolved that the "Army and Navy" should be a standing toast for the future. So long as the army and their "wooden walls" acted as they had recently done, they might, he was confident, rest secure under such protection (Hear).

The CHAIRMAN gave "The Bishop and Clergy of the Diocese," remarking that they were not honoured that day with the presence of many clergymen, but he was sure their sympathies were with them and the society. He coupled with the toast the name of the Rev. J. W. Eagleton, who in responding said the clergy took great interest in one part of the proceedings of such societies—the premiums given to deserving labourers.

The CHAIRMAN said the next toast was one of deep interest to all of them—it was "Success to the Rutland Agricultural Society" (loud applause). It was usual in proposing such a toast to travel over the past, present, and probable future condition of the society, which had now been established nearly a quarter of a century. He had been connected with it all that time, and he could say that so complete had been its organisation, and so efficient and zealous had been its officers, that very little was desired for the future (Hear). The exhibition that day, taken in the whole, had never been surpassed: there might have been occasion when, individually, better animals had been seen; but collectively the show was equal to any he had seen at Oakham. He had great pleasure in alluding to the success, on the present occasion, of a most zealous supporter of that society (Mr. Bradshaw), who alone had taken six first prizes for sheep: this was an extraordinary fact, seeing that that gentleman had other parties to compete with, who had equal facilities for feeding and bringing such animals to perfection; the success he had alluded to spoke highly for a Rutland farmer (Hear). Another fact he would allude to, and that was that there had been a trifling extension of prizes in Class 25. He had been called upon to act as a judge of hunting horses, and himself and colleagues got up another prize of five sovereigns for the second-best animal: this was done with a view to encourage exhibitors, and he should be very glad to see a larger show and better horses. Another and a new feature was a prize offered by his Grace the Duke of Rutland, being a silver medal, value three sovereigns, to the exhibitor of the best beast shown in extra stock; he was happy to say that this prize had gone into the county of Lincoln, a friend of his (Mr. Lynn, of Stroxtun) having borne off the medal. (Applause.) A good deal had lately been said about the position of the agriculturists, the high prices, the war, &c. He would not take up much of their time upon that occasion, but they would allow him, perhaps, to combat what had been said relative to high prices: how did they affect parties standing in the position of either landlord, occupier, or labourer; had any one of these been particularly benefited? He did not think that the landlord had been specially favoured by the rise, for their household expenses had increased in proportion, and they were not taking advantage—at least he did not intend to do

so—of the temporary rise in prices to increase their incomes. He thought, therefore, under those circumstances landlords were positive losers. Then as to occupiers: taking that part of the country lying between Cambridge and Lincoln, and near to which position he resided, he considered the occupier of land had not had a year more difficult to contend with as regarded his cropping; the granaries were certainly lightly stored. A friend of his the other day said that he had thrashed a stack of wheat, and he had expected to obtain at least fifty quarters, instead of which quantity he got twenty-eight! Another gentleman had said to him "I have had the thrashing-machine at work for a week, and have never in my life been so disappointed respecting the yield." The occupier, therefore, had not benefited. Then as to labourers: in no part of England was the condition of this class so well considered as in this; the farmers had raised the wages of their labourers, but even then they could not compensate him to the extent he was benefited when wheat was at 40s. a quarter; neither could the farmer afford to do so. Then, he would ask, how far had all been benefited by high prices? (Hear.) He (the chairman) knew, too, what the effect had been with respect to grazing, for they had had no grass in his part of the country. It had not, therefore, been so good a year as some writers in certain prints would lead the public to suppose. It had been said that they ought to have agricultural statistics. He should like to know who could sit down a month after harvest and tell accurately what amount of grain he had got; he considered the cry about agricultural statistics a "will o' the wisp." He had been asked in Parliament, when acting in the Poor-law department, whether it would be possible to give information respecting the amount of produce; and the answer he gave was, that he had no doubt the acreage could be given, but not the quantity of grain produced, and that if such an attempt as the latter were made the returns could not be depended upon. He knew the farmers were a candid set of men, frank and open, and so far as he was concerned he would tell all he knew, but that would be but little. He did not think that journalists, members of Parliament, or any other persons, could tell them how to conduct their affairs better than they knew themselves. (Hear.) If they were called upon by her Majesty's Government to make returns, all they could do, in his opinion, was to give the acreage, and leave those who called upon them to find out the probable yield. They would most likely have what would be called a "statistical board," the members of which would have nice salaries. A registration board, for the purpose of obtaining information respecting the census, was appointed in the year 1851, but they did not get the whole of their information until three years afterwards: there were no returns until 1854. The members of that board were, he had no doubt, well-paid men. Suppose the farmers gave an account of their produce in 1855, and the returns were not published until 1858, those returns would no doubt be very useful then (laughter). Let them oppose the frittering away of the public money in so useless a manner. The parties who cried out most for these returns were the commercial portion of the community; these classes wanted to know the amount of grain there was in the country, and what amount of gold was likely to be sent away for grain exported from France and other places, because the stocks and exchanges were regulated by those transactions, and such information would be of great importance to them, but of none to the agriculturists. (Hear.) In conclusion, the right hon. chairman said he hoped the Rutland Society would continue to prosper: let them uphold by all means that eminent association, which was the means of diffusing so much good. He had no doubt the words of the toast he had the pleasure of

proposing would be fully realized. (The chairman sat down amidst loud applause.)

Mr. C. J. BRADSHAW here read the awards of prizes to class 29; after which the Chairman presented the medal given by the Duke of Rutland to Mr. Lynn, jun. (in the absence of his father), expressing a hope that the winner would value the prize as highly as the members of that society did.—The medal is a very elegant one, and has appropriate inscriptions engraved on both sides.

The CHAIRMAN next proposed "The High Sheriff of the County" (Arthur Heathcote, Esq.).

In that gentleman's absence,

Sir GILBERT HEATHCOTE, Bart., M.P., responded, and gave "The Lord Lieutenant of the County" (the Marquis of Exeter), remarking that his lordship, who was highly respected, was a great patron and supporter of agriculture. The noble marquis had that day obtained one of the principal prizes; and although it would find its way to Burghley by Stamford, they had the pleasure of knowing that many other prizes would go to Burley by Oakham (applause).

The CHAIRMAN, in complimentary terms, proposed "The Health of the President of the Society" (the Earl of Gainsborough), and said the deep interest the earl took in the welfare of the society was exemplified in the catalogue of prizes offered that day. He also alluded to the benefits conferred upon cottagers by the allotment system—one mainly carried out through the instrumentality and zeal of the earl's respected agent, Mr. Baker (applause). The toast was drunk with three times three.

The Hon. H. Y. NOEL responded.

R. W. BAKER, Esq., said he had the honour, by desire of his brother farmers, to propose the next toast, which was, "The Health of the Chairman of that Meeting" (loud applause). If one toast was more grateful to all of them than another, it was the one he then proposed (Hear). Sir John lived in the hearts of all of them (applause). A great many of them in that hall remembered the support the chairman gave to their society years ago, and at a time when it most needed assistance. About 1834, they re-organised the society, and then agreed to elect a certain number of presidents and vice-presidents, and in that year Sir John was at their meeting as vice-president. In 1837 he presided at an annual meeting held at the Crown Inn, Oakham; and on that occasion he (Sir John) said, "Let us put our shoulders to the wheel and erect this building" (the hall). On behalf, therefore, of all those interested in the erection of that edifice, he begged to say that they took Sir John as one of the corner-stones of the building—the steady, kind, and persevering support they had received from their chairman warranted him (Mr. Baker) in saying so: he never deserted the agricultural interest (Hear, hear). Much more might be said of him; but as he (Mr. B.) had no wish to intrench upon the rules of the society by introducing politics, he would therefore, in conclusion, remark that Sir John Trollope might have been respected in 1834 and 1837, but that respect had grown stronger year by year, and he fervently hoped that he would remain amongst them for a long time. He begged to give them "The health of their Chairman, and thanks to him for his services over a period of nearly twenty-five years" (loud applause).—Drunk with three times three.

The CHAIRMAN responded in appropriate terms, and assured the company that their kindness would not be thrown away upon unfruitful soil, and that he should always feel deeply interested in the welfare of the inhabitants of Rutland (applause).

G. H. HEATHCOTE, Esq., M.P., proposed "The Vice-Presidents of the Society;" to which toast

R. W. BAKER, Esq., responded.

WM. SHARRAD, Esq., of Langham, said he had the pleasure to propose the toast of "The Members for the County." He congratulated the freeholders of Rutland that they had two good representatives (A Voice: "Middling.") He concluded by requesting that the toast be drunk with honours (three times three cheers were rather feebly given).

Sir GILBERT HEATHCOTE, Bart., M.P., in returning thanks, apologized for the absence of the Hon. G. J. Noel, M.P., who was abroad; and after expressing the pleasure he felt in seeing their society in so flourishing a state, and at the successful show of that day, alluded to the war, expressed his confidence in the successful result of the present struggle, and said that, as the war with Louis the Fourteenth had produced

a Marlborough, and Waterloo a Wellington, so also, he thought, great generals would not be wanting to assist England in her emergencies.

ORLANDO EDMONDS, Esq. (of Stamford), proposed "The Judges of Hunting Horses," and suggested that that class be made more worthy of competition, by increasing the value of the prizes.

THOMAS HEYCOCK, Esq., of Braunston, responded to the toast.

The Hon. H. Y. NOEL proposed "The Judges of Stock." Mr. Noel suggested that one of the many young and rising farmers of Rutland should always be associated with them in their duties, and reap the benefit of their advice and judgment.

In the absence of the Judges of Stock (who were compelled to return by an early train),

Mr. JOHN PAINTER, of Burley (one of the stewards), responded.

The CHAIRMAN proposed "The Stewards," and bore testimony to the zeal and efficiency of those officers.

Mr. J. G. BOSWORTH responded, and proposed "The health of R. L. Bradshaw, Esq.," who had done that day what no other had yet been able to do—carry off the six first prizes in the sheep classes (the toast was drunk with three times three).

R. L. BRADSHAW, Esq., in responding, said he felt the compliment they had paid him so deeply, that he could hardly find words to express his feelings. His friends around him had given him the opportunity to make a remark respecting the prize ox last year in the first class. Last year, the Duke of Rutland (who took the prize alluded to) obtained the gold medal at Smithfield: he hoped the Marquis of Exeter would be equally successful this year. As far as the first-prize sheep exhibited this year were concerned, he might perhaps be allowed to say that they stood a fair chance of being first in London; and he hoped, for the sake of the Rutland Society, that such would be the case. Some sheep stood the journey to the metropolis much better than others; and he would remark that, as sheep were often greatly deteriorated in their transit on long journeys, the difference of opinion amongst judges that sometimes took place between the awards at Rutland and in London formed, therefore, no criterion as to the real merits of the sheep exhibited in the latter place. It had been known that animals which had taken first prizes at Oakham had not stood first at Smithfield, not because they were not worthy of the prize, but simply owing to the deterioration he had alluded to. The reason he had alluded to this matter was that the remark had been made, "Why, the judges at the Oakham Show must have been all wrong." He thanked them for their kindness; but the real credit was due to his son, to whom all the management of the sheep had been entrusted; and should he be so fortunate as to take a prize in London, he should hand it over to him (applause).

Sir G. HEATHCOTE, Bart., M.P., proposed "The Secretaries" (Mr. C. J. Bradshaw, Mr. T. Swingle, and Mr. W. Fowler)

Mr. C. J. BRADSHAW responded in a neat speech, for which we regret we have not space.

R. W. BAKER, Esq., proposed "The Farmers' Club," and after alluding to the good effected by the circulation of books and newspapers, said he hoped the Club would continue to receive an accession of members. Alluding to Mr. Bradshaw's sheep, he gave it as his opinion that the laurels of the Smithfield Club would come again into Rutland; they must be extraordinary animals that beat them, and better than what have been seen in the Smithfield Show for some years (Hear). Mr. Baker then entered into some very interesting particulars to show that over an extent of 20,000 acres of land in the immediate neighbourhood with which he was acquainted, cultivated under various landlords, there was not that extra breadth of land sown with wheat in 1855 over 1854 which had been stated by some writers; that from the breadth now sown over the same extent of land there would not be a very large quantity harvested in 1856 over 1855; in short, that there would be an increase about 12 per cent. in 1856 over 1854. Mr. Baker also showed some very important particulars from actual returns from sixty-four small allotments in the parish of Exton. Each person occupying  $1\frac{1}{2}$  roods of land, which is cultivated upon the fork and spade system, the average value of the produce of these sixty-four allotments was, in 1855, £9 16s. 6d. each. The average quantity of wheat was at the rate of  $5\frac{1}{2}$

quarters, or, in value, £22 per acre; barley,  $8\frac{1}{2}$  qrs., or £17 per acre; beans,  $6\frac{1}{2}$  qrs., or £13 per acre; potatoes, 96 sacks, or £36 per acre. The largest crop of wheat in the sixty-four allotments was at the rate of  $7\frac{3}{8}$  qrs. per acre, or £31; potatoes, 128 sacks per acre, or £48; carrots,  $58\frac{1}{2}$  cwt. upon one-eighth of an acre, or £52 13s. per acre: calculating wheat at 80s. per qr., barley 40s., beans 40s., potatoes 7s. 6d. per sack, and carrots 45s. per ton. He also showed that the average of wheat, barley, and beans in 1855, in these allotments, was very nearly the same as the average of the three years 1840-1-2, which also proved that, although the produce of 1855 in the district was below the abundant crop of 1854, still it was very little below an average of years. He hoped they would feel interested in the few observations he had made to them; at all events, he thought they would do no harm. He begged to propose "The Farmers' Club," and to assure them of its continued prosperity. (Mr. Baker resumed his seat amidst loud applause.)

Mr. WORTLEY responded to the toast. He eulogised the society, speaking highly of the usefulness of the Journal, and at the same time enforced the necessity of keeping up the character of the local societies, which were the tributary streams to the Royal Agricultural Society. He would also take the opportunity to say that he entirely differed from the Hon. H. Noel, who had suggested that a young farmer of Rutland should accompany the judges in making the award, for his own improvement; for he contended that the judges ought by all means to be perfect strangers to the stock and their owners. He concluded by proposing "The Labouring Classes."

The CHAIRMAN proposed "The Visitors," coupling with the toast the name of Mr. Ainsworth, from Lancashire; to which toast that gentleman responded.

Mr. R. L. BRADSHAW proposed "The Magistrates of the County," coupling with the toast the name of Sir Gilbert Heathcote, who responded.

The CHAIRMAN gave "The Royal Agricultural Society," and called upon Mr. Wortley to respond.

G. H. HEATHCOTE, Esq., proposed "Sir John Trollope and Fox-hunting," a toast which was received with enthusiasm, and drunk with three times three.

The CHAIRMAN responded in a spirited speech, and in the course of his remarks said it was not his wish to enter into new pursuits; but as his friends on his right and left (Sir G. Heathcote and Son) had refused to take the field, between the two he tumbled into it himself. He hoped the lovers of the chase would have good sport, and that the good fellowship he had experienced would continue (applause).

The CHAIRMAN gave "Prosperity to the town and trade of Oakham," to which toast Mr. Wellington responded; and after the toast of "Lady Trollope and the Ladies of Rutland" had been proposed by Mr. R. L. Bradshaw, and responded to by the Right Hon. Chairman, the latter vacated his seat and left the room amidst loud applause.

Thus ended one of the most successful and spirited meetings that has been held at Oakham for many years. We regret that we are compelled to abridge our report.

## SHROPSHIRE CATTLE AND POULTRY SHOW.

This was a very successful meeting. The show of horses was not so large as might have been expected from the ample resources of the district; but this may result from the smallness of the premiums offered, and a curtailment in the classification of last year. Some of the hunters displayed were remarkably fine animals, particularly the winner of the prize, a bay gelding, four years old, by "Drayton," the property of Mr. Calcott, of Battou, who is a first-rate judge in horseflesh. The agricultural class included four stallions, and the rest were very promising colts.

The entries for stock were, on the whole, good, and several of the animals exhibited possessed considerable merit. In the fat stock department both the Herefords and shorthorns were well represented, and the same remark will apply to the breeding stock.

The show of sheep was not numerous, but little, if at all, inferior in point of excellence to last year's display. A small lot of Leicesters, of rather diminutive size, but good in quality, were penned on the left, and immediately adjoining the entrance. The class for Southdowns was also weak as regards numbers, but the animals shown were of large-size and of beautiful symmetry. The Shropshire downs were in great force, and the breed was in every way well represented.

We cannot speak too highly of the pigs, more particularly the young brawns, which were full of quality, and the sows and pigs.

The poultry was again a great source of attraction, the entry being very large, and some of the birds possessing rare merit.

### THE DINNER.

The annual dinner of the association took place at the Lion Hotel. The chair was occupied by Viscount Newport, M.P., President of the Society, supported on the right and left by John Loxdale, Esq., W. B. Lloyd, Esq., Captain William Kenyon, M. G. Benson, Esq., and B. H. B. Owen, Esq. The Mayor of the Borough, John Hazeldine, Esq., was the Vice-President. The company numbered about sixty, and included Peter Beck, Esq.; R. H. Kinchant, Esq.; John Meire, Esq.; Mr. J. C. Etches, Mr. Gough, Mr. Horton, Harnage Grange; Mr. Adney, Harley; Mr. Calcott, Betton; Mr. Claridge, Pitchford Park; Mr. Hill, Golding; Mr. James Meredith, Frodesley; Mr. John Preece, Cressage; Mr. Wilson, Smith-

field Road, Mr. George Badger, Mr. Joseph Meire, Mr. T. L. Meire, Mr. J. M. Skrymsher; Mr. James, Cheltenham; Mr. Smith, Sutton Maddock; Mr. Fowler, Acton Reynald; Mr. Jebb, jun., The Lyth; Mr. Hewer, The Verne, Herefordshire; Mr. Hopwood, The Rowney, Market Drayton; Mr. Beetenon; Mr. Henry Pickstock, Baschurch; Mr. Edward Hughes, Mr. Lewis Meredith, Mr. Samuel Jukes, Mr. Daniel Pritchard; Mr. Crane, Shrawardine; Mr. Philpott, Unicorn Inn; Mr. Hayley; Mr. Crane, Forden; Mr. Simpson; Mr. Lee, Brompton; Mr. Wood, The Marah; Mr. S. Plimley, Alderbury; Mr. William Statham, Mr. John Frail; Mr. Bowen, Enadon; Mr. W. G. Preece (Secretary to the Society), Mr. Edwin Preece; Mr. Wright, Hatton; Mr. Matthews, Baschurch, &c., &c.

After the usual loyal toasts, the health of the Chairman was given by the Mayor.

The noble CHAIRMAN, in responding, expressed the pleasure he had derived from attending the present meeting, more especially as he found that the character of the Show had in no degree degenerated, in point of quality at least. He believed that these societies, when properly conducted, were advantageous to the agricultural community, as they tended to excite a spirit of generous rivalry and emulation among farmers, and by bringing the landlord and tenant into more frequent contact, a better feeling was established between them. After remarking on the excellence of some of the sheep exhibited, to which his attention had been particularly drawn, and urging upon the agricultural and trading community a renewed and more vigorous support of the Society, the noble lord concluded by proposing "Success to the Cattle and Poultry Show," afterwards intimating that his honoured relative and colleague in the representation of the southern division of the county (the Hon. Robert Clive, M.P.) had consented to become President of the Society for the next year (cheers).

Several other toasts were given, and after spending a pleasant evening, the company drank, "All friends round the Wrekin," which was pledged in a true Shropshire style.

### LIST OF PRIZES.

#### FAT STOCK.

##### HEREFORDS.

Steers, not exceeding three years and three months. Prize,

£5, J. Naylor, Esq., Leighton. Commended, Mr. Carter's, o Dodnore.

Cows and heifers. Prize, £5, Mr. Edward Price, the Court House, Pembridge. Highly commended, Mr. Richard Thomas, of Ryton, Salop, and John E. L. Hewer, Esq., Vern House, Marden. Commended, Mr. Richard Hill, Golding, Salop.

#### SHORTHORNS.

Oxen or steers, exceeding three years and three months old. Prize, £5, John Naylor, Esq., Leighton Hall. Commended, Mr. John Higgins, Lubstree Park, Salop.

Cows and heifers. Prize, £5, Viscount Hill, Hawkstone. Highly commended, Edward Bird Guest, Esq., Ivy House.

#### SHEEP.

Shropshire-downs. Prize, £4, William Foster, Esq., Kinver Hill Farm, Staffordshire. Highly commended, Mr. Henry Smith, jun., The New House, Sutton Maddock, one year and eight months. Commended, Mr. Richards Thomas, Woodbatch, Salop, and Mr. Henry Smith, jun., The New House, Sutton.

#### PIGS,

Exceeding one year old. Prize, £3, Mr. William Preece, Eardington, Salop.

#### BREEDING STOCK.

##### HEREFORDS.

Bulls of any age. A sweepstakes of £2 each, with £10 added, Mr. Richard Hill, Golding Salop, "Restorative." Commended, Mr. John Monkhouse, The Stow, Herefordshire, "Madoc."

Bulls, not exceeding three years and three months old. Prize, £5, John Naylor, Esq., Leighton Hall. Commended, Mr. Richard Hill, Golding.

Cows, exceeding three years and three months old, in calf or in milk. Prize, £5, William Stedman, Bedstone Hall, Salop. Commended, John Naylor, Esq., Leighton Hall.

Pair of heifers, not exceeding three years and three months old, in calf or in milk. Prize, £5, John Naylor, Esq., Leighton Hall. Commended, Mr. William Allen, Unckington, Salop.

##### SHORTHORNS.

Bulls of any age. A sweepstakes of £2 each, with £10 added. Second prize, £3, Mr. Edward Gough, Gravel Hill, Salop, "Legitimate" (10412), aged six years. Commended, Mr. Joshua Price, Featherstone, Staffordshire; Viscount Hill, Hawkstone, Salop; and Mr. Peter Perry, Acton Pigott, Salop, "Dandy."

Bulls, not exceeding three years and three months old. Prize, £5, Viscount Hill, Hawkstone.

Cows, exceeding three years and three months old, in calf or in milk. Prize, £5, E. W. S. Owen, Esq., Conover, Salop.

Pair of heifers, not exceeding three years and three months old, in calf. Prize, £5, Viscount Hill. Commended, Sir E. J. Smythe, Bart., Acton Burnell Hall, Salop.

#### SHEEP.

Shropshire or Southdown rams. A sweepstakes of £1 each, with £5 added, William Wyley, Esq., Dothill, Salop. Commended, Mr. Henry Smith, jun., Sutton Maddock, Shiffnal.

Leicester, or other long-woolled rams, a sweepstakes of £1 each, with £5 added, Mr. Edward Gough, Gravel Hill, Salop.

Leicester ram-lambs. Prize, £3, Mr. William Lowe, Uckington, Salop.

Leicester ewes. Prize, £5, Mr. John Wedge, Fern Hill. Commended, Mr. Edward Gough, Gravel Hill, and Mr. John Wedge, Fern Hill, Newport.

Southdown ram-lambs. Prize, £3, Viscount Hill, Hawkstone.

Southdown ewes. Prize, £5, William Foster, Esq., Kinver Hill Farm. Commended, Mr. Henry Smith, jun., Sutton Maddock.

Shropshire-down ram-lambs. Prize, £3, Rev. C. P. Peters, Pitchford rectory, Salop. Commended, ditto, ditto, and William Foster, Esq., Kinver Hill Farm.

Shropshire-down breeding ewes. Prize, £15, Edward Holland, Esq., Dumbleton, Gloucestershire. Highly commended, William Foster, Esq., Kinver Hill Farm. Commended, Mr. Henry Smith, jun., Sutton Maddock, and ditto, ditto.

#### HORSES.

Horses, mares, and geldings, calculated for hunters, carriage horses, or chargers. Prize, £5, Mr. Charles Calcott, Betton, bay gelding.

Brood mares, calculated to breed hunters, carriage horses, or chargers, with one of her produce under 12 months old. Prize, £5, G. H. Talboys, Esq., Broseley.

Horses, mares, and geldings, adapted to agricultural purposes. Prize, £5, Edward Holland, Esq., Dumbleton, Gloucestershire.

Brood mares, best calculated to breed horses for agricultural purposes, to be shown with one of her own produce. Prize, £5, Mr. William Lawrence, Cantlop, Salop.

#### PIGS.

Boars of any breed, not exceeding two years old. Prize, £3, Mr. Samuel Bluck, Bromfield, Salop. Highly commended, Mr. Henry Hill, Stableford, Salop, and Sir E. J. Smythe, Bart., Acton Burnell Hall.

Sows, of any age or breed, each with not less than five breeding pigs, not exceeding six months old. Prize, £5, Mr. Edmund Meredith, Frodesley, Salop. Commended, Charles Chandler, Esq., Bicton, Salop.

#### EXTRA STOCK.

Exhibitors, Mr. Edmund Meredith, Frodesley, Salop, gelt, in pig, small breed; and Peter Beck, Esq., Shrewsbury, black gelding, by the Steamer.

### RABBITS—NOXIOUS VERMIN TO THE TENANT FARMER.

SIR,—In traversing several of the Midland counties, more especially by the the side of woods, plantations, and forests, I find the rabbits greatly complained of by tenant farmers. In too many cases the gamekeeper stocks the tenant's farm with rabbits and without stint, the rabbits being considered the gamekeeper's property and part of his wages. I have known and do know instances, where tenant farmers of the first class are not allowed to kill a rabbit on their farms; and I know where the game and rabbits found upon a lordship are sold yearly to the man who will give the most for them, without any remuneration to the tenant farmer who rears and feeds them. Such is a badge of the old feudal system of the game and rabbit laws. Let the lords of the soil consider that a single rabbit running over a farm will destroy in one year a bushel of wheat. What is a bushel of wheat worth? Why 10s.! And what is the rabbit worth when it has destroyed the bushel of wheat? Why from 9d. to 1s. Is not this waste of property monstrous, in the middle of the nineteenth century, and in the great age of discovery? Where can the ears, eyes, and conscience of the steward of the noble lord be, to allow a gamekeeper to stock his master's tenants' farms without stint, nay, with vermin—rabbits? Justice calls out aloud, far and wide, and says rabbits ought to be the property of the tenant farmer and not the property of the gamekeeper in lieu of wages, which makes the gamekeeper noxious in the eyes of the tenant farmers. I know an instance of a highly respectable tenant farmer in the county of Bucks, where the damage done by rabbits in one year upon his farm, which was of a moderate size, was valued at £150 by highly respectable and competent valuers.

The wheels of nature and of time were never made to roll backward. The tide of reason, long delayed, long checked and obstructed, has nevertheless set in, and plainly indicates that with the high price of corn under free trade, wheat ought not to be destroyed by vermin called rabbits.

Not many years back, in North Lincolnshire, many rabbit warrens were let to warreners upon Lincoln Heath and the Wolds, of 1,000 acres in each warren, at not more than 2s. 6d. per acre. Who did the rabbits in the warrens belong to? Why the warrener, the tenant; the same as cattle and sheep upon a farm, and of course not to the hireling gamekeeper, or his master the owner of the land; but to the tenant warrener, who stocked his land with rabbits instead of cattle and sheep. And were a tenant farmer to stock his farm with rabbits instead of sheep and cattle, would the gamekeeper or his master claim the whole of the rabbits the tenant's stock, which he kept to pay the rent of his farm? Then why is a gamekeeper or landlord allowed to claim the rabbits upon the farm of a tenant?

Leamington, Warwickshire, Nov. 30th.

S. A.

## THE SMITHFIELD CLUB AND BIRMINGHAM CHRISTMAS CATTLE SHOWS.

Some six months since we felt it our duty to warn the Directors of the Smithfield Club and the Midland Counties Cattle Show of the unprofitable collision to which they were once again approaching. It would seem to have been the duty of neither to heed our caution. Not the slightest effort, we believe, was ever made on either side to avert the evil. In the face of the very palpable fact that the best animals had been continually sent from one show to the other, and that the opportunity for comparison thus afforded was one of the most satisfactory the public could enjoy, neither of the societies cared to secure such advantages. Indeed, as the occasion drew near, we came to be assured by both, with a pardonable exercise of the puff preliminary, that their respective entries and attractions would be greater than ever. Curious as it might sound, there would be better animals and more of them in Baker-street and Bingley Hall, when London and Birmingham each "kept itself to itself," than when one lent its aid to the other.

All this has been scarcely realized. On the contrary, from what we have seen of the one show and heard of the other, we have not the least hesitation in saying that both have suffered. There are many reasons offered for this. Food for stock has been notoriously scarce and dear. Farmers, again, have been labouring under a strong attack of the "twenty-pound a load" fever, and it is but human nature to see people well satisfied when they are doing well. The heavy expense of fattening-up cattle and sheep to the prize acmè of condition might not, under present circumstances, seem necessary, and we have no doubt that many have thus stayed their exertions. Still, we cannot at all admit that any such combination of causes could have thinned the entries down to what we found them. We can only revert to the one fatal error in forgetting that nothing but the Irishman's bird was ever able to be in two places at once. There was many a good beast, which, if he had not been in Birmingham, would have been in London, and perhaps more still that would have gone on from the metropolis to the midland counties.

An attempt has been made to show that the Smithfield Club has had by far the worst of this *contretemps*. It has been declared, in fact, in so many words, that the exhibition is this year much inferior to that collected in Birmingham. We do not see that the comparison is altogether a fair one; but if it is drawn, we have the authority of some of our best judges for saying that, in real excellence, in having brought together the best animals of their several kinds, the Smithfield Club has a very decided superiority. The challenge offered by the Duke of Richmond at the dinner, with reference to his own entries, might be very

safely extended. We are forced to say thus much, after what has already been declared; but we do so with anything but an intended disparagement of our Birmingham friends. On the contrary, there is no meeting of the whole year we enjoy more than theirs. To their admirable arrangements we have, time after time, given that approval they so well merited. We have now, we are happy to add, to thank them for something further. The Directors of the Midland Counties Society have been the first to acknowledge the impolicy of this opposition week, as they have determined that such a mistake shall never occur again. Though unable to attend ourselves, we have made arrangements for a full report of the meeting, supplied by one of our own correspondents, and to be found in another part of this magazine.

We have also had three of our staff busily engaged in the King-street Bazaar. Their labours will record what the Smithfield Club really was able to do. Our own conviction is that in the cattle classes generally, both for numbers and excellence, the show was unequivocally below the mark. It is long since there was a poorer lot of Devons; while the Shorthorns, with only a few exceptions, by no means bore testimony to their rapidly extending repute. For *picked* good beasts we should have gone to the Herefords, a cluster of young animals being very superior. These, with the "other" breeds, Welsh and Scotch, and sheep—the long-wools more especially—constituted the chief strength of the yard. They were flanked, however, by a row of steam engines, and crowned with an implement gallery, that of itself was an admirable exhibition of wares and inventions. There was no falling off here. The display was larger and better than ever.

On the whole, we are inclined to think the members of the Smithfield Club will profit more than usual from the experience of this last show. They have received a home thrust or two, rather roughly given. Many of their own body have evinced their anxiety to break fresh ground, and do a little more than they have done. Beyond this, they have entered on a more favourable term with the proprietor of the Bazaar—an arrangement which savours more of that liberality there should be. For instance, in future the members of the Club will all have the entry to "the private view"—a privilege they should have had from the first. It is not much, after all, the members of the Smithfield Club receive in this way, while we are much mistaken if such a step will not materially increase their numbers. So far this private view has been rather a melancholy affair, with a few representatives of the Press, and a few exhibitors scattered over a space amply sufficient to accommodate all the cognoscenti.

In another part of the proceedings the Smithfield

Club has made a very decided improvement, and that is the dinner at which the prizes are distributed. It was not only the best, but the best served, arranged, and attended we ever remember to have been present at. Further than this, it was, as the reporters record, "rendered more than usually interesting" by the presentation of a piece of plate to the honorary secretary of the Club, Mr. Brandreth Gibbs. It is not often that honorary appointments are particularly well filled, and it is not common that these testimonial offerings are by any means too well merited. If, however, a man has deserved well of those he has served, it is Mr. Brandreth Gibbs. Either as Director of the shows of the Royal Agricultural Society, or as Secretary of the Smithfield Club, he has worked with equal zeal and ability. Few, indeed, could fulfil the duties with more method, energy, or a greater experience of those he has to encounter. His labours, moreover, are those of a nature we do not see much of, and he must be often toiling early and late for the accommodation of those who cannot know half of what he has done for them. Our report of the dinner will show the manner in which he was introduced by the President and received by his friends. Mr. Gibbs' own speech, which ran to some length, touched not only on business detail and deduction, but overflowed at times with simile, metaphor, and poetical illustration. Never before has the Smithfield Club enjoyed such an oration.

The reports of the other meetings will speak for themselves. The subject selected for discussion at the Farmers' Club allowed ample limit to the introducer; and it will be seen that Mr. Baker very

ably handled his text, hardly leaving any topic untouched. The debate which followed, though sufficiently energetic, was by no means equal to what the Club has done in discussion. We may take an early opportunity of referring to what occurred here. At the Society of Arts, Mr. Bailey Denton's paper on Drainage called up a number of contemporary authorities, not to be exhausted at one sitting.

The meetings of the Royal Agricultural Society of England have not been of so public a character as we might have wished. They have nearly all been confined to committees—in which one of the most important matters has been the great conference with the implement makers. This turns on the triennial or biennial trials, only, of machinery; and it is understood that to a certain extent "the prayer of the petitioners" will be granted. By some strange mischance, the only public meeting of the week is fixed for a day when there is no public to attend it. That is to say, the general meeting of the society is fixed for the *Saturday* in the Smithfield week, at eleven o'clock; and by Saturday at eleven o'clock nine-tenths of the members who have come to town are gone out again. The consequence is that this general meeting is the most formal of all routine affairs. There is a common rumour that our leading agricultural bodies are too confined in their administration. Without in any way here admitting the truth of this allegation, we would certainly counsel our friends in high places to give their brother-subscribers more consideration as well as more opportunity for expressing their opinions than they appear at present to enjoy. We speak with a due regard for the interests of all.

## SMITHFIELD CATTLE SHOW.

The numbers exhibited in each of the eight divisions into which the cattle are grouped, are as follows:—Devons, 17; Herefords, 20; Shorthorns, 40; Scotch or Irish, 10; Welsh, 6; Other Pure Breeds, 3; Cross or Mixed-bred, 7; and Extra Stock, 9: making a total of 112.

We at once proceed to give the results of our inspection of the various classes, beginning with the DEVONS.

**CLASS I.**—Devon Steers, not exceeding 3 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 4. The Earl of Leicester, of Holkham Hall, Wells, Norfolk, 2 years and 11 months, bred by exhibitor, and fed on mangel wurzel, turnips, hay, linseed cake, bean and pea meal. The judges have done rightly in awarding to this animal the first prize. He is remarkably level; has a remarkably good chine and wide hips, a first-rate fore-quarter, and a good rump, while the firmness of his flesh, and his beautiful quality altogether, excited general admiration.

No. 1. His Royal Highness Prince Albert, 2 years and 10 months, bred by George Turner, of Barton, near Exeter, and fed on bean and barley meal, linseed cake, swedes, and hay. Second prize. We think that this steer deservedly occupies the secondary instead of foremost position in its class, and that therefore dis-

crimination not favouritism has swayed the decision of the arbitrators in this case. This animal has an exceedingly good hand, and is of fine character and quality, but smaller in frame than the prize beast, and deficient at the rump and hind quarter.

No. 2. H. Frampton, of Blandford, Dorset, 2 years 9 months and 17 days, bred by Lord Portman, of Bryanston House, Blandford, and fed on hay, swedes, mangel wurzel, carrots, vetches, barley, oat and bean meal, and oil cake. A beast of much greater size, but not at all equal in quality.

**CLASS II.**—Devon Steers or Oxen, above 3 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 13. The Lady Elizabeth Louisa Reynell, of Avisford House, near Arundel, Sussex, 4 years and 10 months, bred by Robert Hole, of Harwood, near Dunster, and fed on swedes, hay, barley meal, and oilcake. A lady cattle-feeder carries away the first prize, for a very well made-up animal, firm, yet fat, and with great size; hips wide, and general symmetry of form.

No. 7. His Royal Highness Prince Albert, 3 years and 8 months, bred by Richard Mogridge, of Molland, near South Molton, and fed on bean and barley meal, linseed cake, swedes, and hay. Second prize. Here again we find a similar defect to that of his Royal Highness's young steer, namely, a slight falling off in the rump, although the two animals were not of the same herd.

Both, however, possess a degree of merit fully entitling them to the amount of honour they have received.

No. 6. R. J. Webb, of Calcot-place, near Reading, 3 years and 7 months, bred by the Earl of Aylesford, of Packington, near Coventry, and fed on hay, mangel wurzel, swede, turnips, oilcake, barley and bean meal. Particularly noticeable for its wide fore-quarter; but as too often happens, this is not quite matched by an equal excellence in the hind-quarters, the flank and tut being rather deficient.

No. 8. John Tucker, of Yard Farm, Staplegrove near Taunton, 4 years 7 months and 8 days, bred by exhibitor, and fed on barley, bean, and pea meal, hay, grass, and roots. An animal of great size, and exceedingly fat.

No. 9. J. Trevor, sen., of Broughton Pastures, near Aylesbury, 5 years and 3 months, bred by Edwin G. Toose, of Bishop's Lydeard, near Taunton, and fed on grass, oilcake, and hay. This beast possesses a large heavy frame, but is rather deficient in one or two of the points which indicate a fat and well-fed animal.

CLASS III.—Devon Heifers, not exceeding 4 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified. Freemartins and Spayed Heifers are not qualified.

No. 14. John Tucker, of Yard Farm, Staplegrove, near Taunton, 2 years and 10 months, bred by John Biffon, of Nailbourne Farm, Kingston, near Taunton, from the stock of exhibitor, and fed on barley, bean and pea meal, hay, grass, and roots. First prize. We much admired the fine bone and symmetrical proportions, as well as good meat of this heifer, though she is not quite perfect and level between the hip and tut.

No. 15. Thos. White Fouracre, of Durston, near Taunton, 2 years and 9 months, bred by exhibitor, and fed on hay, grass, roots, bean and barley meal. Second prize. Remarkably wide hips; broad, straight back; chine fully out, and twist good.

CLASS IV.—Devon Cows, above 4 years old, that must have had at least one live Calf, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 16. His Royal Highness Prince Albert, 5 years and 9 months, bred by Lord Portman, of Bryanston House, Blandford, and fed on bean and barley meal, linseed cake, roots, and hay—had two calves. First Prize. A very superior cow, having a straight and very wide flat back; thighs and twist exceedingly good; hips wide; rump fat, and not sloping off; chine full, and ribs well standing out.

No. 17. John Coate, of Hammoon, near Blandford, Dorset, 4 years and 7 months, bred by John Badcock, of Stogumber, near Taunton, and fed on hay, oilcake, mangel-wurzel, and cabbage—had one calf. Second Prize. Decidedly inferior to the other, being much less widely built in frame.

We come next to the Herefords, and here meet with commendations abundantly bestowed. Some very fine animals are exhibited; and, indeed, visitors could hardly believe in some instances that the right ages had been given, and that beasts could attain to such great size and maturity in so short a time.

#### HEREFORDS.

CLASS V.—Hereford Steers, not exceeding 3 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 19. Isaac Niblett, of Filton, near Bristol, 2 years 10 months and 1 week, bred by T. L. Meire, of Cound, near Shrewsbury, and fed on hay, swedes, mangel wurzel, barley meal, and cake. First Prize.

This steer possesses a remarkably good hand. His back is straight, ribs well springing out; altogether, a well-made animal, covered with exceedingly good meat.

No. 18. Edward Longmore, of Adforton, near Ludlow, 2 years and 11 months, bred by Thomas Longmore, of Buckton, near Ludlow, from the stock of Mr. Tudge, of Ashford, and fed on oilcake, pea meal, and ground oats. Second prize. A shorter frame. Back and ribs well covered; rump, tut, and twist good; amazingly fat for so young an age.

No. 20. Josh. Phillips, of Ardington, near Wantage, Berks, 2 years and 7 months, bred by Thomas Carter, of Dodmore Farm, Ludlow, and fed on barley meal, cake, swedes, and hay. Highly commended. Very fat; but not nearly so good a hand as some others in the class.

No. 21. Lord Berwick, of Cronkhill, near Shrewsbury, 2 years 10 months and 12 days, bred by exhibitor, and fed on grass, hay, roots, barley and pea meal, and oilcake. Commended. This steer has certainly much better meat than the preceding, and is both well formed and well fed.

No. 22. William Heath, of Ludham Hall, near Norwich, 2 years and 7 months, bred by John Child, of Ledwych, near Ludlow, and fed on grass, hay, turnips, oilcake, oat and pea meal. Commended. A very large and heavy beast, but deficient in firmness of hand.

This class is very meritorious, and deserving of praise.

CLASS VI.—Hereford Steers or Oxen, above 3 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 29. William Heath, of Ludham Hall, near Norwich, 3 years and 11 months, bred by William Stedman, of Bedstone Hall, near Ludlow, and fed on grass, hay, turnips, oilcake, oat and pea meal. First prize. We do not know which to admire most, the great size, breadth, and depth of frame, or the beautiful quality, symmetry, and colour of this steer. He possesses a remarkably good chine and fore-quarter; an extraordinarily full and wide breast, and a wonderful flank, and carries in every point an immense quantity of firm meat.

No. 33. His Royal Highness Prince Albert, 3 years and 11 months, bred by John Stephens, of Hay, Brecon, and fed on oilcake, bean meal, swedes, and hay. Second prize. This animal is level, wide, and well-formed; rump good, and the meat firm.

No. 25. Philip Turner, of The Leen, Pembridge, near Leominster, 3 years 11 months and 5 days, bred by exhibitor, and fed on grass, hay, turnips, oat, barley, and bean meal, and cake. Commended. Of very great size, breadth, and depth; but inferior to the preceding beasts in quality.

No. 28. Arthur James, of Monnington Court, near Hereford, 4 years 1 month and 5 days, bred by Richard James, of Monnington-on-Wye, near Hereford, from the stock of Mr. Smith, of Shelsley Walsh, and fed on grass, hay, turnips, mangel wurzel, pea and barley meal, and oilcake. Commended. This is a very good steer, with a straight back, and particularly heavy thighs. His hand is very firm.

No. 26. Thomas Bridge, of Ramsey's Tyrel, near Ingatstone, Essex, 3 years and 5 months, bred by Thomas Palphrey, of Penybont, Radnor, and fed on vegetable roots, linseed, oilcake, barley and linseed meal, and hay. A superior chine, but there is not a corresponding breadth between the hips, which renders him less proportionate than some worse-fed beasts.

No. 24. The Earl of Radnor, of Coleshill House, near Farringdon, Berks, 3 years and 3 months, bred by exhibitor, and fed on corn, cake, hay, and roots. We

cannot praise this animal so highly as some others, one deficiency being observable between the rib and the hip.

**CLASS VII.**—Hereford Heifers, not exceeding 4 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified. Freemartins and Spayed Heifers are not qualified.

No. 34. Joseph Phillips, of Ardington, near Wantage, Berks, 2 years and 7 months, bred by Thomas Carter, of Dodmore Farm, near Ludlow, and fed on barley meal, oilcake, swedes, and hay. First prize. This heifer has a very good back, full chine, and very wide hips.

There was no competition for the second prize.

**CLASS VIII.**—Hereford Cows, above 4 years old, that must have had at least one live Calf, without restriction as to feeding, yet the kind or kinds of food must be certified.

No. 37. John Henry Gurney, of Catton Hall, near Norwich, 8 years, bred by William Chilor, of Wigmore Grange, near Leominster, and fed on swedes, beet, hay, oat and barley meal, and linseed-cake—had 2 calves. First prize. This very remarkable cow, at such an age, and having had 2 calves, has yet laid on an immense quantity of meat, apparently very fat, but firm to the hand. Such an animal *must* be of fine feeding quality, and, in fact, she is well-formed and symmetrical, and has fine offal and a kindly coat.

No. 36. Josh. Phillips, of Ardington, near Wantage, Berks, 4 years and 1 month, bred by Thomas Carter, of Dodmore Farm, near Ludlow, and fed on barley meal, swedes, cake, and hay—had 2 calves. Second prize. Firm, good meat, but her coat not bright—in some points, though, a good animal.

No. 35. Philip Turner, of the Leen, Pembridge, near Leominster, 4 years and 11 months, bred by exhibitor, and fed on grass, hay, turnips, cake, bean, barley, and oatmeal—had 2 calves. Highly fattened, but has one defect in not being sufficiently filled out between the hip and rib.

#### SHORT-HORNS.

**CLASS IX.**—Short-horned Steers, not exceeding 3 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified.

This class is generally commended, but we hardly see why it should be so distinguished.

No. 40. J. Holmes, of Brooke Hall, near Norwich, 2 years 11 months and 8 days, bred by exhibitor, and fed on swedes, mangel wurzel, hay, chaff, bean and barley meal, oil cake, and molasses. First prize. This is a superior animal, well fed, and with exceedingly firm good meat.

No. 41. Earl Spencer, of Althorp Park, near Northampton, 2 years and 11 months, bred by exhibitor, from the stocks of Sir Charles Knightley, Bart., and own, and fed on grass, hay, turnips, mangel wurzel, barley and bean meal. Second prize. Not fat, but with very firm hand; a nice animal, but of no especial merit.

No. 39. Richard Stratton, of Broad Hinton, near Swindon, Wilts, 2 years and 10 months, bred by exhibitor, and fed on hay, roots, cake, linseed, and beans. Commended. A very good back, several excellent points, but a failing place behind the shoulder.

**CLASS X.**—Short-horned Steers or Oxen, above 3 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 46. The Marquis of Exeter, of Burghley Park, near Stamford, 3 years and 10 months, bred by exhibitor, and fed on linseed cake, bean meal, and vegetables. First prize and the gold medal. In the eyes of judges this is really an astonishing animal; first there is his immense size, then his beautiful symmetry of form, and then his splendid quality, light bone, and fine head.

Whether we look at the fulness of the chine, great depth through the chest, wonderful breadth both in the fore and hind-quarter, the level back to the rump and tut, the thick thighs, and the firmness of the meat, we must allow this to be a very superior specimen of a well-bred and well-fed short-horn. If there be any failing point, it is a lightness in the flank. This ox, we believe, has been sold for £80.

No. 59. Thomas Mortin, of Ashford, near Staines, Middlesex, 3 years and 7 months, bred by William Bayley, of Britwell Farm, near Maidenhead, and fed on mangel wurzel, swedes, Belgian carrots, oilcake, and hay. Second prize. This is a very good animal, with fine head and offal, and considerable breadth of frame. The meat is firm; of very good quality.

No. 49. The Hon. Colonel Pennant, of Penrhyn Castle, near Bangor, Carnarvon, 3 years and 11 months, bred by exhibitor, from the stock of Sir Charles Knightley, Bart., and fed on barley, bean and pea meal, oilcake, linseed oil, swedes, mangel wurzel, and hay. Commended. A superior steer, remarkably wide-built, and of merit in several points.

No. 47. Henry Vyner, of Newby Hall, near Ripon, York, 4 years and 7 months, bred by Anthony Hurwood, of Pickhill, near Thirsk, from the stocks of the Earl of Carlisle and Mr. B. Wilson, of Brawith, and fed on linseed cake, tares, hay, turnips, and ground oats. This animal has a tremendous frame, standing very high; he is fat, and yet of firm hand, and is well filled out, and level. His thighs are somewhat deficient; and he has a white coat, not very fine in character.

No. 54. William Hewer, of Sevenhampton, near Highworth, Wilts, 3 years and 9 months, bred by exhibitor, from the stocks of the late Earl Ducie and own, and fed on grass, hay, cabbage, turnips, bean meal, and oilcake. A good steer, but a little narrower in the hip than some other in this class.

No. 56. His Royal Highness Prince Albert, 3 years and 10 months, bred by Stewart Marjoribanks, of Bushey Grove, Watford, from the stock of Mr. Troutbeck, and fed on oilcake, bean and barley meal, swedes, mangel wurzel, and hay. This animal is not remarkable, except as being well fattened, and rightfully yields the palm of superiority to those which have taken away the honours.

No. 57. R. W. Baker, of Cottesmore, near Oakham, 3 years 9 months and 3 days, bred by exhibitor, and fed on oilcake, bean and barley flour, hay, and roots. A good steer, with a broad back, equally fattened; but in quality we should place it below the preceding one.

No. 60. The Earl of Leicester, of Holkham Hall, Wells, Norfolk, 4 years and 7 months, bred by Croft Sharpley, of Acthorpe, near Louth, from the stock of Mr. Cropper, of Minting, Lincoln, and fed on mangel wurzel, turnips, linseed cake, and hay. Not at all superior, being somewhat defective behind the shoulder, and not wide enough in frame.

**CLASS XI.**—Short-horned Heifers, not exceeding 4 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified. Freemartins and Spayed Heifers are not qualified.

This class is generally commended, and deservedly so.

No. 67. William Aldworth, of Frilford, near Abingdon, 2 years and 6 months, bred by Wm. Miller, of Water Eaton, near Kidlington, Oxon, and fed on grass, hay, swedes, mangel wurzel, barley and bean meal, and oilcake. First prize. A superior heifer, of exceedingly good form and quality; ribs standing well out.

No. 63. C. P. Duffield, of Marcham Park, near Abingdon, Berks, 3 years and 11 months, bred by Thos. Macc, of Sherborne, near Northleach, and fed on oilcake, bean and barley meal, mangel wurzel, swedes, and

hay. Second prize. This heifer has laid on a large quantity of meat; and her wide and deep fore-quarter and proportionate frame are points generally admired.

No. 61. George Hare, of Holbrook Cottage, near Ipswich, 2 years and 3 months, bred by George Maxwell, of Kidbrook Manor, Blackheath, from the stock of R. Searson, of Cranmore Lodge, Deeping, Lincoln, and fed on roots, oilcake, barley meal, and lentil chaff. Commended. A white heifer, of exceedingly good quality of flesh and great beauty of form, with a fine head and light bone.

No. 64. Josh. Phillips, of Ardington, near Wantage, Berks, 3 years and 8 months, bred by Thomas Garne, of Broadmoor, near Northleach, and fed on barley meal, cake, swedes, and hay. Commended. This animal is fat, with a very good firm hand; she has a broadly-expanded chest, wide hips, and good rump; and her fine head and generally excellent quality point her out as almost deserving of the second prize.

No. 66. His Royal Highness Prince Albert, 3 years and 4 months, bred by exhibitor, and fed on oilcake, bean meal, swedes, and hay. Not of large size, but of beautiful quality; hips wide, tut good; she is very fine, and is well fattened.

**CLASS XII.**—Shorthorned Cows, above 4 years old, that must have had at least one live calf, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 73. Henry Ambler, of Watkinson Hall, near Halifax, York, 7 years 11 months and 16 days, bred by the late William Dunkley Manning, and fed on grass, roots, cake, and bean meal—had 2 calves. First prize. A cow of extraordinary size; good back, and especially good chine.

No. 74. Richard Stratton, of Broad Hinton, near Swindon, Wilts, 5 years and 9 months, bred by exhibitor, and fed on hay, roots, cake, linseed, and bean meal—had 2 calves. Second prize. A firmer hand than the preceding has. These are both very heavy beasts, well meriting the distinction they have received.

No. 71. His Royal Highness Prince Albert, 5 years and 11 months, bred by the late Captain Dilke, R.N., of Maxstoke Castle, and fed on bean and barley meal, linseed cake, swedes, and hay—had 2 calves. Commended. His Royal Highness has been rather more fortunate in this class, although not carrying off a prize. This is a very superior animal; very level, with a straight broad back, and chine exceedingly well out; the rump is also very good, and the flank very heavy indeed.

No. 76. John Tucker, of Abbey Print Works, Stratford, Essex, 6 years and 8 months, bred by Thomas Herbert, of Macaroni Farm, near Lechlade, and fed on hay, oilcake, locust beans, bean and barley meal, and roots—had 2 calves. Commended. A very good back; hips wide; flank good.

#### SCOTCH OR IRISH.

**CLASS XIII.**—Scotch or Irish Steers or Oxen, of any age, without restrictions as to feeding, yet the kind or kinds of food must be certified. This class is generally commended, and indeed some of the animals exhibited are of a size and proportion of form quite surprising to southern farmers.

No. 82. John Grove, of Ferne, near Salisbury, Polled Angus, supposed to be 5 years, breeder unknown, fed on roots, barley, bean, and linseed meal. Prize. This animal has a very deep chest, and generally good fore-quarters; but is low-standing, and much smaller than many in this class. Our opinion would not have awarded him the honour he wears, some of his competitors being of decidedly greater merit.

No. 78. William Stirling, M.P., of Keir, near Dunblane, Perth, West Highland, 5 years and 11 months,

bred by the late Donald McLaren, of Callander, and fed on grass, hay, turnips, oilcake, and bruised oats. Commended. This shaggy-coated animal attracted universal attention, from his great size and tremendous horns, measuring between 4 and 5 feet from tip to tip. Though the chine is a little deficient, he has a chest like a bison, and his hind-quarter is certainly extraordinary for its great breadth and depth, and his thighs are meated to the very hocks. His flesh is firm, and his prominent eye, fine head, and short nose all indicate excellencies in the breed.

No. 80. The Hon. Colonel Pennant, of Penryhn Castle, near Bangor, Carnarvon, West Highland Scot, supposed about 5 years and 6 months, breeder unknown, fed on barley, bean, and pea meal, linseed, linseed-oil, oilcake, swedes, mangel-wurzel, and hay. Commended. A pretty fair animal, with good rump, but not well thrown out in the ribs; covered with shaggy hair.

No. 79. His Royal Highness Prince Albert, Scotch, about 5 years, breeder unknown, and fed on bean and barley meal, linseed-cake, roots, and hay. This is a large beast, but rather too narrow at the rump.

No. 85. Sir J. B. Mill, Bart., of Mottisfont Abbey, near Romsey, Hants, Scotch, 6 years and 9 months, breeder unknown, fed on swedes, hay, and barley meal. Not straight enough in the back; sides and chest deep, short legs, and curly coat.

**CLASS XIV.**—Scotch or Irish Heifers or Cows, of any age, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 86. Joshua Arkwright, Mark Hall, Harlow, Essex, Polled Galloway Scot, supposed about 4 years, breeder unknown, fed on hay, grass, roots, linseed-cake, bean and barley meal. Prize. Very long and high standing, but not a first-rate chine.

No. 87. His Royal Highness Prince Albert, Galloway or Polled Scot, about 4 years and 6 months old, breeder unknown, fed on oilcake beanmeal, swedes, and hay. A very good animal, with a straight good back.

#### WELSH.

**CLASS XV.**—Welsh Steers or Oxen (Runts), of any age, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 90. The Hon. Colonel Pennant, of Penrhyn Castle, near Bangor, Carnarvon, supposed about 5 years and 6 months, breeder unknown, and fed on barley, bean, and pea meal, oil cake, linseed and linseed oil, swedes, mangel wurzel, and hay. First prize. A particularly good animal; broad and deep, with a superior chine; and well fed.

No. 91. Sir Richard Williams Bulkeley, Bart., of Baron-hill, Beaumaris, Anglesey, 5 years and 6 months, and fed on turnips, straw, hay, oatmeal, linseed meal, oilcake, Indian corn, and sugar. Second prize. A very handsome steer; of capacious frame, and with good quality of meat.

No. 89. George David Griffith, of Berry-hill, near Newport, Pembroke, 4 years and 10 months, bred by exhibitor, and fed on grass, hay, winter vetches, turnips, oilcake, and barley meal. Of very great size, and high standing; but forequarters too narrow in proportion.

**CLASS XVI.**—Welsh Heifers or Cows, of any age, without restrictions as to feeding, yet the kind or kinds of food must be certified.

Only one exhibited, and this not of sufficient merit for a prize.

#### OTHER PURE BREEDS.

**CLASS XVII.**—Steers or Oxen, of any pure breed (except Devons, Herefords, Shorthorns, and Scotch, Welsh, or Irish), of any age, without restrictions as

to feeding, yet the kind or kinds of food must be certified.

No. 95. Charles Neame and Sons, of Selling, near Faversham, Kent, 3 years and 11 months, Sussex, bred by exhibitors, and fed on linseed cake, turnips, mangel wurzel, bean, pea, and oat meal, and clover. Prize. A large, high-standing animal, with big horns, hand very firm and good.

CLASS XVIII.—Heifers or Cows, of any pure breed (except Devons, Herefords, Shorthorns, and Scotch, Welsh, or Irish), of any age, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 97. William Heath, of Ludham Hall, near Norwich, 3 years 8 months and 13 days old Norfolk, bred by exhibitor, from the stock of the late Mr. Thomas Heath, and fed on grass, hay, turnips, oilcake, oat and pea meal. Prize. Fat, and of prime quality.

CLASS XIX.—Cross or Mixed-bred Steers, not exceeding 3 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 98. The Earl of Radnor, of Coleshill House, near Farringdon, Berks, 2 years and 11 months Hereford, Ayrshire, and Shorthorn, bred by exhibitor, and fed on corn, cake, hay, and roots. Prize. Broad, well-made animal, but small.

CLASS XX.—Cross or Mixed-bred Steers or Oxen, above 3 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 102.—James Taylor, of Nigg, near Park Hill, Ross, N.B., 4 years and 6½ months Shorthorn and Ross-shire, bred by exhibitor, and fed on grass, turnips, oilcake, and bean meal. Prize. An amazing frame, but not very fat; well formed, but hand rather loose.

CLASS XXI.—Cross or Mixed-bred Heifers, not exceeding 4 years old, without restrictions as to feeding, yet the kind or kinds of food must be certified.

No. 104. Edward Waters, of Stratford-sub-Castle, near Salisbury, 3 years and 9 months Shorthorned and Hereford, bred by exhibitor, and fed on barley meal, linseed cake, and hay. Prize. A beautiful heifer, of fine quality, and an exceedingly good hand.

No. 103. Henry Overman, of Weasenhams St. Peter, near Rougham, Norfolk, 2 years and 10 months Ayrshire and Shorthorn, bred by exhibitor, and fed on roots, hay, cake, and meal. Small, but very symmetrical, and fine in quality.

#### EXTRA STOCK.—CATTLE.

No. 110. John Overman, of Burnham Sutton, near Burnham Market, Norfolk, above 4 years Shorthorned ox, breeder unknown, fed on grass, turnips, mangel wurzel, cake, hay, oat and bean meal. Silver medal. A very widely formed ox, with good meat, but not especially remarkable for its fine quality.

#### SHEEP AND PIGS.

In taking a cursory glance over the various classes of sheep, we were led to the conclusion that they were not quite so well sustained as on many former occasions, and we felt ourselves confirmed in this opinion on going in our usual way through them more carefully. We find it so at this meeting, in all the classes, either of cattle, sheep, or pigs. We must be as brief as possible in this department; and if our view in any of the classes should not in every instance coincide with the decision of the judges, it must be remembered that our facilities, and that of the general public, of comparison and adjudging, are far less than theirs.

#### SHEEP—LONG-WOOLLED BREEDS.

CLASS XXII.—Pens of three Fat Wether Sheep of any Long-woolled breed, 1 year old (under 22 months), without restriction as to feeding.

No. 114. The Marquis of Exeter, of Burghley Park, near Stamford, 20 months and 3 weeks Leicester wethers, bred by exhibitor. Good animals; rumps short; skins don't match.

No. 115. G. S. Foljambe, of Osberton Hall, near Worksop, Notts, 20 months Leicester wethers, bred by exhibitor. These sheep possess beautiful forms, level fat backs, breast ends well forward, plaits well thrown out, and full good thighs; deep frames of good form, good looks, and wool thickly set; rather small. Second prize, £10.

No. 118. Robert Lee Bradshaw, of Burley-on-the-Hill, near Oakham, 21 months improved Leicester wethers, bred by exhibitor, from the stock of Messrs. March and Painter. Three very superior sheep, one an extra one, with astonishing plaits, and breasts all broad; fat backs, deep in frame, broad chines, thick necks, good looks, thighs and flanks deep and full; hand rather too soft for first quality; wool good and plentiful. This pen reminds us of our best years. First prize of £20, silver medal to the breeder, and gold medal as the feeder of the best pen of long-woolled sheep in any of the classes.

No. 119. Lord Berners, of Keythorpe Hall, near Tugby, Leicester, 20 months Leicester wethers, bred by exhibitor, from the stocks of Messrs. Burgess, of Holme Pierrepont, and Mr. Borton, of Barton, Yorks. Three very compact, well-formed sheep; a capital match, very deep frames, extraordinary backs, and good hand; wool rather thinly set, but curly fleeces; too small in size. Third prize of £5.

CLASS XXIII.—Pens of three Fat Wether Sheep, of any Long-woolled breed, 1 year old (under 22 months), without restrictions as to feeding. Each sheep not to exceed 220lbs. live weight.

No. 123. The Marquis of Exeter, of Burghley Hall, near Stamford, 20 months and 3 weeks Leicester wethers, bred by exhibitor. Pretty frames, good looks, but short faces; fair necks and breasts, chines not full, plaits good, wool broad staple. Third prize of £5.

No. 124. G. S. Foljambe, of Osberton Hall, near Worksop, Notts, 20 months Leicester wethers, bred by exhibitor. Three very good sheep, not perfectly matched in wool; one has a capital fleece; their frames are very proportionate and good; rumps rather too narrow, thighs good; faces rather too short; mutton scarcely firm enough for first quality. First prize of £20, and silver medal to breeder.

No. 126. Robert Lee Bradshaw, of Burley-on-the-Hill, near Oakham, 21 months Improved Leicester wethers, bred by exhibitor, from the stocks of Messrs. March and Painter. Three very deeply framed animals, of good form, deep plaits; rumps rather short; good looks and good wool. Second prize of £10.

#### LONG-WOOLLED BREEDS (not being Leicesters).

CLASS XXIV.—Pens of three Fat Wether Sheep, of any Long-woolled breed (not Leicesters), 1 year old (under 22 months), without restrictions as to feeding.

No. 129. Edward L. Betts, of Preston Hall, near Maidstone, Kent, 21 months and 2 weeks Cotswold wethers, bred by David Smith, of Sherborne, near North-leach. Three very fat and useful sheep; mutton not firm; wool heavy, and large staple; offal fine.

No. 130. William Hewer, of Sevenhampton, near Highworth, Wilts, 21 months Cotswold wethers, bred by exhibitor. Three very fine and beautiful sheep, two of them exceedingly good, one a capital back; their chines are good, plaits full, thighs deep, wool good and

plentiful, but not corresponding; offal fine. The prize of £10, and silver medal as the breeder.

#### EXTRA STOCK.—LONG-WOOLLED SHEEP.

No. 132. G. S. Foljambe, of Osberton Hall, near Worksop, Notts, 81 months pure Leicester ewe, bred by exhibitor. A beautiful short-legged ewe, with very deep well-formed frame, capital plaits, good length, and full-made throughout. Silver medal as the breeder of the best Long-woolled Sheep in Extra Stock.

No. 137. Edward Handy, of Sierford, near Andoversford, 81 months Cotswold ewe, bred by exhibitor. This ewe is very superior in frame, with most excellent mutton, good rump, thighs deep, flanks fair, plaits good, neck too light, offal fine, wool fair.

No. 140. Wm. Park, of Stragglethorpe, Lincolnshire, near Newark-on-Trent, Notts, 57 months Long-woolled ewe, bred by exhibitor. A very good sheep, heavily loaded with good mutton, but not quite fine enough in hand; deep frame, plaits and bosom very good, chine good, offal light, wool fair. Highly commended.

#### CROSS BREEDS.

CLASS XXV.—Pens of three Long and Short-woolled Cross-bred Fat Wether Sheep, 1 year old (under 22 months), without restrictions as to feeding.

No. 141. John Hitchman, of Little Milton, near Tittsworth, Oxon, 21 months and 2 weeks Cross-bred wethers, bred by exhibitor. Three large and well-formed sheep; frames very broad and deep, full plaits, backs well covered, and good quality of flesh; wool good, not heavy; offal fair; looks good. Second prize of £5.

No. 142. William Samuel Stevens, of Gatehampton Farm, Goring, near Reading, 21 months Cotswold and Hampshire-down wethers, bred by exhibitor. Very large and deep in frame, good looks, and plenty of good wool.

No. 143. John B. Twitchell, of Wilby, near Northampton, 21 months Leicester and South-down wethers, bred by exhibitor. Very high standing, but not correspondingly broad in frame; wool rather light; offal fine. Commended.

No. 145. E. F. Whittingstall, of Langley, Bury, near Watford, Herts, 21 months and 1 week cross-bred wethers, bred by exhibitor. These possess beautiful quality of flesh, two are particularly good; wool, rather fine and light. Highly commended.

No. 151. Samuel Davis, of Sevenhampton, near Highworth, Wilts, 1 year and 9 months Cotswold and Down wethers, bred by exhibitor. Good broad back, rather loosely covered; wool good, and looks well ordered. Highly commended.

No. 152. John Overman, of Burnham Sutton, near Burnham Market, Norfolk, 20 months Down and Leicester wethers, bred by exhibitor, from the stock of Hugh Aylmer, of West Dereham. Three surprising sheep and beautifully matched, capital large frames, broad and deep; excellent quality of mutton, necks good, deep thighs, wool fine quality and plentiful, offal light, and good looks. First prize of £10, and silver medal as the breeder.

CLASS XXVI.—Pens of three Long and Short-woolled Cross-bred Fat Wether Sheep, 1 year old (under 22 months), without restrictions as to feeding. Each sheep not to exceed 220 lbs. live weight.

No. 153. Lord Walsingham, of Merton Hall, near Thetford, Norfolk, 20 months Leicester and South-down wethers, bred by exhibitor, from the stock of Robert Alymer, of Westacre. Three very well-formed sheep, rather too long frames, but of very beautiful quality in mutton; wool fine. Highly commended.

No. 156. John Overman, of Burnham Sutton, near Burnham Market, Norfolk, 20 months Down and Leicester wethers, bred by exhibitor, from the stock of

Hugh Aylmer, of West Dereham. These were three very compact, well-formed animals; fine wool and fine offal, and flesh of excellent quality. The prize of £10, and silver medal as the breeder.

#### EXTRA STOCK—CROSS-BRED SHEEP.

No. 158. John Hitchman, of Little Milton, near Tittsworth, Oxon, 21 months and 1 week wether, bred by exhibitor. Very good quality of mutton, chine good, plaits good, rump short. Highly commended.

No. 165. Charles Howard, of Biddenham, near Bedford, 21 months Down and Cotswold wether, bred by exhibitor. Very good in frame and quality of mutton. Silver medal to the breeder of the best cross-bred sheep in extra stock.

No. 167. John Overman, of Burnham Sutton, near Burnham Market, Norfolk, 20 months Down and Leicester wether, bred by exhibitor, from the stock of Hugh Aylmer, of West Dereham. Capital plaits, loin, and back; fine rump. Commended.

#### SHORT-WOOLLED BREEDS.

CLASS XXVII.—Pens of three Fat Wether Sheep, of any short-woolled breed, 1 year old (under 22 months), without restrictions as to feeding.

No. 169. William Rigden, of Hove, near Brighton, 20 months and 2 weeks Southdown wethers, bred by exhibitor. Three very beautiful animals, of excellent symmetry and first-rate quality, and well matched; their general size and proportions rather too small for our taste; very handsome countenances, and wool of the finest quality, and well-ordered; necks, somewhat too long and thin; chines not very broad, full chests, very good shoulders, full back, and loins fat and firm; hips wide, and rumps and docks good; thighs deep, but flanks not full; their under-parts generally not quite in proportion; offal fine. First prize of £20, and silver medal as the breeder, and gold medal as the feeder of the best pen of one-year-old sheep in any of the short-woolled classes.

No. 174. The Duke of Richmond, of Goodwood, near Chichester, 20 months Southdown wethers, bred by exhibitor. A very good pen indeed; larger and broader frames, better chines, but loins and back not covered; hips broad, chests good; stand well; good looks, and offal fine; wool fine quality. Commended.

No. 177. Lord Walsingham, of Merton Hall, near Thetford, Norfolk, 20 months Southdown wethers, bred by exhibitor. This is an extraordinary pen of sheep; large and very compact frames; beautiful, level, well-covered fat backs, and broad hips; full plaits, well thrown out shoulders, stand well; chines good, necks rather light, chests full and well out; thighs deep, and flanks full; wool fine, rather light; frames larger than 169, and had their rumps, hips, and docks been equal, they must have taken the first prize; in many respects they are a superior pen; looks are equal to them. Second prize of £10.

No. 179. Henry Lugar, of Hengrave, near Bury St. Edmund's, 21 months Southdown wethers, bred by exhibitor. This is a very handsome lot, compact in form, with good chines; wool fine. Highly commended.

No. 180. John Overman, of Burnham Sutton, near Burnham Market, Norfolk, 20 months Southdown wethers, bred by exhibitor, from the stock of Henry Lugar, of Hengrave, and own. A pen of very good well-formed sheep; heavy, and highly profitable.

CLASS XXVIII.—Pens of three Fat Wether Sheep, of any short-woolled breed, 1 year old (under 22 months), without restrictions as to feeding. Each sheep not to exceed 200 lbs. live weight.

No. 183. Sir John Villiers Shelley, Bart., M.P., of Maresfield Park, Sussex, 21 months Southdown wethers,

bred by exhibitor. A very compact beautifully-formed lot; deep in frame, with handsome looks. Highly commended.

No. 185. The Duke of Richmond, of Goodwood, near Chichester, 20 months Southdown wethers, bred by exhibitor. A very complete lot; two particularly compact in frame. The pen possess better hips and rumps than others, but the neck and chins are not to our taste; one of these has an extra good frame. N.B.—Southdown breeders appear to prefer a peculiar symmetry; we think the same contour should prevail in every animal—not narrow necks and chins. The prize of £10, and silver medal to the breeder.

No. 189. The Earl of Chichester, of Stanmer Park, near Lewes, 21 months Southdown wethers, bred by exhibitor. The fashionable frames—rather long and high, standing proportionately; necks and chins too thin; plaits not full. Highly commended. Class commended generally.

**CLASS XXIX.**—Pens of three Fat Wether Sheep, of any short-woolled breed, 2 years old (above 22 and under 34 months), without restrictions as to feeding.

No. 190. Hugh H. Lindsay, of West Dean, near Chichester, 33 months Southdown wethers, bred by the Rev. L. V. Harcourt, of Newsells Park, near Royston, Herts, from the stocks of J. A. Pinnix and the Rev. L. V. Harcourt. These are very fine animals, but rather too narrow frames to our taste; plaits and girth not full enough; good thighs and flanks, long rumps, short docks, wool good. Second prize of £10.

No. 192. The Duke of Richmond, of Goodwood, near Chichester, 32 months Southdown wethers, bred by exhibitor. Very capital frames, deep and good; certainly, after our (it may be perverted) taste, they are well-formed throughout, and possess good wool and excellent quality of mutton, with good countenances and light offal. First prize of £20, and silver medal to the breeder.

No. 194. Sir R. G. Throckmorton, Bart., of Buckland, near Farringdon, Berks, 32 months Sussex-down wethers, bred by exhibitor. This is a very handsome pen, with the best rumps in the class.

No. 195. Lord Walsingham, of Merton Hall, near Thetford, Norfolk, 32 months Southdown wethers, bred by exhibitor, from the stock of Jonas Webb. These are large and well-formed, with fine wool. Highly commended.

#### SHORT-WOOLLED BREEDS Not being South-downs.

**CLASS XXX.**—Pens of three Fat Wether Sheep, of any short-woolled breed, not South-downs, 1 year old (under 22 months), without restrictions as to feeding.

No. 200. William King, of New Hayward Farm, Hungerford, Berks, 21 months West Country down wethers, bred by exhibitor. Immense size, queer heads, deep frames, and long. Commended.

No. 201. John T. F. Pain, of North Houghton, near Stockbridge, Hants, 21 months and 2 weeks Hampshire-down wethers, bred by exhibitor. Very good sheep, long frames, good mutton; black faces, large heads, loin too long, and bodies rather let down; if not so fat, their frames would be narrow. First prize of £10, and silver medal as the breeder.

No. 202. E. F. Whittingstall, of Langley Bury, near Watford, Herts, 21 months West Country down wethers, bred by William King, of New Hayward, Hungerford, from the stock of William Humfrey. This is a pen of very superior well-framed sheep, broad, compact, large, and evenly fed; very fat, and fair quality, deep in form, and well-proportioned; good thighs and flanks, and pleasant looks; plenty of wool. Perhaps not noble enough in their general character, otherwise

they must have had the prize: in many respects decidedly superior to 201, and in none much their inferior. Highly commended.

#### EXTRA STOCK.—SHORT-WOOLLED SHEEP.

No. 203. William Rigden, of Hove, near Brighton, 20 months and 2 weeks South-down wether, bred by exhibitor. Highly commended.

No. 206. G. S. Foljambe, of Osberton Hall, near Worksop, Notts, 20 months South-down wether, bred by exhibitor. Commended.

No. 209. John Kent, of Goodwood, near Chichester, 32 months South-down wether, bred by the Duke of Richmond, of Goodwood. Commended.

No. 212. Lord Walsingham, of Merton Hall, near Thetford, Norfolk, 20 months South-down ewe, bred by exhibitor. A little beauty, of first-rate quality. Silver medal to breeder.

No. 213. The Duke of Richmond, of Goodwood, near Chichester, 32 months South-down wether, bred by exhibitor. A little larger, very compact, and all but equal to 212. Highly commended.

#### PIGS.

**CLASS XXXI.**—Pen of three Pigs of any breed, above 13 and not exceeding 26 weeks old.

No. 223. His Royal Highness Prince Albert, 22 weeks and 2 days Windsor, bred by exhibitor, and fed on barley-meal and skim-milk. This is a very compact, well-formed lot, of excellent quality. Second prize of £5.

No. 224. John Coate, of Hammoon, near Blandford, Dorset, 24 weeks and 1 day improved Dorset, bred by exhibitor, and fed on barley-meal and milk. These are very pretty, rotund little fellows, backs broad and full make, deep in frame, heads very short, and fine large necks, feeding full up between the ears, which are short and frisky; capital thighs, round and deep; tail, very thin and fine; rump rather short. First prize of £10, and silver medal as breeder.

No. 225. Sir John Cathcart, of Cooper's Hill, Chertsey, Surrey, 24 weeks and 3 days Sussex, bred by exhibitor, and fed on barley and pea-meal, potatoes, and skim-milk. These are rather larger in frame, finer in hair, ears short and more erect, and head larger. Commended.

**CLASS XXXII.**—Pens of three Pigs, of any breed, above 26 and not exceeding 52 weeks old.

No. 228. The Earl of Radnor, of Coleshill House, near Farringdon, 41 weeks and 4 days Coleshill, bred by exhibitor, and fed on barley meal, whey, &c. These possess the old form of his Lordship's Coleshill breed, but more hair, and not so large as usual; ears short but drooping, snouts very short, frame round and compact, denoting better constitution.

No. 229. Samuel Druce, of Eynsham, near Oxford, 32 weeks and 1 day Improved Oxfordshire, bred by exhibitor, and fed on barley meal, wash, and skim milk. These have very level good backs, with better rumps, good chins, and necks well formed; heavy thighs, fine in hair and offal. Highly commended.

No. 230. George Horne, of Egham, Surrey, 28 weeks Improved Leicester, bred by exhibitor, and fed on toppings, barley meal, peas, and skim milk. These are very fine in quality of flesh, hair fine, short faces, necks not well fed up to ears. Commended.

No. 232. His Royal Highness Prince Albert, 44 weeks Windsor, bred by exhibitor, and fed on barley meal and skim milk. Three very large and good pigs in every respect; fine hair, frame long, and deep in proportion, no unevenness in feeding; rumps rather too short, and tails drooping too soon. First prize of £10, and silver medal as breeder.

No. 233. John Coate, of Hammoon, near Blandford, Dorset, 34 weeks and 2 days Improved Dorset, bred by exhibitor, and fed on barley meal, pollard, and milk. These are smaller, but very compact; backs broad and level, rumps not long enough; beautiful quality, not fed so full in the neck. Second prize of £5. Class generally commended.

CLASS XXXIII.—Pens of three Pigs, of any breed, above 12 and under 18 months old.

No. 234. Samuel Druce, of Eynsham, near Oxford, 59 weeks and 1 day Improved Oxfordshire, bred by exhibitor, and fed on barley meal, wash, and skim milk. These are large and well fed pigs, deep in frame and good in rump, which is a good quality, not often found. Commended.

No. 235. Stewart Marjoribanks, of Bushey Grove, near Watford, Herts, 17 months 2 days Improved Bushey, bred by exhibitor, and fed on swill, toppings, and barley meal. These are very large and well formed, broad, and deep in frame throughout, extraordinary necks and throats, backs good and level, fine in hair, snouts short, ears fine, thin, and erect; deep sides, and very compact. First prize of £10, and silver medal as breeder.

No. 236. His Royal Highness Prince Albert, 16 months and 3 days Windsor, bred by exhibitor, and fed on barley meal and skim milk. Very extraordinary necks; the throat uncommonly fat, full up to the ears; back broad and level, deep sides, capital twist, but rump short. Commended.

No. 238. Sir J. B. Mill, Bart., of Mottisfont Abbey, near Romsey, Hants, 14 months 3 weeks and 4 days Mottisfont, bred by exhibitor, and fed on milk, pollard, and barley meal. A very good pig, and evenly fed; good rump, and plenty of hair. Second prize of £5.

#### EXTRA STOCK.—PIGS.

No. 242. Stewart Marjoribanks, of Bushey Grove, near Watford, Herts, 17 months and 2 days Improved Bushey, bred by exhibitor, and fed on swill, toppings, and barley meal. Very good in quality, and large for age. Silver medal as breeder.

No. 244. John Coate, of Hammoon, near Blandford, Dorset, 34 weeks and 2 days Improved Dorset, bred by exhibitor, and fed on barley meal, pollard, and milk. A capital animal, not large, but a beautiful frame. Commended.

No. 245. John Scott, of Whitewall House, near Malton, York, 4 years and 5 months large breed, bred by exhibitor, and fed on peas and barley meal. A sow of prodigious dimensions. Coarse, large offal; very long and deep in frame; fair quality of flesh; fine in hair; ears short and prickly; broad chine. Her length, nine feet; girth, seven feet; weight, sixty-six stones. Sold for £27 or £28. Commended.

No. 246. George Turpin, jun., of Uxbridge, Middlesex, 66 weeks and 5 days Essex, bred by Mr. Harding, late of Uxbridge, from the stock of Mathew Newman, of Court Farm, Hayes, and fed on wash, offal, barley, and pea meal. A pig of excellent quality, and large; loin a little defective. Highly commended.

The various classes of pigs are certainly very good, but as a whole we do not deem them equal to some former years. Mr. Coates retains his fame with great credit to himself. Lord Radnor does not come up to former years, but his sort retain their character. The prices of some animals in the yard are almost fabulous: an ox sold for £80, a pig for £28, and sheep in proportion. The general arrangements were admirable, and no confusion or hindrance was apparent.

## THE IMPLEMENT DEPARTMENT OF THE SMITHFIELD CATTLE SHOW, 1855.

In taking our annual review of the collection of machinery, seeds, &c.—an innumerable diversity of articles and productions for the use of the husbandman—perhaps we cannot do better than give a sort of itinerary of the galleries and corridors occupied by the stands. And, in the outset, we wish to state that no arrangement can be better for the public, or more satisfactory to the exhibitors, than those ordered and carried into effect by Mr. Gibbs. Some person must occupy the best site, as others the more unfavourable in the building; but we are still convinced that the exhibitors generally are satisfied of the willingness of the Honorary Director of the Show to afford every one the best assistance in his power.

Below-stairs are the steam engines and thrashing machines.

Messrs. Clayton and Shuttleworth exhibit their portable combined thrashing, straw-shaking, riddling, winnowing, chaff-separating, and barley-horning machine; another thrashing machine, fitted with Nalder's well-known revolving screen for finishing the corn for market; and two portable steam engines.

Messrs. Garrett and Son show their portable thrashing machine; and their portable combined thrashing machine for preparing corn for the blower; also two portable steam engines.

Messrs. Hornsby and Sons exhibit their portable combined thrashing machine; and one of their portable steam engines.

Messrs. Barrett, Exall, and Co.—their portable combined thrashing-machine; one portable steam-engine; and one horizontal fixed engine.

W. Cambridge—his portable combined bolting thrashing-machine; and a portable engine.

Messrs. Ransomes and Sims—their portable combined thrashing-machine, which is constructed on the principle of having *rotary* motion only; and one portable steam-engine.

Messrs. Tuxford and Sons—their portable combined thrashing-machine, in which both the straw-shaking and winnowing are accomplished by a simple *pendulous* motion, with as few "bearings" as possible.

Messrs. Hart, of Wantage, Berks, show a portable combined thrashing-machine, which not being so generally known as those of the celebrated firms above-named, may have a few more words from us. Screens are attached to one side of the machine, and sliders for the different qualities of grain are arranged in a row, like those of a flour-dresser. 1 and 2 for best corn; 3, tail; 4, seeds; 5, thin corn, or chicken's meat. It has a double-blast blowing machine, a riddle with double delivery, a husk machine, a separator, a balanced vibrating trough or riddle, and a drum—all patented.

Messrs. Holmes and Son, of Norwich, exhibit their prize clover-sheller, with attached dressing apparatus; and one portable combined thrashing-machine.

Ascending the gallery, we observe first, a patent plough, by T. K. Sheen, Aylesbury, having a

mouldboard made of beech-wood attached to an iron plough: a steel mouldboard is quite as well adapted for a wet clay soil, though the price of this implement is £3 15s.

James White, 266, High Holborn—a simple and effective hand flour-mill; and a neat little bread-oven to be fitted on a common stove.

Thomas Gibbs and Co., corner of Half-Moon Street, Piccadilly, exhibit a large assortment of samples and specimens; among which we noticed some very fine swedes, green globe turnips, long red and long yellow mangolds, one of the long red weighing 27½ lbs. There are also some swedes and yellow-globe mangolds grown by H. R. H. Prince Albert, taken from the crop for which he was awarded the Silver Cup of the Royal South Bucks Agricultural Association; the seed having been obtained from Mr. Gibbs.

Biggs' justly celebrated sheep-dipping composition and dipping apparatus occupy their usual position.

On the stand of Messrs. Howard, of Bedford, we observed their first-class ploughs: one fitted with a paring share, which has a steel blade for paring grass lands; also their well-known harrow and steel-toothed horse-rake.

Wedlake's chaff-cutters, oat-bruisers, and a fixed vertical steam-engine, were exhibited, and explained to the public by attendants in scarlet jackets and blue caps—certainly attractive in their way.

George Gibbs and Co., 26, Down Street, Piccadilly, show a variety of pasture, garden, and agricultural seeds, and specimens. Among these productions is an immense drumhead cattle cabbage, 40 lbs. in weight, grown by Mr. Smith, of Lois-Weedon; a long red mangold, weighing 28 lbs.; and a yellow-globe, weighing 30 lbs., grown by the same gentleman. As a curiosity, there is a bundle of wheat from a crop, the seventeenth in succession upon the same land, grown by Mr. French, of Thrapstone, Northamptonshire.

Lloyd, of 15, Old Street Road, Shoreditch, has some useful hand flour-mills, and invites "every man to be his own miller."

Busby, of Bedale, Yorkshire, shows his well-known ploughs and celebrated carts, one with a capital tipping apparatus.

The next article is a dressing machine, by Sawney, of Beverley, for separating cleavers, goose-grass, or hariff from wheat or barley. This newly invented apparatus has been awarded prizes at Malton, Boston, Driffield, and several other places, within the present year.

Clayton and Shuttleworth exhibit a fixed horizontal steam engine, a circular-saw bench, grinding mill, &c.

Turner and Co., Ipswich, roller crushing mills, invaluable to feeders of stock, whether with linseed or other grain.

Garrett and Son, famous horse hoe and first-class drills for various purposes, including their beautiful manure distributor; also a very superior portable horse-power thrashing machine, a seeming novelty among so many steam machines.

Skirving, of Liverpool, has a stall with specimens of the varieties of roots for which his name is celebrated. Swedes we saw of 21 lbs. weight, without

being coarse, and long red mangolds 25 lbs. in weight.

Hornsby and Sons show their very superior and well-known winnowing machine, and their completed and perfected drills, for sowing every species of grain, seed, and manure.

Holmes and Son, of Norwich—drills and dressing machines.

Dray and Co., London-bridge—their excellent reaper, with patent tipping platform for facilitating the delivery of the cut corn, together with a number of chaff cutters, crushers, and other machinery, including Salmon's seed-separating machine.

Crosskill's stand contains his reaper, improved clod crusher, with alternate rings of different diameter, to give it a self-cleaning action, his noted carts and wheels-and-axles, and his bone mill.

Coleman, of Chelmsford—his excellent cultivator, the tines of which are so shaped as to "ride on the land;" that is, they pare or grub without having a tendency to root down and anchor themselves in the earth, as is the case with teeth pointing abruptly downward.

Lawson and Sons, of Edinburgh, show on their stall many beautiful specimens of grain and grasses; some very fine wheat and oats; and their display of roots is remarkable, if it be true (as stated) that they are not picked, but are the average of this year's crop, grown from Messrs. Lawson's seed.

Burgess and Key exhibit their celebrated prize reaper, with its revolving screw platform, which attracted very great attention; they show also their 3-knived chaff cutter, and superior churns.

Sutton and Son, of Reading, show their superior varieties of roots and seeds. Among them is the Elvetham mangold, a long red sort, but stout as well as of great length: this, we hear, has taken the first prize at the present Birmingham Show. On this stall are some Lincolnshire red globe turnips, 3 ft. in diameter; green globe turnips, very globular and beautiful in shape; and some yellow globe mangold grown by H. R. H. Prince Albert at the Norfolk farm. Both his Royal Highness's 25-guinea silver cups awarded by the Royal South Bucks and East Berkshire Agricultural Societies have been won by Messrs. Sutton's purple swede.

Long's specific for dressing sheep invites the notice of flockmasters; fleeces being exhibited to show its beneficial effect upon the skin.

William F. Roe, 70, Strand, the hydraulic ram, Parsey's revolving pump, fountains, pumps, and an apparatus for singeing horses with gas.

E. Weir, Oxford-street, exhibits his draining-level, hose-pipe reel, &c.

B. Greening and Co., Manchester, machine-made iron and fencing, in which the wonderful power and utility of machinery is well illustrated: for this fencing is sold at a trifle more than the worth of the material used; whereas, were such a web made by hand-labour, it could not be produced for three times the price.

Next we come to Clayton's brick and tile machine, which has obtained the gold medal at the Paris Exhibition.

Stanley, of Peterborough, shows his excellent steaming apparatus, crushers, &c., which are required in the cooking and preparation of food for cattle.

B. Fowler and Co., Whitefriars-street, Fleet-street, exhibit some new pumps which deserve more than a bare mention. They are made double-acting, a continuous supply from one barrel thus doubling the quantity raised by ordinary pumps; and by this arrangement the pump is rendered far less cumbersome than when two barrels are employed. The piston is solid; and all the valves being out of the barrel, permits their areas to equal that of the piston, and the water passages to be proportionately large. Speedy access to all the valves simultaneously is procured by the removal of a single door-plate; but what chiefly renders these pumps (both horizontal and vertical) extremely portable, is the application to them of Holman's patent reciprocating lever. By this very ingenious contrivance all the mechanism for obtaining a parallel motion is comprised within a space of a couple of inches, thus doing away with connecting rod, parallel rods, bushes, &c., and reducing all into a very small compass. The motion is obtained by an arc and slot in the lever handle of the pump, working on two studs or bolts. Whether the same principle could be applied to the steam engine, we do not know enough of the friction involved to be able to say.

Fowler and Fry, Bristol, show their root-pulper, which consists of an iron disc attached to a fly-wheel, and having on one side a great many small cutters, which reduce the roots to very fine shreds, so that these can be thoroughly mixed with barley-meal, pollard, chaff, &c.

J. Cayley, of 5, Bank-buildings, has a stall with samples of manures, drugs, and chemicals; and particularly invites the attention of farmers, graziers, jobbers, and all classes interested in the health of cattle, to his treatment of pleuro-pneumonia.

J. Warren, Maldon, Essex, exhibits his patent expanding plough; in which the plough body, instead of being immoveably fastened to the beam, is hung to it by a joint, and can be vertically adjusted by a lever movement, so as to set it at a greater or less angle with the beam. This is instead of altering the dip of the share alone, and we learn that this ready mode of adjustment to set the share and entire plough more or less into the ground is found to lighten the draught for the horses, and to ease the labour of the ploughman.

Ball, of Rothwell, Northamptonshire, shows his noted "criterion" ploughs and farmers' carts.

W. Williams, of Bedford—pipe and tile machine; together with some chaff-cutters, and his well-known harrows.

J. Free, 22, Charlotte-street, Blackfriars-road, has a stall of cattle-gauges; and, indeed, such helps may be most needed about Christmas, when so many animals are fattened beyond the ability of the feeder's eye to weigh them.

H. Thompson, Lewes—haymaking machine, horse-rake, and drainage levels.

R. Hunt, of Earl's Colne, Essex, exhibits his cloverseed engine, which gained a silver medal at Carlisle, and the first prize at Tiverton. It separates the husk or hull from the seed, at the rate of from two to three bushels of clover, and from four to six of trefoil seed, per hour, driven by three-

horse power. It consists of a hollow frustrum of a cone, of cast iron, within which is driven, at great velocity, a drum of the same form, by means of which the seed is drawn from the large to the small end; and in the process the husk is cleared from the seed. The seed is carried into the cylinder by means of a grooved roller, driven from the drum spindle. At the small end of the cylinder a sieve and blower are fixed, in order to separate the seed from the chaff and hard cob. Owing to the unwillingness of the inventor to expose the interior of the machine to the public, we are unable to describe the precise means by which the seed is drawn through the cylinder. The price is £27. Mr. Hunt exhibits also a simple little hand seed-drill, for filling up missed places in rows of turnips, &c.

Assistance of a scientific order is provided for the agriculturist in the barometers, thermometers, saccharometers, and other ometers, for weather-gauging, draining, dairying, brewing, &c., exhibited by Bennett, of 65, Cheapside.

J. Comins, South Molton, Devonshire, shows his turnwrest plough, which obtained the Great Exhibition prize medal.

Smyth and Sons, Peasenhall, Suffolk, patent corn, seed, and manure drills, among which is especially worthy of remark their corn drill for small occupations.

Robert Lane, Cirencester, shows an oilcake breaker of simple construction, the working parts made of wrought iron; a chaff cutter to cut two lengths of chaff; besides crushers and other machines.

G. Chivas, of Chester, has a stall of specimens of his orange jelly turnip, for sowing in July instead of the globes, and in August and September as a stubble crop. It is said by some growers to be much more rapid in growth, nutritious in quality, and more hardy, than any other variety adapted for late sowing; the roots shown are certainly much finer than we had anticipated, from seeing one or two field crops; and we are assured that 27 to 29 tons per acre have been produced.

Ransomes and Sims' stand comprises several of their swing and wheel ploughs, Lord Beauclerk's patent archimedean subsoiler being very conspicuous; chaff engines and turnip cutters, oilcake breakers, Hurwood's mealing mill for grinding all kinds of grain, and a variety of other machines. As a novelty worthy of remark, we may mention Biddell's combined oat and bean mill, consisting of the triangle steel-bladed bean cutter, and the steel oat mill brought out at Carlisle, both mounted upon one axle, one operation being changed for the other by simply shifting a hopper-board. The price is considerably lower than that of the two mills separately.

We next come to Cambridge's wheel-presser roller, excellent both as a clod-crusher and wheatland consolidator; and then to Bentall's stand of broadshare and subsoil ploughs. His famous broadshare implement is here shown in all its parts and varieties, and certainly we possess no implement that can be compared with it for adhering closely to its work, and paring a great breadth of ground per day with a very light draught. It has

shares for many different purposes: one double-winged share being fitted with small breasts, for laying the surface up in ridges; there are straight furrow shares; fallow shares, with prongs for bringing up couch and rubbish to the surface; and the implement also makes a capital subsoiler. Bentall's harrows, turnip cutters, and oilcake breakers, are all contrived and executed with a view of supplying a cheap implement, as far as this can be accomplished consistently with efficient working and durability.

Whitmee and Co., 18, Fenchurch-street, show a number of corn crushers, flour mills, &c.; and with the £6 size one man can crush four bushels per hour; and with steel rollers they are very lasting, as well as efficient.

Samuelson, of Banbury, exhibits chaff cutters, turnip cutters, churns, &c. Gardner's turnip cutter, as improved by Samuelson, with ledge to cut the last piece, and double-action so as to cut one way for sheep and the other for beasts, may safely be pronounced the best of its class. A barrel of very large dimensions is manufactured for driving by steam power.

Cuff, 10, Smithfield, of "farmer's friend" notoriety, has a stall of veterinary drugs, oils, ointments, and dressings. A model of his new apparatus for dipping sheep attracted considerable attention. In this contrivance, a galvanized-iron cradle is first put over the sheep's back, and a couple of straps buttoned underneath him; a crane then lifts him up, and lowers him into the dipping tub, keeping his head uppermost. Being then hoisted up to drain, he is lowered on the ground and set at liberty. The object of this apparatus is to save men the unhealthy labour of dipping the animals, and at the same time preventing any tearing of the sheep's wool. The price is four guineas.

We next passed Coulson's mortising machine, and then the stand of Crowley and Sons, of Newport Pagnell, Bucks. Here is a model of the Newport cart, for which a prize was awarded at the Great Exhibition, and the Newport hames, which have iron plates attached, to prevent excessive wearing of the collar. We observed a model of a "Herculean cultivator," patented by Mr. W. Smith, of Woolston, near Fenny Stratford, Bucks, the inventor of the rotary-sickle reaping machine exhibited at Lincoln in 1854; the improvements in this cultivator consist in the shape of the tines, the fastening of the tines to the frame, and the line of draught. This implement is intended to be drawn by steam power; and we learnt that Mr. Smith is now making a steam-plough, to be worked by a stationary engine and traction ropes. Mr. Crowley states that the difficulties of anchoring, turning the implement at each end of the field, and ploughing in lands, have been overcome, and that in a short time the invention will be brought before the public. Messrs. Smith and Crowley have combined three ploughs in a frame, without making a cumbersome, unmanageable machine, like those of some previous inventors. We heartily wish that they may be successful, and that the judges at Chelmsford may have to award them the £200.

Woods, of Stowmarket, shows his rasping machines for pulping roots, and perhaps these are as

efficient and economical of power as any yet produced.

James Grove, Great Baddon, Essex, exhibits some wonderful specimens of roots grown from seed supplied by him; one yellow-globe mangold weighing 32 lbs., and a long-red measuring 36 inches in length.

Not of small importance to the farmer are good stable-fittings, of which Barton, of 370, Oxford-street, show some patented by him, including hay-boxes, mangers, water-troughs, &c., constructed so as to prevent waste of provender, guarding against accident or injury to the horse, and being enamelled as a preventive against contagion.

Smith, of Kettering, Northamptonshire, shows his steerage horse-hoe, which received a first-class medal at the Paris Exhibition. A very simple, easily-worked, and effective implement. Price £7 10s. His well-known winnowing-machine is also on the same stand.

Hill and Smith, Brierley Hill, Staffordshire, exhibit their Cornes' prize chaff-cutting machine, which, from having obtained the Royal Agricultural Society's highest prize ten years in succession, ought to be the best for its purpose. According to the trials made in various years, this machine cuts a greater quantity with the same application of power than any other yet constructed; and is not unduly complicated in any of its parts, and so little liable to get out of order.

Carson, of Warminster, Wilts, shows his chaff-cutter; and Moody's patent turnip pulper, which tears the roots into shreds by means of gouge-shaped cutters, and is one of the most valuable machines for this purpose.

Two striking objects in this part of the gallery, are the self-holding lever plough, and general cultivator, patented by Mr. J. A. Williams, of Baydon, Wilts, which were noticed in our report last year. The ploughs or cultivator tines are so hung in a carriage frame as to be raised or lowered with a parallel motion, by means of chains and levers. We suppose these machines are intended to be drawn by steam-power; and we hoped that, before this, Mr. Williams would have brought out his entire apparatus for steam ploughing; perhaps the knowledge that a Buckinghamshire farmer is also in the field, will tend to accelerate his progress in this important branch of agricultural mechanics.

Barrett, Exall, and Andrewes show their patent horse works and thrashing machine, their safety chaff cutter, grain mills, &c.

Reeves, of Bratton, Wilts, Chandler's liquid manure drill and distributor, the value of which is becoming every year more apparent to large turnip growers.

Smith and Ashby, of Stamford, exhibit their Exhibition prize horse rake, for hay, corn, couch, or twitch, stubble, &c., with the additional improvement of patent steel teeth, which are stronger, more durable, and much lighter than teeth made of iron. This implement has obtained the prize at Carlow. The haymaker invented and perfected by this firm is undoubtedly the very best yet made; it has taken every prize offered by the Royal Agricultural Society for the last nine years, the prize of every

other society wherever it has been exhibited, and the first-class medal of the Paris Exhibition. We cannot commend too highly their hand and horse-power chaff cutters, which are remarkable for their simplicity of construction, and the long drawing cut of the knives gives them a great advantage over others which work with a more chopping action. Their horse works are also very strong, and yet portable; and their cake breaker is very cheap, as well as efficient. The price is only £3 10s., and it will break for sheep or beasts by merely reversing the action of the handle.

Richmond and Chandler exhibit their well-known and superior chaff cutters, that for hand-power having obtained the prize at Carlisle. A number of corn crushers and other machines were also shown by the same firm.

We may conclude our cursory notices by mentioning a weighing apparatus, attached to a dressing machine exhibited by Mr. T. Luck, of Spalding, Lincolnshire. It is intended to save the work of a measurer; but the labour of raising the corn into the hopper by elevators would greatly add, we should think, to the work of turning the dressing machine.

## LIST OF PRIZES.

### JUDGES:

#### *Cattle and Long-woolled Sheep.*

JOHN BUCKLEY, Normanton Hill, Loughborough.  
WILLIAM HESSELTINE, Worlabby House, Brigg, Lincoln.

ROBERT SMITH, Emmett's Grange, South Molton.

#### *Cross-bred and Short-woolled Sheep and Pigs.*

HENRY FOOKES, Whitchurch, Blandford.  
JOHN CLAYDEN, Littlebury, Saffron Walden.  
THOMAS HAWKINS, Smallbridge, Suffolk.

### DEVONS.

CLASS 1.—Steers not exceeding 3 years old.—1st prize, £25, the Earl of Leicester, of Holkham Hall, Norfolk; purchased by William Jeffery, Foubert's-place, Regent-atreet. 2nd, £10, His Royal Highness Prince Albert; purchased by Wm. Jeffery.

CLASS 2.—Steers or Oxen above 3 years old.—1st prize, £25, the Lady Elizabeth Reynell, of Avisford House, Arundel; purchased by Mr. Withers, Guildford, Surrey. 2nd, £10, His Royal Highness Prince Albert; purchased by F. Collingwood, High-street, Islington.

CLASS 3.—Heifers not exceeding 4 years old.—1st prize, £15, Mr. John Tucker, of Yard Farm, Staplegrove, Taunton; purchased by G. Stockley, High-street, Notting-hill. 2nd £5, Mr. T. W. Fouracre, of Durston, Taunton; purchased by Mr. Anderton, New Cross, Surrey.

CLASS 4.—Cows above 4 years old, that must have had at least one live calf.—1st prize, £20, His Royal Highness Prince Albert; purchased by Mr. Jeffery. 2nd, £10, Mr. John Coate, of Hammoon, Blandford; purchased by John Topp, Poole, Dorset.

### HEREFORDS.

CLASS 5.—Steers not exceeding 3 years old.—1st prize, £25, Mr. Isaac Niblett, of Filton, near Bristol; purchased by John Scarlett, Quebec-street, Portman-square. 2nd, £10, Mr. Edward Longmore, of Adforton, near Ludlow; purchased by A. Underwood, Eccleston-street South, Pimlico.

CLASS 6.—Steers or Oxen above 3 years old.—1st prize, £25, Mr. William Heath, of Ludham Hall, near Norwich; purchased by Mr. Francis Spencer, Southampton. 2nd, £10, His Royal Highness Prince Albert; purchased by Robert Dominy, Blandford, Dorset.

CLASS 7.—Heifers not exceeding 4 years old.—1st prize, £15, Mr. Joseph Phillips, of Ardington, near Wantage; purchased by Thos. Collingwood, Abingdon.

CLASS 8.—Cows above 4 years old, that must have had at least one live calf.—1st prize, £20, Mr. John Henry Gurney, of Catton Hall, near Norwich. 2nd, £10, Mr. Joseph Phillips, of Ardington, near Wantage.

### SHORTHORNS.

CLASS 9.—Steers not exceeding 3 years old.—1st prize, £25, the Rev. James Holmes, of Brook Hall, near Norwich; purchased by Solomon Hopson, Stroud. 2nd, £10, Earl Spencer, K.G., of Althorp Park, Northampton; purchased by B. Oliver, Southampton.

CLASS 10.—Steers or Oxen above 3 years old.—1st prize, £25, and also the Gold Medal as the best Ox in any of the classes, the Marquis of Exeter, of Burghley Park, Stamford; purchased by G. and C. Davis, Black Bull Tavern, New Cattle Market. 2nd, £10, Mr. Thomas Mortin, of Ashford Ford, near Staines; purchased by Joseph Woodward, George-street, Richmond.

CLASS 11.—Heifers not exceeding 4 years old.—1st prize, £15, Mr. William Aldworth, of Frilford, near Abingdon. 2nd, £5, Mr. C. P. Duffield, of Marcham Park, near Abingdon.

CLASS 12.—Cows above 4 years old, that must have had at least one live calf.—1st prize, £20, and also the Gold Medal as the best Cow in any of the classes, Mr. Henry Ambler, of Watkinson Hall, near Halifax; purchased by Mr. Palmer, Elsecar, Yorkshire. 2nd, £10, Mr. Richard Stratton, of Broad Hinton, near Swindon.

### SCOTCH OR IRISH BREEDS.

CLASS 13.—Scotch or Irish Steers or Oxen of any age.—The prize of £10, a polled Angus, Mr. John Grove, of Ferne, near Salisbury; purchased by Mr. Ferris, Bath.

CLASS 14.—Scotch or Irish Cows or Heifers of any age.—The prize of £5, a polled Angus Galloway Scot, Rev. Joseph Arkwright, of Mark Hall, Harlow, Essex.

### WELSH BREEDS.

CLASS 15.—Steers or Oxen (Runts) of any age.—1st prize, £20, the Hon. Col. Pennant, of Penryn Castle, Bangor; purchased by Mr. Kirkby, Park-street. Second, £5, Sir R. Williams Bulkeley, Bart. of Baron Hall, Beaumaris; purchased by Wm. Chambers, Ealing.

CLASS 16.—The prize of £5 was withheld, there not being sufficient merit.

### OTHER PURE BREEDS.

CLASS 17.—Steers or Oxen of any pure breed (except Devons, Herefords, Short-horns, and Scotch, Welsh, or Irish) of any age.—The prize of £10, a Sussex Steer, Messrs. Chas. Neame and Sons, of Selling, near Faversham, Kent.

CLASS 18.—Heifers or Cows of any pure breed (except Devons, Hereford, Short-horns, and Scotch, Welsh, or Irish) of any age.—The prize of £10, a Norfolk, Mr. William Heath; purchased by Mr. H. Keeble, Lion Tavern, New Cattle Market.

### CROSS OR MIXED BREEDS.

CLASS 19.—Cross or mixed-bred Steers, not exceeding 3 years old.—The prize of £15 (a Hereford, Ayrshire, and Short-horn), the Earl of Radnor, of Coleshill House, near Highworth; purchased by Mr. Petheridge, 11, Hastings-atreet, Burton-crescent.

CLASS 20.—Cross or mixed-bred Steers or Oxen above 3 years old.—The prize of £15 (Short-horn and Rosa-shire), Mr. James Taylor, of Nigg, near Park Hill, Ross, N.B.; purchased by Mr. S. Barnes, St. Neots, Hunts.

CLASS 21.—Cross or mixed-bred Heifers, not exceeding 4 years old.—The prize of £10 (Short-horn and Hereford), Mr. Edward Waters of Stratford-sub-Castle, near Salisbury; purchased by Messrs. Smith and Son, Salisbury.

### SHEEP.

#### LONG-WOOLLED BREEDS.

CLASS 22.—Under 22 months old.—1st prize, £20, and also the Gold Medal as the best pen of Long-woolled Sheep, Mr. R. L. Bradshaw, of Burley-on-the-Hill, near Oakham; purchased by Mr. T. Pitcher, John-street, Clerkenwell. 2nd, £10, Mr. G. S. Foljambe, of Osberton Hall, Worksop, Notts; purchased by Mr. H. Barclay, Wells-street, Oxford-street. 3rd prize, £5, Lord Berners, of Keythorpe Hall, Tugby, Leicester; purchased by Mr. T. H. King, Brighton.

CLASS 23.—Under 22 months old.—1st prize, £20, Mr. G. S. Foljambe, of Osberton-hall, Worksop, Notts; purchased by Mr. Farey, Caledonian-road. 2nd, £10, Mr. R. L. Brad-

shaw, of Burley-on-the-Hill, near Oakham; purchased by George Page, Cross-street, Hoxton. 3rd, £5, the Marquis of Exeter, of Burghley-park, Stamford; purchased by Mr. H. Barclay, Wells-street, Titchfield-street, Oxford-market.

#### LONG-WOOLLED BREEDS (NOT BEING LEICESTERS).

CLASS 24.—Under 22 months old.—The prize of £10 to Mr. William Hewer, of Sevenhampton, near Highworth; purchased by Edward Bassett, Crown-court, St. James.

#### CROSS BREEDS.

CLASS 25.—Under 22 months old.—1st prize, £10, Mr. John Overman, of Burnham Sutton, Norfolk; purchased by C. and G. Davis, Black Bull Tavern, New Cattle-market. 2nd, £5, Mr. John Hitchman, of Little Milton, near Tetsworth, Oxon; purchased by Mr. Sheppard, Holloway.

CLASS 26.—Under 22 months old.—The prize of £10 to Mr. John Overman, of Burnham Sutton, Norfolk; purchased by Mr. D. Bull, 9, Great Chapel-street, Westminster.

#### SHORT-WOOLLED BREEDS.

CLASS 27.—Under 22 months old.—1st prize, £20, and also the Gold Medal as the best pen of Short-woolled Sheep, to Mr. William Rigden, of Hove, near Brighton; purchased by Mr. Davey, Brighton. 2nd, £10, Lord Walsingham, of Merton-hall, Thetford, Norfolk; purchased by William Jeffery.

CLASS 28.—Under 22 months old.—The prize of £10 to the Duke of Richmond, of Goodwood, Chichester; purchased by Mr. King, Paddington-street.

CLASS 29.—Above 22 and under 34 months old.—1st prize, £20, to the Duke of Richmond; purchased by Wm. Jeffery. 2nd, £10, to Mr. H. H. Lindsay, of West Dean, Chichester.

#### SHORT-WOOLLED BREEDS (NOT BEING SOUTH DOWNS).

CLASS 30.—Under 22 months old.—The prize of £10 to Mr. John T. F. Pain, of North Houghton, Stockbridge, Hants PIGS.

CLASS 31.—Any breed above 13 and not exceeding 26 weeks old.—1st prize, £10, and also the Gold Medal as the best pen of Pigs, improved Dorset breed, to Mr. John Coate, of Hammoon, near Blandford; purchased by D. Hedges, High-street, Notting-hill. 2nd, £5, Windsor breed, to his Royal Highness Prince Albert; purchased by Thomas Wall, Jermyn-street.

CLASS 32.—Any breed above 26 and not exceeding 52 weeks old.—1st prize, £10, Windsor breed, to his Royal Highness Prince Albert; purchased by Thomas Wall, Jermyn-street. 2nd, £5, improved Dorset breed, to Mr. John Coate, of Hammoon, near Blandford; purchased by John Hagman, 125, High-street, Poplar.

CLASS 33.—Any breed above 21 and under 18 months old.—1st prize, £10, improved Bushey breed, to Mr. Stewart Marjoribanks, of Bushey-grove, Watford; purchased by D. Hedges, High-street, Notting-hill. 2nd, £5, Mottisfont breed, to Sir John B. Mill, Bart., of Mottisfont Abbey, near Romsey, Hants; purchased by John Garland, 26, Market-place, Oxford-street.

#### EXTRA STOCK.

The silver medal to the exhibitor of the best beast, a short-horned ox, Mr. John Overman, of Burnham Sutton, Norfolk; purchased by William O. Oliver, Southampton.

The silver medal to the exhibitor of the best long-woolled sheep, a pure Leicester ewe, Mr. G. S. Foljambe, of Osberton-hall, near Worksop; purchased by W. Dudley, Butchers' Arms, New Cattle Market.

The silver medal to the exhibitor of the best short-woolled sheep, a twenty-months Southdown ewe, the Right Hon. Lord Walsingham, of Merton-hall, Thetford; purchased by W. Lawrence, Isleworth.

The silver medal to the exhibitor of the best cross-bred sheep, a Down and Cotswold wether, Mr. Charles Howard, of Biddenham, near Bedford; purchased by J. and J. Stevens, Oxford.

The silver medal to the exhibitor of the best pig, an improved Bushey, Mr. Stewart Marjoribanks, of Bushey-grove, Watford; purchased by George Stone, Watford, Herts.

#### BREEDERS' SILVER MEDALS.

##### DEVONS.

Class 1.—The Right Hon. the Earl of Leicester, of Holkham-hall, Norfolk.

Class 2.—Mr. Robert Hole, of Harwood, Dunster, Somerset.  
Class 3.—Mr. John Biffen, of Nailsbourne Farm, Wingston, Taunton.

Class 4.—The Right Hon. Lord Portman, of Bryanstone, Blandford.

##### HEREFORDS.

Class 5.—Mr. T. Lockley Miere, of Cound, Shrewsbury.

Class 6.—Mr. William Stedman, of Bedstone-hall, near Ludlow.

Class 7.—Mr. Thomas Carter, of Dodmore Farm, near Ludlow.

Class 8.—Mr. William Chilor, of Wigmore Grange, near Leominster.

##### SHORT-HORNS.

Class 9.—The Rev. J. Holmes, of Brook-hall, near Norwich.

Class 10.—The Marquis of Exeter, K.G., of Burghley-park, Stamford.

Class 11.—Mr. William Miller, of Water Eaton, near Kidlington, Oxon.

Class 12.—The Executors of the late Mr. W. D. Manning, of Rothersthorpe, Northampton.

##### OTHER PURE BREEDS.

Class 17.—Messrs. Charles Neame and Sons, of Selling, near Faversham.

Class 18.—Mr. William Heath, of Ludham-hall, near Norwich.

##### CROSS OR MIXED BREEDS.

Class 19.—The Earl of Radnor, of Coleshill-house, Highworth.

Class 20.—Mr. James Taylor, of Nigg, near Park-hill, Ross, N.B.

Class 21.—Mr. Edward Waters, of Stratford-sub-Castle, Salisbury.

##### LONG-WOOLLED SHEEP.

Class 22.—Mr. R. L. Bradshaw, of Burley-on-the-Hill, Oakham.

Class 23.—Mr. G. S. Foljambe, of Osberton-hall, Worksop, Notts.

##### LONG-WOOLLED SHEEP (NOT BEING LEICESTERS).

Class 24.—Mr. William Hewer, of Sevenhampton, near Highworth.

##### CROSS-BREEDS (SHEEP).

Class 25.—Mr. John Overman, of Burnham Sutton, Norfolk.

Class 26.—Mr. John Overman, of Burnham Sutton, Norfolk.

##### SHORT-WOOLLED SHEEP.

Class 27.—Mr. William Rigden, of Hove, near Brighton.

Class 28.—His Grace the Duke of Richmond, K.G., of Goodwood, Chichester.

Class 29.—His Grace the Duke of Richmond, K.G., of Goodwood, Chichester.

##### SHORT-WOOLLED SHEEP (NOT SOUTH DOWNS).

Class 30.—Mr. John T. F. Pain, of North Houghton, Stockbridge, Hants.

##### PIGS.

Class 31.—Mr. John Coate, of Hammoon, near Blandford.

Class 32.—His Royal Highness Prince Albert.

Class 33.—Mr. Stewart Majoribanks, of Bushey-grove, near Watford.

##### HIGHLY COMMENDED.

A Hereford steer, exhibited by Mr. Josh. Phillips, of Ardington, near Wantage, Berks, bred by Mr. Thomas Carter, of Dodmore Farm, Ludlow.

A long-woolled ewe, exhibited by Mr. William Park, of Stragglethorpe, Lincolnshire, near Newark-upon-Trent, Notts.

Three cross-bred wethers, exhibited by Mr. E. F. Whitting-stall, of Bury, near Watford, Herts.

Three Cotswold and Down cross-bred wethers, exhibited by Mr. Samuel Davis, of Sevenhampton, near Highworth.

Three Leicester and Southdown cross-bred wethers, exhibited by Lord Walsingham, and bred from the stock of Mr. Robert Aylmer, of Westacre.

A cross-bred wether, exhibited by Mr. John Hitchman, of Little Melton, near Tetsworth, Oxon.

Three Southdown wethers, exhibited by Mr. Henry Lugar, of Hengrave, near Bury St. Edmunds.

Three Southdown wethers, exhibited by Sir John Villiers Shelley, Bart., M.P., of Maresfield Park.

Three Southdown wethers, exhibited by the Earl of Chichester.

Three Southdown wethers, exhibited by Lord Walsingham.

Three west-country down wethers, exhibited by Mr. E. F. Whittingstall, of Langley, Bury, near Watford, Herts, and bred by Mr. William King, of New Hayward, Hungerford, from the stock of Mr. Wm. Humfrey.

A Southdown wether, exhibited by Mr. Wm. Rigden, of Hove, near Brighton.

A Southdown wether, exhibited by the Duke of Richmond.

Three pigs of the improved Oxfordshire breed, exhibited by Mr. Samuel Druce, of Eynsham, near Oxford.

Essex pigs, exhibited by Mr. Geo. Turpin, Jun., of Uxbridge, Middlesex, bred by Mr. Harding, late of Uxbridge, from the stock of Mr. Matthew Newman, of Court Farm, Hayes.

#### COMMENDED.

A Hereford steer, exhibited by Lord Berwick, of Cronkhill, near Shrewsbury, and bred by exhibitor.

A Hereford steer, exhibited by Mr. Wm. Heath, of Ludham Hall, near Norwich, and bred by Mr. John Child, of Ledwych, near Ludlow.

A Hereford steer, exhibited by Mr. Philip Turner, of The Leen, Pembroke, near Leominster, and bred by exhibitor.

A Hereford steer, exhibited by Mr. Arthur James of Monnington Court, near Hereford, and bred by Mr. Richard James, of Monnington-on-Wye, near Hereford, from the stock of Mr. Smith, of Shelsley Walsh.

A short-horned steer, exhibited by Mr. Richard Stratton, of Broad Hinton, near Swindon, Wilts, and bred by exhibitor.

A short-horned steer, exhibited by the Hon. Colonel Pennant, of Penrhyn Castle, near Bangor, Carnarvon, and bred by exhibitor, from the stock of Sir Charles Knightley, Bart.

A short-horned heifer, exhibited by Mr. George Hare, of Holbrook Cottage, near Ipswich, and bred by Mr. George Maxwell, of Kidbrook Manor, Blackheath, from the stock of Mr. R. Searson, of Cranmore Lodge, Deeping, Lincolnshire.

A short-horned heifer, exhibited by Mr. Joseph Phillips, of Ardington, near Wautage, Berks, and bred by Mr. Thomas Garne, of Broadmoor, near Northleach.

A short-horned cow, exhibited by H.R.H. Prince Albert, and bred by the late Capt. Dilke, R.N., of Maxstoke Castle.

A short-horned cow, exhibited by Mr. John Tucker, of Abbey Print Works, Stratford, Essex, and bred by Mr. Thomas Herbert, of Macaroni Farm, near Lechlade.

A West Highland ox, exhibited by William Stirling, Esq., M.P., of Keir, near Dunblane, Perth, and bred by the late Mr. Donald McLaren, of Callander.

A West Highland Scot, exhibited by the Hon. Col. Pennant, of Penrhyn Castle, near Bangor, Carnarvon; breeder unknown.

Three Leicester and Southdown wethers, exhibited by Mr. John B. Twitchell, of Welby, near Northampton.

A Down and Leicester wether, exhibited by Mr. John Overman, of Burnham Sutton, near Burnham Market, Norfolk, and bred by exhibitor, from the stock of Mr. Hugh Aylmer, of West Dereham.

Three Southdown wethers, exhibited by the Duke of Richmond.

Three West-country Down wethers, exhibited by Mr. Wm. King, of New Hayward Farm, Hungerford, Berks, and bred by himself.

A Southdown wether, exhibited by G. S. Foljambe, Esq., of Osberton Hall, near Worksop, Notts, and bred by himself.

A Southdown wether, exhibited by Mr. John Kent, of Goodwood, and bred by the Duke of Richmond.

Three Sussex pigs, exhibited by Sir John Cathcart, of Cooper's Hill, Chertsey, and bred by himself.

Three improved Leicester pigs, exhibited by Mr. George Horne, of Egham, Surrey, and bred by himself.

Two Oxfordshire pigs, exhibited by Mr. Samuel Druce, of Eynsham, and bred by himself.

Three Windsor pigs, exhibited and bred by H.R.H. Prince Albert.

An improved Dorset pig, exhibited and bred by Mr. John Coate, of Hammoon, near Blandford.

A pig of the large breed, exhibited by Mr. John Scott, of Whitewall House, near Malton, York.

#### ANNUAL DINNER, AND PRESENTATION OF A TESTIMONIAL TO MR. BRANDRETH GIBBS.

The annual dinner of the club took place at the Freemasons' Tavern, Great Queen-street, on Wednesday evening; his Grace the Duke of Richmond, the President, in the chair. More than the ordinary amount of interest was displayed in the proceedings by the circumstance that the handsome testimonial subscribed for by the members to Mr. Gibbs, the honorary secretary, "in appreciation of his valuable services," was to be presented to that gentleman on the occasion. The result was, that at the hour appointed for dinner upwards of 200 gentlemen had assembled. In the completely-filled room were the following, amongst many other gentlemen directly connected with the agricultural interest:—Lord Berners, Lord Walsingham, Sir R. Bulkeley, Mr. Miles, M.P., and Messrs. Hamilton Lindsay, Raymond Barker, C. T. Tower, Charles Barnett, H. Braudreth, R. W. Baker, John Hudson, Fisher Hobbs, Professor Simonds, Henry Wilson, Fetherstonhaugh, Rutherford, B. E. Bennett, W. Stratford Stratford, Barugh Almack, Richard Milward, R. J. Webb, R. Worthington, Henry Manning, Wm. Wilson, John Overman, F. F. Hallett, Wm. Rigden, Isaac Niblett, G. D. Griffith, Hugh Aylmer, Thomas Twitchell, G. P. Tuxford, H. Corbet, John B. Twitchell, Charles Howard, Thos. Greetham, Lawrence Willmore, Robert Smith, John Buckley, E. W. Moore, Rev. Thos. Stevens, D. Taylor, Valentine Barford, A. C. Stook, Brandreth Gibbs (Hon. Sec.), W. Baker, N. Barthropp, N. G. Barthropp, Samuel Druce, R. S. Bradshaw, John Coate, John Painter, John Beasley, Seaton, H. W. Keary, Osborne, Bott, Moorsom, Hale, Lavies, Dr. Lavies, Ashton, Kaye, Porter, Thomas, Wright, Philip Pain, Edward Stenning, J. T. F. Pain, Wm. Smith, R. Doig, Charles Neame, Charles Neame, jun., Thomas Gibbs, Wm. Torr, C. Stokes, John Clayden, Jonas Webb, Samuel Jonas, James Sharpe, Edward Pope, Edward Frost, J. S. Turner, W. W. Turner, Wm. Tanner, J. C. Jonas, Fownes, &c.

The usual loyal toasts having been given and responded to with the accustomed honours,

His Grace the PRESIDENT rose, and, in proposing that they should drink to "The Army and Navy of England," drew attention to the admirable manner in which the former service had conducted itself throughout the campaigns in the East. That army was composed of officers and men, most of whom had never until landing in the Crimea heard the hiss of a hostile bullet. It then stormed the heights of the Alma, achieved the flank march to Balaklava, fought the hard and single-handed fight of Inkerman (cheers), went through the hardships and privations of a winter campaign, and performed the dangerous and monotonous duty of trench-work—monotonous, because in working with pick-axe and spade there was little glory to be won; and in all these situations nobly maintained the honour and glory of the British arms, at the same time that it had laid aside all old traditions and prejudices, and cultivated the closest ties of friendship with our gallant allies the French (cheers). A great deal had been said respecting the capture of Sebastopol and the storming of the Redan; and having himself had the good fortune of being in no less than three storming parties, he could only say that his surprise had always been how they could ever have succeeded, and not that they had failed (Hear, hear). The naval brigade too had shared in the privations of the red jackets in the trenches and batteries; and he hoped that they would ere long get the reward of their meritorious services (loud cheers). It happened, however, that the navy of England had not, as in days of yore, been enabled to meet the enemy on the seas, and they complained at not having their fair share of the war; but he took leave to disagree with them there, for it was well known to the Emperor of Russia that the discipline and seamanship of the British fleet were such that he dared not send out his ships to meet them in action (Hear, hear). He (the Duke of Richmond) deplored, as he was sure they all must do, the necessary losses which war ever had and ever would bring in its train. There were few who, in their own homes or in their neighbourhoods, had not to lament the fall of some one dear to them; but when war was first declared, he, as an old soldier, knew that it was no child's play they were about to enter upon (Hear, hear). Our men had done their duty well, both to their Sovereign and their country, and he called upon the gentlemen around him, therefore, to give three British cheers for the army and navy of England.

The toast was drunk with three times three, and prolonged cheering.

Song—"Rule Britannia."

The PRESIDENT again rose, and proposed, as the next toast, "Prosperity to the Smithfield Cattle Club" (loud cheers). He had heard it stated that there were rival societies established in other parts of the country. "Rival societies!" He considered them in no such light (Hear, hear). On the contrary, the Smithfield Cattle Club was formed to promote the improvement of the stock of the country, and the more societies they had, with this as the object in view, the better (loud cheers). If, however, there was a society in England that thought it could show better stock than was now in the yard in Baker-street, let the shows be held as at present, and then the following week let the best animals exhibited at each be shown together, and see to which the premium would be given (cheers). He would not go into the question of cattle, though he was satisfied that it would be difficult to beat Lord Exeter's ox, which had won the gold medal at the Smithfield Show (Hear, hear); but as a breeder of Southdowns, he was prepared to show his sheep against any local society or any society in the world (loud and protracted cheering). He was not the winner of a gold medal on this occasion, but he should be delighted if, the day after to-morrow, the sheep that had obtained the gold medal elsewhere would come and compete with his here (renewed cheers). He had made these remarks merely for the purpose of illustrating the fallacy of the statement that there was any rivalry in the matter. The object was to benefit agriculture, and he cared not whether the largest amount of benefit was produced by the shows in London or by the shows in any other part of the country. The Smithfield Club awarded prizes to the best animals, and their doing so gave the young farmer an opportunity of coming to their shows, and seeing what a real good animal was, which no young farmer would ever see unless he was enabled to institute a comparison of one with another (Hear, hear). The committee would be always happy to receive any suggestions from "Practical Farmers" with regard to the distribution of the prizes; but there was one thing which he hoped the club would never do, which was to repudiate the pure breeds (cries of "Hear"). He had made the same observation a hundred times before—there was, therefore, nothing new in it—that though crosses paid the tenant farmer best, and he was delighted at seeing the splendid crosses in their show-yard to-day, they might, nevertheless, depend upon it that they must have some men to look a little further than that, and preserve the pure breed to fall back upon (Hear, hear). It was the landlord's business to do that, and it was the tenant's business to profit by it (loud cheers). But, then, premiums must be given to those who are possessed of pure breeds, or they would get idle and negligent in their vocation (cheers).

The toast was drunk with three times three, and great enthusiasm.

The PRESIDENT: Gentlemen, I now rise to present to Mr. Brandreth Gibbs the testimonial which has been subscribed for by the members of this club (protracted cheers). I have had the satisfaction of witnessing his exertions as our honorary secretary for above 15 years; and your attendance upon the present occasion denotes, I think, your anxiety to pay honour where honour is due—(loud cheers)—for you are congregated together this evening in numbers larger than I have ever before had the pleasure of addressing at the annual dinners of the club. I am sure you must all feel deeply grateful to Mr. Gibbs for the services he has rendered. Not only has he been indefatigable in his exertions to induce gentlemen to join us; but he has done his best to secure fair play to all, and has devoted himself with great assiduity to the management of our finances, which when the report is published, you will find, I think, to be in a sound and encouraging position. In presenting this testimonial to you, Mr. Gibbs, I do it as the representative of the Smithfield Cattle Club, and as one who is not altogether unknown to the tenant farmers of England; to a man who is worthy of the respect and honour of this Club, and what is more, who is a real straightforward, honest English gentleman (loud cheers).<sup>21</sup>

The health of Mr. Gibbs was then drunk with three times three, followed by great and prolonged applause.

The testimonial consisted of a candelabrum for six lights, representing an oak tree with spreading branches and foliage, to carry either lights or glasses. In the centre was a trellis-

work frame, to support a crystal bowl. Around the foot of the tree were grouped a short-horned ox, a long and a short-woolled sheep, a pig, and various roots, the whole carefully modelled from nature, and standing upon a richly-chased tripod base with three panels. In the first compartment was a view of the Smithfield Club Cattle Show, surmounting a medallion of his Grace the Duke of Richmond, K.G., the president of the Club. In the second were introduced the full arms of Mr. B. T. Brandreth Gibbs, under which, in the scroll-work of the base, were various agricultural implements. In the third panel was engraved the inscription, beneath which was a medallion of the late president, the Earl Spencer. The medallions were by Wyon, R.A. There were also a pair of richly-chased and classically-shaped wine coolers or flower vases, with demi-horses as handles, standing on square plinths, in the panels of which were represented various prize animals, beautifully chased in basso-relievo in dead silver, giving the whole a characteristic effect. The candelabrum stood two feet six inches in height, and the weight of the three pieces was 536 ounces, and the cost £360. The following inscription was engraved on each: "Presented to B. T. Brandreth Gibbs, Esq., by the members of, and others interested in, the Smithfield Club, in appreciation of the valuable services rendered by him to that society as its honorary secretary. 1855." These various articles were modelled and manufactured by J. W. and F. B. Thomas.

Mr. GIBBS (who on rising was received with reiterated and continued plaudits) said—Upon each succeeding year, when you have done me the honour of drinking my health, I have always found it most difficult to return thanks in suitable terms for the manner in which his Grace has been pleased to propose it, and to you, gentlemen, for the manner in which you have been good enough to receive it. But if upon former occasions I have found it difficult, how much more so must it be upon this, when you are honouring me in a manner that I could never have anticipated, and which I am conscious I do not deserve! It has hitherto been my custom, in addressing you, to allude to such general subjects connected with the interests of the club as I have considered would be most acceptable to you, and most appropriate to emanate from your secretary. It is, however, unnecessary for me now to enter into any details as to the position of the club; suffice it to say, that this is in every respect most satisfactory; and that I believe that it is continuing successfully to carry out the great national object for which it was originally instituted—that "of supplying the English markets with the cheapest and best meat," by directing attention to the science and practice of breeding and feeding stock (cheers). You will recollect that for nearly half a century this club stood alone as a national society for this purpose, but of late years it has found a valuable co-operator in the Royal Agricultural Society of England, in which the science of breeding receives the greatest attention, but the department of feeding still remains the distinctive and peculiar province of this club. The means which the club has employed to carry out its object has been the giving of prizes and medals for the best animals exhibited at its shows, these animals being sent to exemplify the result of the experiments in feeding that have been made upon them. Much practical good has, no doubt, resulted from this; still it has often struck me that, much as the club has already done, there is scope for it to do more; and that, therefore, whilst the club will be giving nearly £1000 a year in prizes for the animals—the results of these experiments—it would be well if prizes were offered also for the best account or essay on the feeding, treatment, and management by which they have been brought to such perfection (Hear, hear). The report should state the different kinds of food, the quantities, and the reasons for which each change has been adopted. By this means a large amount of practical knowledge would be got together; and, by being published in the shape of a pamphlet each year, the experience gained would not be confined to the particular homestead on which the animal was fed, but would be placed within the reach of those anxious to obtain it (Hear, hear). Thus much for the practical part of the subject; but I think we should go a step further, and call in the aid of science in this, as in the other branches of agriculture. The chemist should analyze the different kinds of food, and tell us the nutritive qualities and constituent

parts; whilst the animal physiologist should inform us of their action on the system. He should tell us which of those elements produces muscle, which fat, and which lean; he should tell us which are astringent, and which the contrary; he should explain which are cooling, and which are stimulating—which act upon the blood, and which determine to the skin; he should explain to us the processes by which aliment is converted into flesh, the functions of the different organs, and the wants of the system. These, and many other points which I need not enumerate here, would form subjects for the aid of science, for it is nature that we have to deal with; and to deal with it successfully we must know the laws by which it is governed (Hear, hear). The importance of these subjects has been still more strongly forced upon my mind by the admirable and elaborate address delivered by his Royal Highness Prince Albert a few days since, and I trust you will not consider this an inappropriate occasion to allude to them, and for me to volunteer to undertake the additional duties which receiving such essays and preparing them for the press will entail upon your hon. secretary (Hear, hear). Having said thus much respecting the club, it now becomes my duty to say a few words respecting myself, for there are events in the life of every man upon which he will look back in future years as forming an era—as marking an epoch—in his individual history; events, perchance, to which his memory will ever recur with feelings of satisfaction and delight. Such, then, is the present occasion to me; and I should not be doing justice to my own feelings, and I should be omitting what I consider to be due to you, if I were not briefly to review the period that I have had the pleasure of being connected with this club; and I take this review not for the purpose of setting forward any services which I may be supposed to have rendered, but on the contrary, to show that I claim no merit for any success that may have attended my exertions, beyond what must result from such energy and perseverance as you had a right to expect from anyone undertaking the office that you have entrusted to me (cheers). It might, indeed, be a pleasing task to me to retrace my earlier years, when I first visited your shows, and learned to take an interest in your proceedings, under the parental care of one whose health was wont to be drunk within this hall, not only as my father, but also as the father of the Smithfield Club; but I will not weary you with this, but pass on to the time when I first became personally connected in the management of your shows. Most of you will recollect what the Smithfield Club was—how its affairs were managed some eighteen or nineteen years ago, when my brother, Mr. Brandreth, first consented to become your honorary secretary—and you will not, I am sure, forget how thoroughly he re-organized and remodelled the system of conducting them (Hear, hear). Year after year fresh improvements were introduced, till at last its management began to assume that system and order which have subsequently been carried out, not only in its meetings, but also in those of the Royal Agricultural Society of England; and, I believe I may add, in many local societies throughout the country (Hear, hear). To him, then, and not to me, is due the credit of instituting these changes; but I had the advantage of watching the effects of those improvements, and of helping in an humble degree in carrying them out. I, therefore, when the time arrived for me to become your secretary, did not come altogether as a novice; for I had the benefit of being acquainted with all the details, and I had the still greater advantage of being able to get his advice and directions in any cases of difficulty that might arise. With such advantages then as these, I repeat, I cannot claim any merit to myself; but they stopped not here, for I had the good fortune to commence under the presidency of a lamented nobleman, whose name must ever be dear to all connected with agriculture, but especially to the members of the Smithfield Club, for most of you know better than I can tell how deep a debt of gratitude this club must ever owe to the exertions and straightforward business-like qualities of the late Earl Spencer (Hear). Not only did he come forward and take the club by the hand at a period when its prospects were far different from what they are now, but he continued during succeeding years to guard it with a watchful care, and aid it with his influence and support; and I cannot, upon this occasion, refrain from expressing my feelings of respect and veneration for the memory of that lamented nobleman, not only because the duties of my office having brought me much into contact with him, I had some opportunity of becoming acquainted

with the simple greatness of his character, but also because he used to give me the benefit of his counsel and advice with, I may say, almost parental care. But when the time arrived that this benefactor was to be taken from among us, fortune still seemed to smile on this club, and not only on it, but on kindred societies too, because there was still among our officers a nobleman who for years had been constantly watching over the interests of the club, and had given it the benefit of his talents and unfailing attendance at all its meetings. Not only has his Grace the Duke of Richmond, our president, been a worthy successor of the late Earl Spencer—not only, like him, has he been a constantly successful exhibitor at our shows, carrying off the highest honours the club could bestow, but he has always displayed the same energy in your cause that characterized him in earlier years in another sphere; and I well know that nothing but severe indisposition or absolute necessity can ever keep his Grace from presiding at the meetings of the club. But it would ill become me to say more of what the club owes to his Grace, because it is too well known and too thoroughly appreciated by you to need a single word from me; but his Grace will, I trust, pardon me if I embrace this opportunity of publicly expressing to him my thanks for the kindness I have always received at his hands. Not only have my communications always had the promptest attention, but I have had the readiest access to him whenever I have found it my duty to consult him. I can assure his Grace that his constant kindness will be one of the most pleasing remembrances connected with my office. I must also express the advantages I have derived from the ready co-operation of the different gentlemen who have during the last twelve years succeeded to the office of steward. Not only has there never been any difference between us, but I feel a pride in being able to say that I have always received their prompt assistance in carrying out the necessary arrangements for your shows; and that although coming from various parts of the kingdom, and, doubtless, accustomed to different systems of management at local shows, they have never either expressed or manifested any wish to alter such arrangements as I had made. This has not only been a gratification to me, but it has given me the advantage of adopting a comparatively uniform system from year to year, and also keeping it in harmony with that adopted at the meetings of the Royal Agricultural Society of England; and I need not point out the benefit, not only as regards the officers, but also exhibitors, that such should be the case. (Hear, hear.) I have, therefore, to express my thanks to the stewards; and when I mention such names as Jonas Webb, Fisher Hobbs, Chapman, Ellman, Forr, Bruce, Buckley, Clayden, Willmore, Greetham, Pope, and the like, you will readily believe that it has been a source of great pleasure to have been associated with such men as colleagues and officers of the club. (Hear, hear.) I think, therefore, you will allow that with such great advantages and co-operation, I am justified in repeating that I cannot claim your thanks beyond such as may be due to ordinary energy and exertion; but, gentlemen, you have been good enough to think otherwise, and that my humble endeavours are worthy of having your thanks embodied in a tangible form, and by the energy of your committee, aided by the assistance of my friend Mr. Fisher Hobbs, as its honorary secretary, you now ask me to accept the beautiful testimonial before me. (Cheers.) Gentlemen, I neither anticipated nor expected to receive such at your hands; still I accept it as freely as it is freely given. (Loud cheers.) I accept it for the purpose of valuing it—not only for its intrinsic worth—not only for the beauty and elegance of the designs, and their appropriateness to the objects of the club—not only because the medallions on its base bear the profiles of the noblemen under whose presidency I have acted; but because I shall regard it as the depository—the tangible form in which your thanks and good wishes are expressed towards me. (Renewed cheers.) The remembrance of this will stimulate me to fresh exertions; and when the time arrives, as arrive it some day must, when I shall be prevented from taking so active a part in the management of your affairs, it will be for a memento of the past, and as some token given will recall the memory of a friend, so each time that my eye rests upon this elegant testimonial it will recall, not one friend, but many; it will bring me back to the years of my activity and strength; it will bring me back to your shows; it will bring me back to this room, and memory will bid me see again the faces of many friends that are around me

now; and like as when a traveller revisits a once well-known spot, the sight of some one object there—it may be, perchance, a time-worn oak upon the village-green, whose widely-spreading branches shade the lowing herds and bleating flocks beneath—recalls the sound of sweet music he had heard there in earlier days, so as I travel along life's varied paths, each time that my eye rests on yonder silver-mantled oak, with the emblems of flocks and herds around its base, it will recall what is like sweet music to my ears; for it will bring back not only the sound, but even the very words in which his Grace has been pleased to present it to me (cheers). And like, as in harmony, when a note is struck, one string that is in unison with it will vibrate whilst the others remain at rest, so when these words shall have died away and become at rest on our ears, they will continue to vibrate in a chord within my breast, awakening a deep responsive echo from the inmost recesses of my heart. And I trust it will not end here, but that in years remoter still, that testimonial will be valued highly by others too—not only because it will have been handed down an heirloom, but also because the inscription on its base will tell that one who has gone before them has not been deemed in his generation unworthy to receive such a compliment—such a mark of esteem, even from the members of the Smithfield Club. And gentlemen, it is my fervent wish that in those future days the club may be flourishing and prosperous, and that it may continue successfully to carry out the great national objects for which it has been established (cheers).

Lord BERNERS then gave "The Health of the President of the Club, his Grace the Duke of Richmond," and referring for a moment to the show, pointed out, as one of its commendable features, the circumstance that there was an almost total absence of the over-fed and mis-shapen animals which had been seen there so repeatedly in former years. He rejoiced at the improvement exhibited by the cross-breeds; but how any man of ordinary intelligence could pretend to produce crosses in perfection from other than the pure breeds he was utterly at a loss to understand (general cries of "Hear"). To produce a perfect animal there should be pure blood on each side. (Hear, hear.) True, there seemed to be an exception in the case of Mr. Druce's sheep; but not one man in a thousand had the intelligence, the perseverance, or the will to select animals as that gentleman had done. (Hear, hear.) That was the exception, therefore, not the rule; and the object of the Smithfield Cattle Club and of the Royal Agricultural Society of England would be carried out efficiently only so long as the principal prizes were given to the pure breeds (cheers).

The health of the noble President was drunk with three times three and much enthusiasm; and having been briefly responded to by his Grace,

Mr. Gibbs read the judges' award of prizes, which was followed by

The PRESIDENT giving "The Health of the Winners of the Gold Medals for the best Pens of Long-wooled and Short-wooled Sheep respectively."

Mr. BRADSHAW, the winner of the former, and Mr. RIGDEN, the winner of the latter, severally returned thanks.

"The Health of the Successful Competitors in other Departments" was also proposed; and his Grace then gave "The Royal Agricultural Society of England," to which

Mr. MILES, the late President, replied. In doing so, he felt much pleasure in knowing that these associations had a very similar object. It was the duty of one to perfect the breeds of cattle, and of the other to bring them to a fat condition for the consumer. After a reference to his own year of office, Mr. Miles proceeded to say that in the capacity of president he had, with other agriculturists, visited the exhibition of stock in Paris. He knew it was considered that they should notice what they saw on that occasion. The fact, however, was, that while the French stock were nearly as good as our own, the generality of other animals could be praised neither in a breeding nor a feeding market. Still what was worthy of record was a breed of cattle, the Charolise, of very superior milking and feeding qualities. The French, too, had succeeded where we failed with crossed Merino sheep, admirable in wool and good in carcass; and he had only to trust that some future encouragement would be given for these in our own country.

The PRESIDENT next gave "The Stewards;" to which

Mr. WILLMORE, as senior steward, responded. He said that he felt greatly obliged for the compliment paid to him and his colleagues. Their duties, though onerous, were much

lessened by the kind assistance of the noble President, and the great aid rendered by their honorary secretary, Mr. Gibbs. Still there remained many difficulties with which they have had to contend; one was the appointment of judges. He thought they had been very happy on this occasion. His great study, since his career in office, had been to select a proper person, and he felt the importance of it so much the more after what had been said to night in regard to cross-bred animals; for he was quite sure that unless the pure breeds were recognised and fully attended to, no good could result from such shows. There was another matter he wished to allude to—he meant the arrangements now about to be made with Mr. Bulnois for the future shows. He considered the plan the yard committee had recommended was for the best interests of the Club; and he hoped those recommendations would be adopted. He would mention further, that a leading journal, the *Times*, had thought proper to find fault with the present arrangements and show, and to make a very unfair comparison between the Birmingham meeting and this. He knew well—and his information was from the most practical men—that the Birmingham show, with few exceptions, was far inferior in many respects to our own. He could only trust, in conclusion, knowing what excellent men of business his present colleagues were, that the same zeal and energy would be evinced in carrying out the plans of the Club as had been always found heretofore.

Mr. ROBERT SMITH, in returning thanks for the judges, wished to impress the fact that, while the spectators only obtained a view of the stock as they passed along in crowds, the judges, on the other hand, had the animals out and walked before them, often over and over again. They did not, therefore, care much as to what was said of their decisions; but on this occasion, while a portion of the press had attacked the club, it had let the judges alone.

The PRESIDENT gave, as the concluding toast of the evening, "The Labourer;" and in doing so remarked on the value of a good man to a farmer, and the necessity for a general feeling of good will between the three classes, landlord, tenant, and labourer.

#### MEETING—TUESDAY, DECEMBER 11TH, 1855.

The chair was taken by Lord Berners, Vice-President of the Club, in the absence of the Duke of Richmond, the President, who had to attend a meeting of militia colonels at the War Office.

The Duke of Richmond was re-elected the President. The Marquis of Huntly, Earl of Hardwicke, Earl Spencer, Earl of Yarborough, and Lord Berners, Vice-Presidents; the Duke of Richmond, Lord Portman, and Mr. B. T. Brandreth Gibbs, Trustees; Mr. B. T. Brandreth Gibbs, Hon. Secretary; Mr. Sanday, of Holme Pierrepont, Steward of Cattle and Long-wool Sheep; Mr. Fookes, of Whitechurch, Blandford, Steward of Cross-bred Sheep, Short-wools, and Pigs.

On the motion of Mr. Clayden, it was determined to offer a separate Medal for Ewes, both Long and Short-wool Sheep, shown as Extra Stock.

On the motion of Mr. Brandreth, a Committee was appointed to take into consideration the subject of the exhibitors' standing-room for implements in the galleries.

The Report of the Yard Committee respecting the renewal of the lease of the Bazaar was discussed at great length, and the final settlement deferred till Thursday's meeting.

New members were elected, and a vote of thanks passed to the Chairman.

#### THURSDAY, DECEMBER 13TH, 1855.

His Grace the Duke of Richmond, President, in the chair.

The adjourned debate on the renewal of the lease was resumed, and it was eventually determined to renew the engagement for five years; the Club to receive an additional £200 per annum from the proprietor, making £700 per annum; he doing as heretofore, paying all expenses of fodder, police, lighting, fitting up, &c., &c.; with the additional privilege for Members of the Club to have the right of entrance free both during the Show and to the private view after the Judges have completed their awards on the Monday evening.

On the motion of Mr. B. E. Bennett, the Prize for Welsh Heifers and Cows was increased to £10; and a Silver Medal to the Breeder, if he has filled up the Breeders' Certificate.

On the motion of the President, the Prizes for Scotch and

Irish Cattle were increased, to be as follows:—Steers and Oxen, 1st prize £20 (Silver Medal to the Breeder, provided he has furnished the Breeders' Certificate); 2nd prize £5. Heifera or Cows, the prize of £10 (Silver Medal to Breeder, on same conditions as above).

The statement of the finances showed a balance of £1,300 in hand, after payment of the present year's prizes and expenses; and it was intimated by different members that they would hand in notices of motions ready for next year, for increasing the Prizes offered by the Club.

New members were elected, and a vote of thanks passed to the President for his conduct in the chair.

## METROPOLITAN CATTLE MARKET.

MONDAY, DEC. 17.

### THE GREAT CHRISTMAS SHOW.

This was the day appointed for holding the Great Christmas Show of Fat Stock; and the advantages of the removal of the trade of Smithfield to Copenhagen-fields was never more apparent than on this occasion—the only one, in point of fact, since such removal in which nearly the whole of the standings have been filled—arising from the large unoccupied space generally noticed over and above the actual requirements of supply. This, however, we look upon not as an evil, but a positive advantage, as was strikingly apparent this morning. As regards excitement, compared with many corresponding days in Smithfield, there was literally none; and the greatest order was observed both in the arrival and departure of the stock; indeed, it would be impossible to over-estimate the value of the market for an exhibition of this kind.

From the past having been an unfavourable season for the rearing of fat Beasts—as the supply of natural food has fallen considerably short of the demand, as prices have, consequently, ruled unusually high, and as the value of cakes and linseed has been from 30 to 40 per cent. above the ordinary runs of years—we fully expected to see a smaller number of really fat animals than usual; but a careful consideration of the supply brought forward does not justify our expectations. The wonders, and the names of the salesmen to whom they were consigned, we have noticed below. But we may here refer to the Beasts in classes. The supply of Shorthorns, both for number and quality in the aggregate, certainly stood first. Norfolk forwarded perhaps the best stock in this respect; Lincolnshire stood next; but we had some very prime animals from other counties. The Herefords may be placed in the next category; and, possibly, if we compare the value of meat to the butcher, this stock might well claim the first class, because it has less superfluous fat upon it; indeed, the exhibition of that breed was remarkably good. As regards the Devons, we have less scope for comment than usual. Though very good, they did not come up to previous years. It is, however, very probable that the high value of live stock in the west of England has deterred many graziers from forwarding their usual supplies. There were some remarkably fine Welsh Runts on sale; and the show of Scots, both from Scotland and different parts of England, was seldom equalled.

We have now sketched out the general excellencies of the pure breeds. We have done so from the conviction that they are deserving our first consideration, because upon them the stamina of fat stock must always depend. It is, however, necessary that we should say a few words respecting the crossings. With a few exceptions, they were deficient in weight and quality, consequently dear both to the butcher and consumer; and

such has been the case for a long series of years, and no doubt it will continue to be so. Still, we find that a contemporary print has set forth the doctrine that the Smithfield Club ought to give large prizes to cross-bred stock, to the partial neglect of the pure breeds, simply because the latter are chiefly in the hands of a certain class of graziers. We need scarcely point out to the practical man the extreme absurdity of *such* a theory; but we deem it right to warn the consumers not to be led astray by such vapid nonsense, which has been evidently concocted to produce discontent where none ought to exist.

The amount of stock brought by the various railways was very large, yet it arrived in excellent condition, and it must be satisfactory to learn that scarcely any traces of disease were noticed amongst either the Beasts or Sheep.

The annexed return shows the number of Beasts shown, and the prices obtained for them, on the great days in Smithfield, in the last fifteen years:—

Year.	Beasts shown.	Prices.			
		s.	d.	s.	d.
1840	3,528	4	4	to	5
1841	4,500	3	8		5
1842	4,541	3	4		8
1843	4,510	2	8		4
1844	5,713	4	0		6
1845	5,326	3	6		8
1846	5,470	4	0		5
1847	4,282	3	4		8
1848	5,942	3	4		8
1849	5,765	3	4		6
1850	6,341	3	0		10
1851	6,103	2	8		2
1852	6,271	2	8		0
1853	7,037	3	2		10
1854	6,181	3	6		4

Last week's imports of foreign stock into London were moderate, the total supply amounting to 4,752 head. In the corresponding week in 1854 we received 3,999; in 1853, 6,316; in 1852, 4,436; in 1851, 4,277; in 1850, 5,124; in 1849, 2,388; and in 1848, 3,656 head.

#### IMPORTS INTO LONDON LAST WEEK.

From Whence.	Beasts.	Sheep.	Calves.	Pigs.
Harlingen	494	1265	64	—
Rotterdam	223	561	86	—
Dordt	23	—	—	—
Hambro'	37	20	—	—
Amsterdam	82	1709	—	—
Antwerp	—	—	88	—
<b>Total</b>	<b>859</b>	<b>3555</b>	<b>238</b>	<b>—</b>

The Yearly Comparison of Weekly Imports is as follows:

	Beasts.	Sheep.	Calves.	Pigs.
1854	1130	2593	269	7
1853	1136	4698	462	20
1852	235	3782	419	—
1851	607	3155	363	152

The show of foreign stock to-day was small, and in very middling condition.

From our own grazing districts we received the following supplies of Beasts:—West of England, 500; Norfolk and Suffolk, 700; Lincolnshire, Leicestershire, and Northamptonshire, 3,800—3,000 from the latter counties being conveyed by the London and North Western Railway. From Ireland, 350; and from Scotland, 850 Beasts came to hand. Thus it will be seen that the arrivals were very large; and we may observe that, taking into consideration their weight, the total supply, as a whole, has never been equalled. The great mass of supply had a depressing influence upon the demand; indeed, the trade was heavy. A few very superior Beasts sold at from 5s. 2d. to, in some instances, 5s. 4d. per 8 lbs.; but the general top figure

for Beef was very little over 5s. per 8 lbs., and sales progressed slowly at those quotations.

On the stand of Mr. Robert Morgan we noticed a remarkably fine show of Beasts, the property of Messrs. Martin, Livingstone, Knowles, Cooper, Milne, Mitchell, and Thompson, Scotch graziers; of Messrs. Cook, Thomas, Cooper, Hewson, Lincolnshire; of Messrs. Feltowe, Leeds, Farrer, &c., Norfolk. Mr. Morgan had also a fine collection from other counties.

Mr. Maidwell had on offer a wonderful collection of Beasts forwarded by Mr. William M'Combie, of Tillyfour, Aberdeenshire. This eminent grazier has for many years past furnished a fine collection of Scots for the great market. The number here to-day was 40, and certainly they were the admiration of all present.

Mr. Vorley had also a good show of Beasts, chiefly the property of Messrs. Martin, Stoddard, and Philips, of Scotland.

Other salesmen had fine collections, and we may state that the Beasts shown by Messrs. Giblett and Gurrier, belonging to Messrs. Milne, Stewart, and Shepherd, of Scotland, were remarkably fine.

There was a full average supply of Sheep in the market, and many of them were of great weight. The trade was very inactive, and sales were with difficulty effected at last week's prices. Some of the Leicesters, Gloucesters, &c., sold tolerably well; but small breeds were neglected. The highest quotation was 5s. per

8lbs. Messrs. Weale had on sale several pens of very fine Sheep, the property of F. Wittingstall, Esq., of Langley-Bury, Herts., and of Mr. Rowland of Onslow. They found buyers at high rates. Messrs. Giblett and Gurrier exhibited some fine Downs belonging to Lord Walsingham, Lord Radnor, and Mr. Joseph Carwardine of Herefordshire; several prime Gloucesters, the property of Messrs. Garne, Hewer (of Northleach), and Mr. Craddock; and 40 very fine wethers sent by G. H. Langston, Esq. Mr. Eland showed a very good supply of Lincolns.

We were very moderately supplied with Calves. The primest sold as high as 6s. per 8lbs.; but inferior qualities were a slow sale.

The Pork trade was dull, but we have no change to notice in prices.

*Per 8lbs. to sink the offals.*

				<i>Per 8lbs. to sink the offals.</i>			
		s.	d.	a.	d.		
<i>Coarse and inferior</i>						<i>Prime coarse wool-</i>	
<i>Beasts</i>	.....	3	8 to 3	10		<i>led Sheep</i>	..... 4 4 to 4 6
<i>Second quality do.</i>		4	0 4	4		<i>Prime South-down</i>	
<i>Prime large Oxen</i>		4	6 4	10		<i>Sheep</i>	..... 4 8 5 0
<i>Prime Scots, &amp;c.</i>	...	5	0 5	2		<i>Large coarse Calves</i>	4 10 5 4
<i>Coarse and inferior</i>						<i>Prime small do.</i>	... 5 6 6 0
<i>Sheep</i>	.....	3	4 3	6		<i>Large Hogs</i>	..... 3 10 4 4
<i>Second quality do.</i>		3	8 4	2		<i>Neat small Porkers</i>	4 6 5 0

*Suckling Calves, 23s. to 30s.; and quarter-old store Pigs, 23s. to 28s. each.*

## THE LONDON, OR CENTRAL FARMERS' CLUB.

### THE MANAGEMENT OF ESTATES, SO AS TO INSURE THEIR UTMOST DEVELOPMENT AND IMPROVEMENT.

The usual monthly meeting was held at the Club House, Blackfriars, on Tuesday evening, Dec. 10; Mr. B. P. Shearer in the chair. The attendance of members was very large; the subject for discussion introduced by Mr. R. Baker, of Writtle, "The management of estates, so as to insure their utmost development and improvement."

The CHAIRMAN, in opening the proceedings, said he did not believe the introduction of the important question appointed for consideration could have been placed in better hands; and recollecting the numerous subjects which Mr. Baker had brought before them, and the excellent manner in which he had treated them, he was sure they must all feel exceedingly pleased that he had undertaken this task.

Mr. BAKER then rose, and said: Gentlemen, the subject appointed for this evening's discussion is one of the utmost importance, not only to landed proprietors, but also to the occupiers of farms, as well as of the community at large. The peculiar position that this nation occupies in relation to the whole of the states of Europe, as well as America, has obtained the attention of our most illustrious statesmen and political economists of not only this, but of antecedent periods; and even now is a problem to be worked out by time, and of which no one is able to calculate the result; for circumscribed as this country is, as regards its capability of producing wheat and other necessaries in sufficient quantity for the sustenance of its inhabitants, and with an increase of population in the ratio of two for one in every 50 years, it must be apparent, that unless an acreable increase of agricultural produce takes place to meet the deficiency, that importations of such necessaries must follow upon a scale equivalent to the demand, thus rendering this country dependent upon foreign states for the food of its people to such an extent as may place her independence in jeopardy the

moment it becomes embroiled in war with any of those states from whom it might hitherto have derived its supplies. This premised, it remains to be shown how this difficulty may be met or overcome, or so far mitigated as to remove any apprehensions upon that subject; and, inasmuch as the area of the kingdom cannot be augmented to any considerable extent, it remains to be shown how far the produce may be increased to meet the requirement, and which I hope to be able to prove may be effected, if the restrictions now existing upon cultivation can be removed. Until the commencement of the past century, land constituted the chief wealth of the nation; and as it had been subjected to feudal rights, it came down to the present proprietors fettered with all the restrictions that had appertained to it through the early periods; and even now, notwithstanding the endeavour of our statesmen, from time to time, to abolish those absurd customs of tenure, or so far to mitigate their effects, we are still, in the nineteenth century (so far as the title to and transfer of land is concerned), in a species of refined barbarism. I have adverted to this evil merely to exhibit the difficulties to which all landed proprietors are subject, as a class; as it must be evident that those expenses cannot be met or overcome unless by a proportionate diminution of rent, or by such withdrawal of capital yearly as to prevent the owners entering upon any general or extensive improvements of their estates; and capital thus spared, if directed aright, would enable each proprietor so far to improve the farm, homesteads, and roads, as well as to drain and otherwise improve his estates, so that the highest degree of perfection might be attained, without absorbing the smallest portion of the rental now derived; and in addition as those improvements become developed, the ultimate increase in annual value of the whole of the land of this kingdom might become increased in the short period of thirty years to the extent of 50 per cent.; for as it is upon the investment of capital judiciously that their improvement in a great measure depends, how can it so easily and readily be effected as upon this principle of self-production and development? It is not in my province to insist upon the means by which this might be carried into effect, and upon an occa-

sion like the present, when I am enabled to delineate the outline only, it would be trespassing too much upon the future portion of the subject to dwell longer upon speculative propositions of what might be effected by legal methods, but rather to deal with the question as I find it, and endeavour to show, in accordance with the subject as put down upon the card—"How estates can be managed so as to ensure their utmost development and improvement." In approaching this subject, so large and extended a field presents itself, that I almost fear to enter upon it, or to endeavour to reduce within the space of an ordinary lecture the important question which now engrosses our attention. I shall, however, premise that there is no estate in this kingdom whatever, however highly improved it may have become, but that is still capable of further and more extensive improvement; and when I reflect upon the very inefficient manner in which the largest portion of the estates of this kingdom are managed, it exhibits a picture that I would fain conceal, but which I have only hitherto been able to deprecate and deplore; for, what with the trammels and restrictions upon tenants on one hand, and the insecurity of their investment on the other, it is rather matter of surprise than otherwise that cultivation has arrived at the perfection that it has attained, and which nothing but the enterprise and energy of character possessed by English farmers would have overcome; and it will therefore be my endeavour to show how far these restrictions may be removed, without in any degree diminishing the resources of the landlord, or by interfering with his prerogative injuriously in the slightest degree. And, although his interest may be limited, still, if a disposition exists to carry out extensive improvements upon his estate, tenants will always be found ready to venture their capital if they can look forward with any degree of confidence to the opportunity of re-imbursing themselves the investment they may make in the general and necessary improvement of their several farms. But, so long as landlords refuse to give their tenants a security for their invested capital and skill, it can hardly be expected that any permanent and progressive improvement of the estates of this kingdom will follow; and therefore, to attract capital, the utmost encouragement ought to be given in the outset. The mere consideration of rent, in point of amount, should, in the first instance, be allowed to merge in the larger and more beneficial advantages to be derived from capital when skilfully directed into its proper channel; nor should any other considerations whatever interfere to prevent the attainment of this object. If a tenant is poor and unable to properly cultivate his farm, he must of necessity yearly become still more unable to meet or overcome the difficulties which he may have to encounter; but if there exists a desire to keep him upon the estate, and his character justifies such an endeavour, assistance should be afforded him of a substantial character, not by a mere return by a per-centage upon his rental, but by enabling him to bring his land into a higher and better state of cultivation; and even then, unless his co-operation should be found earnest and continuous, it would be useless to pursue it until the impoverishment of the farm could only be exceeded by the impoverishment of the tenant. The first, and most essential, consideration that presents itself towards the improvement of an estate, is so to arrange all the occupations that the fields of each particular farm may be brought into contiguity with the home-stalls as much as possible. This can only be effected by holding a command over the property at one and the same time, and which can be readily effected if the tenants can respectively be convinced of the benefit to be derived by themselves; but inasmuch as the land will of necessity be of different degrees of value in point of cultivation, and, what is still more important, will vary greatly as regards quality, a proper and equitable adjustment betwixt tenant and tenant can only be effected by some person competent to estimate the respective interests of the several occupiers in the lands so proposed to be exchanged; but as this is a department that can be readily accomplished, I shall not dwell upon it further, but suppose that every holding or occupation is rendered as complete as circumstances will allow, the homestalls being as nearly in the centre of each occupation as possible, the communication to each field rendered practicable by good roads, the size of the holdings being also such as to enable the tenant to keep a sufficient number of horses and workmen to carry on the operations of the farm with the utmost facility. Nor do I consider farms of less than 200 acres of arable land can be managed

so beneficially and profitably, as it must be apparent to every one that the successful cultivation of farms cannot be carried out unless an adequate quantity of manure can be annually produced, so as fully to enable the tenant to obtain good crops. This cannot be effected unless a sufficient number of sheep and cattle can be kept to enable him to produce it; therefore, unless every farm is adapted, as regards extent, quality of soil, and quantity of grass or feeding land, for the accomplishment of this object, it will not only fail in producing that general improvement of each farm respectively, but also of the estate altogether. As soon, therefore, as a proper arrangement of the enclosures of each farm is determined upon, a general survey of the farm homestalls should be made, nor should any repairs or new buildings be commenced until plans have been decided upon for the ultimate improvement of each individual homestall; for unless this is previously done the erection of new buildings will only tend to render it more difficult afterwards to complete and arrange them to the greatest advantage. Every new erection or alteration of a building ought to be subservient to the progressive development and improvement of the whole; and although the means cannot at once be applied to effect such an object, still every step, when taken, should be in the right direction; so that in the end no waste of money or material may ensue. I am desirous of impressing this point upon landowners, as I have seen heavy expenditure going on, regardless of any general plan, until in the end a large outlay might probably have been made, and but little beneficially accomplished, realizing the view taken by an able writer of such men who so proceed; who, as he tersely observes, rarely *finish* anything but their fortunes, or *end* anything but their lives. After the farms have become arranged, and the alterations and improvements of the homestalls decided upon, it will be necessary to obtain suitable tenants, either by treating with those in occupation, or by procuring others who may be seeking farms; and herein a judicious discrimination becomes requisite. Men without skill, enterprise, or capital, should not be treated with. Industry may accomplish a great deal, if aided by capital; capital will effect little, unless it be skilfully directed. But to ensure a successful result, *both* ought to be united in the same tenant; nor is this all that is requisite. Business habits are of little avail, unless accompanied with prudence and economy. Perfection cannot be otherwise attained, but antecedents might always be consulted with advantage; and at the expense of a smile I venture to assert that good farmers are bred as true to stock as their horses or sheep. Through a long life I have observed that, in most instances, farming propensities descend from father to son; and wherever good management and order have been imbibed in early youth, that they became continuous throughout after life to the end. We now come to consider a most important item in the economy of management of an estate, for it cannot be expected that capital will be directed into any channel unless with the prospect of realising profit upon its investment; and to obtain its service effectually, security must be given by the owner, of such a nature as will enable the tenant to look forward with certainty of undisturbed enjoyment of his occupation long enough to enable him again to realise it, or in the event of his occupation being disturbed, of being paid for his permanent improvements in proportion as they may not have been exhausted. And I may be allowed to say emphatically, that it is as much the landlord's interest to render the tenant secure in his occupation, as it is necessary and beneficial for the tenant to become so. Land cannot be well cultivated without a large investment of capital, and unless made by the landlord in part, the tenant must make it entirely himself; and in explanation I state that in the heavy land districts of Essex and other counties instances have come under my observation of £15 per acre and upwards having been invested by the tenant in the first year of his term by draining, chalking, and following the land only, and at a time when the marketable value of the land did not itself exceed £20 per acre. And these are not solitary instances; for in ordinary cases, where draining is done by the tenant, and chalking, marling, or other expensive inorganic manures are also supplied, the cost of these two items alone will frequently amount to £10 per acre; so in converting woodland, the grubbing and bringing it into cultivation amount to from £15 to £20 per acre, notwithstanding which tenants are found who will undertake such business without any security beyond that which they have ordinarily upon the farm

lands adjoining. Whoever has been engaged in the management of estates must have witnessed at the end of a lease the discrepancy in the respective state and condition in which farms are quitted. Upon two that have come under my own management, within the last six months, the landlords have lost one entire year's rent, and have been compelled to take a moiety of a fair rent for seven years to come, besides having to restore the premises at an enormous outlay. The estimated damages sustained upon one of these, of 180 acres only, has been sworn to exceed £1000, and upon the other heavy damages have already been awarded. I mention these instances as preparatory to what I have to advance, and to show that security is absolutely necessary on the part of the landlord against *bad* management, as it is for the tenant to ensure him compensation for his improvements, and good management. In corroboration of the foregoing observations I will now give two quotations from two different authors at periods of 200 years apart; the first from a work called, "The English Improver Improved; or, the Survey of Husbandry Surveyed, by Walter Blith, a Lover of Ingenuity, 1653." In the epistle dedicatory, he states that "the first prejudice to the improvement of land is, that if a tenant be at never so great pains and costs for the improvement of his land, he thereby doth but occasion a greater rack upon himself, or else invests his landlord into his cost or labour gratis, or at best lies at his landlord's mercy for requital, which occasions a neglect of good husbandry to his own, the land, the landlord, and the commonwealth suffering. Now this I humbly conceive may be removed, if there were a law enacted by which every landlord should be obliged either to give him reasonable allowance for his clear improvement, or else suffer him or his to enjoy it so much longer as till he hath a proportionate requital. In Flanders and elsewhere, in hiring land upon leases, if the farmer improve to such a rate above the present value, the landlord gives him either so many years' purchase for it, or allows him a part of it, or confirms more time, &c. Some tenants have advanced land from £20 to £40 per annum, and, depending upon the landlord's favour, have been wiped of all; and many farmers by this uncertainty have been impoverished, and left under great disgrace, which might as well have been advanced." The other observations are from the able pen of Professor Low, in his work on landed property, who says: "The management of a farm, when let, is entrusted to the tenant during the period of his possession. If the tenant consults his interest truly, he will manage the farm in the best way to increase or maintain its productiveness; but this want of knowledge may cause him to mistake the proper means, and his interest, either real or apparent, and even his necessities, may lead him to take more from the farm entrusted to him than tends to the preservation of its productiveness; and especially towards the close of the term, when his interests and those of the landlord begin to separate. To guard against these results, is the legitimate purpose of the written contract, which shall give to the one party the rights necessary to enable him to carry on his business, and to the other a legal security that these rights shall not be employed for other ends than those contemplated by the parties to the contract. To render the terms of the lease subservient to these ends, it is not necessary to multiply too greatly conditions, penalties, and restrictions, which serve but to perplex the lessee, and to give birth to questions, none of which need to occur under a well-considered contract. The essential conditions should be fair to *both parties*—few, simple, and easily understood and complied with; and so expressed, that no reasonable doubt with regard to the meaning of the parties shall arise." The ordinary defects of leases are of two kinds—either the tenant is fettered by a mass of cumbersome and useless restrictions, which take from him the power of exercising his judgment, and adapting his management to the circumstances that may arise; or else the stipulations are so indefinite and lax that the tenant is left with a power which he cannot exercise without injury to the landlord's interest or his own, and which, upon every change of tenants, tends to a deterioration of the farm. Sometimes we find the errors of one lease copied servilely into the next, as if agriculture had remained stationary for a hundred years or more: sometimes we find rules of cultivation laid down and enforced by a mass of penalties, which even the courts of law refuse to sanction, and these rules founded, not upon the best, but upon the worst modes.

The knowledge of improved farming is of slow growth, and the value of what is new can for the most part only be made known by the gradual progress of conviction, derived from experience. But although a landlord cannot at once teach an ignorant and prejudiced tenantry what is good, he may give a better direction to their industry by restraining them from doing what is wrong. This is practically easy in laying down an improved course of good husbandry, or at least to impose such restraining conditions as shall prevent the tenant from following one that is bad. This indeed, will not make a good farmer; but it is one step, and no inconsiderable one, in the progress of improvement. As regards draining, it is absolutely necessary that it should be executed in the first instance, and ought to be considered the foundation of all future improvements—the key-stone of the arch in the one sense, the support of the whole fabric in another; and where it is determined upon as necessary, a careful and judicious survey should immediately take place, the nature of the soil should be carefully ascertained, and the depth and direction of the drains determined upon. It would be impossible for me to define how this is to be accomplished; but I may be allowed to submit, inasmuch as scarcely two cases are similar, that the system to be adopted ought to be such as to meet the case in question. I have no hesitation in stating it as my opinion that capital has been sunk to an enormous amount upon many estates from adopting the parliamentary system. Heavy clay, tender loam, gravel, absorbent and retentive subsoils, varying in every shade and character upon the same estate, have all been treated in a similar manner—the same depth of drain, the same distance apart, like the quack advertised nostrums of the day, have been recommended as suitable in every description of case, however unlike in character, or different as regarded their intensity. Upon one estate under my own especial notice, the rental has been increased 9s. per acre. The outfalls have been opened five to six feet in depth, and seven feet wide at the surface; the consequence is that land-slips have taken place to such an extent that the outfalls have collapsed and the drains throughout have become obstructed: and in various portions attempts have been made to cause the water to run the contrary way; but however weak it may be considered by spirit-drinkers, it has never yet been found weak enough yet to run up a hill. That due inquiry is necessary previous to draining an estate must be obvious; for admitting that four feet in depth is the minimum allowed under Government grants, and that three feet would effect the object, still the depth of four feet might be advantageous as regards durability, and probably the expenditure of the extra depth might be regained by extra durability; but to assume thirty feet as the distance universally necessary apart, or that of any other less or greater distance, is so absurd as not to be dwelt upon. I was lately convinced of this from an inspection of the estate of Lord Berners, known as the Keythorpe Estate, in the county of Leicester. It was my good fortune to inspect a large portion of that estate after the rain which took place in the first week of November had fallen, almost without intermission, nearly sixty hours, and when the whole district was to a great extent submerged in water. Not a bucket-full was seen upon any drained portion of this estate, and within six hours after the rain had subsided a ploughing match was taking place upon strong clay land, without the slightest interruption from excess of moisture; whilst within a hundred yards of the ploughmen a draining match was taking place, where the discharge of water was so great that the drainers were literally working in a stream, exemplifying not only the successful result of the system, but exhibiting a triumph of mind over matter to an astonishing extent; and as other gentlemen are in this room who attended me on that experimental trip, I must appeal to them in confirmation of my statement. This estate has been drained by his lordship systematically; and the nature of the subsoil having been first determined by Mr. Trimmer, the geologist, a method of draining very large portions by the application of few drains was resorted to and succeeded. I can better describe it by supposing a succession of alternate ridges and furrows in a tenacious clay subsoil, varying from 10 to 100 yards apart, being filled in between them by a porous soil of unequal tenacity, but from these furrows having been found to extend in a certain direction parallel with each other, by cutting through them transversely, the clay to the depth of four

or more feet, all the intermediate space or underground furrow becomes drained. The direction of these underground ridges and furrows of clay are first ascertained by digging holes by way of trial four feet in depth and length, and by observing those which remain fullest of water at the lowest portion of the field. The principal drain is cut so near to them as to take off the whole of the water they contained, and if upon becoming emptied the nearest hole in a direction higher up the field became also drained, and so on with the other holes upwards in succession, all the intervening space might be considered sufficiently drained; and the same process, on being carried out by successive operations, and application, the estate became finally drained in a successful manner by the application of an infinitely smaller number of drains than usual. It must be recollected, however, that the surface strata vary considerably, so that no known application of geological science can determine with any degree of certainty either their depth, their inclination, or extent; but one example in a district applies to nearly the whole. All the porous and retentive strata vary alternately. Sometimes the retentive one is nearest the surface, but most frequently the porous one rises to it and rests upon the retentive one. In that case the water descends through it until it becomes resisted by the retentive stratum, and from not finding an outlet, can only pass off by gradual absorption, or by capillary action to the surface, where in process of time it becomes evaporated. The draining of this description of soil is obvious and sufficiently clear, so as not to require any particular observation. If drains are sufficiently deep to prevent the water rising within two feet of the surface, the drainage is effectual; but if the porous stratum is not more than five or six feet in depth, the most economical and effectual mode will be to sink the drains into the retentive stratum below, and thus large extents of surface may be drained by comparatively a limited number of drains. If, on the other hand, the retentive stratum lies above to the depth of several feet, the whole must be drained at such intervals and at such depths as will be sufficient to draw off the water from the soil sufficiently to prevent its interfering with the roots of plants. By reason of these alternate descriptions of strata cropping out upon the sides of hills, land springs are formed: the water sinking through the porous stratum, flows upon the surface of the retentive one, until it emerges upon the sides of the hill, at points parallel with each other upon nearly the same level. Now, in every one of these cases a different application of drainage should be carried out; and these observations applying to estates and large tracts of land together, renders it especially important that a true estimate of the character of the soil should in the first instance be obtained, or a large and unnecessary expense might be incurred. Having, therefore, determined the *principle*, the mode of accomplishing the object next presents itself—Whether at the cost of the landlord alone, or by the tenant, or by both landlord and tenant jointly. In cases where estates extensively require draining, tileries and kilns should be erected at suitable distances; the spare fire-wood of the estate could be thus beneficially applied, and the cost of manufacture economised, independent of diminishing carriage—another very important item—and it would, under all circumstances, be better to find the tenant pipes on his performing the labour and superintending the work. As, however, this is a department that requires a close superintendence, an overlooker should be appointed, whose business it should be to ascertain that each tenant gives a personal superintendence: nothing short of this ought to satisfy a landlord; and unless it can be obtained, the drains should be cut and filled by one party, and the tiles placed by another. Farmers practically know the hazard of intrusting labourers with the execution of the work; and as it rarely is discovered how badly it may have been executed until too late to remedy it, a constant superintendence should be exercised, to see that the work, from time to time, is well executed, and the proper fall of the drains preserved. The mere adjustment of the pipes is also a subject that will require the closest inspection, as from the pipes becoming warped in the process of manufacture, they will, unless great attention is paid, alter their position after the earth is again filled in, and obstruct the *continuous* hollow of the drain to such an extent as to destroy it altogether. And whether the advance of the capital necessary is made by Government or not, to defray the charges, it matters little, for I am enabled to point to estates where a large and what appears a lavish expenditure has been made,

but owing to the work not having been well executed, but little benefit to the estate has been derived. And I would here caution persons disposed to make large investments in such improvements to pause before they proceed, and first examine the nature of the soil; and if of a loose, porous, and variable quality, not to consider that permanency of action of the drains will for a long period of time be obtained without great risk of some of them failing, and that ultimately upon such soils the whole process may, in a few years, require renewing. Nor is it advisable to incur a very heavy expense if upon experience a cheaper method has been found to ensure the object; and I have not hastily come to this conclusion, as I know that systems prevail in Essex and the eastern counties, whereby the drainage is effectual, and most successful in operation upon an average of from 14 to 17 years, at a cost of £2 5s. per acre, and that very seldom it does not exceed 40s. per acre. Nor is it advisable to drain every description of land that may occasionally become overcharged with water; so long as the soil will absorb and carry it off effectually in the space of two or three days, little fear need be apprehended that any ill effects will happen to the crops, notwithstanding that the cultivation may occasionally become retarded; and upon grass land positive injury sometimes follows thorough drainage. It might doubtless become benefited by allowing stock to depasture upon it in wet seasons with less injury, but on the other hand it would grow less grass during the summer months. And so with some description of crops sown in the spring months, especially beans, it has been frequently observed that where the lands have been thoroughly drained, that they have not afterwards succeeded so well. I know that I am treading upon disputable ground by making these observations, but I have seen so much theoretically ascribed to draining that could not be established by practice, by some persons who profess to practise it as a science, but whose scientific knowledge, if it may be called such, must have been obtained in a very short space of time. This happens, however, with the application of every other discovery, wherein persons seek employment merely for their own advantage. The drainage being once effected requires continuous attention to maintain it in working order and efficiency, to secure which plans should be made of the estate, showing the position of every drain and outfall, which should be inspected at least once in every year, to see that no obstruction has taken place, and the outfalls should be thoroughly cleared to allow every drain to work freely as in the first instance; and to enable this readily to be executed, whenever the drains have not been carried out into brick cess-pools or headings, all the drains at the various places of delivery into the open outfalls should be finished with the pipes two feet in length, over which should be placed a piece of oak cut from the thick end of slabs, or of old oak posts, split up for the purpose, and which should be placed over the pipe, and project two or three inches, so that in after times, when requisite to clear the outfalls, the tool of the workman may readily detect the drain by striking upon the wood, without deranging the pipes. It is not, however, the province of myself to enter into further detail, seeing that by only merely dealing in generalities will absorb a greater portion of time than can well be bestowed upon the subject. If, however, the landlord is in a position to execute the work entirely, it might be carried out by a company of men working under a manager and assistants, who could give it constant attention; but, inasmuch as the tenant, under such circumstances, would not be sufficiently interested in obtaining a due performance of the work and of maintaining it afterwards in working efficiency, it must be apparent that the most effectual mode of producing such a result will be to give him a *direct interest* in the outlay, and by the finding the pipes, on the one hand, by the landlord, and the performing the labour on the other by the tenant, a fair adjustment of the cost will follow, provided the tenant's interest is secured to such an extent as to enable him to repay himself his investment on account of the cost of labour bestowed by him. The ordinary charge per acre for thorough draining ought not to exceed 5*l.* per acre; but if judiciously proceeded upon, and carefully executed, would not exceed 4*l.* in ordinary cases. This may be assumed an equivalent to 5s. upon the rental in the one case of the landlord executing the work solely, and 2s. 6d. in the other of the tenant assisting. The repair of farm buildings, gates, &c., perhaps, is better maintained by the landlord and tenant jointly—the landlord finding materials, and the tenant paying the labour attendant

upon their application; but inasmuch as the conversion of timber is not economically carried out by tenants, the timber for gates, fences, and such portions of boards and scantling as are requisite, should be supplied ready sawn to the tenant, the cost of such preparation to be paid at its prime cost by him. In such cases the application of steam-power may be made available upon large estates to such an extent as to reduce the cost of conversion materially, thereby lessening the cost to the mutual advantage of both parties. Much discrepancy has arisen by tenants not having their duties clearly defined as regards repairs. The wear-and-tear of farm buildings is great, and so far as the external portion of repair extends should be executed by the tenant; but the substantial portion, consisting of the frame work of buildings, should be considered as the landlord's duty to support and maintain; the tenantable portion, consisting of all external covering, either of weatherboard, plaster, walls, tiling, slating, thatching, &c., appertaining to the tenant to keep in good order and repair, after having first been delivered over to him in proper state of repair at the commencement of his term. The same will also apply to gates, stiles, bridges, fences, and such other things as may be called attached fixtures, the tenant from time to time repairing them as may become requisite, the element of time always being considered at the termination of a lease as a set off under which he is finally entitled to deduction. As painting and tarring for the future preservation of buildings is expressly a consideration for the landlord's benefit, the materials, therefore, ought to be found by him. I now come to consider a most material point that has been long mooted, but still remains unsettled, although upon the face of it we might hardly consider that two opinions ought to exist. It frequently happens that tenants require extra buildings to those erected, for properly conducting their farm operations, and should they erect them (unless in a particular mode), they would, in point of law, be considered to have become attached to the freehold, and could not be removed at the expiration of a lease by the tenant. This appears so unreasonable and unjust, that it requires no comment on my part, except to consider how this objectionable procedure may be obviated. If the materials have been supplied by the tenant entirely, it ought in the outset to become matter of agreement on the part of the landlord that the tenant should have power to remove such buildings as he may have erected at the end of his term, if the landlord should refuse to take them at what they might be considered worth to remove, the tenant in every case making good any damage that might be caused by their removal. Further than this, the landlord ought not to be called upon to perform, as it would be equally absurd that he should pay for the freaks of a tenant imbued with a building mania, as that the tenant should leave all the erections which he might have put up, and which might be absolutely necessary for the due management of the business, without compensation. And in carrying out estimates of the unexpended improvements, they ought to be calculated in relation to their cost, upon the principle of arithmetical progression; not, however, to extend over more than five years—as every landlord has a right to calculate, at the time he secures a tenant, that he will, in ordinary phrase, become an *improving tenant*—or, in plain terms, that the general condition and cultivation of the estate will become improved under his management. But it too frequently happens in leases of 14 years, or even of longer duration, that the tenant not only ceases to improve his occupation during the last four or five years of his tenancy, but actually exhausts the improvements he had previously made during the first portion of his lease; so that at its expiration the farm is left in no better condition than when he entered upon it, and is frequently reduced to a worse state than that in which he found it. This generally arises from a mistaken idea on the part of the tenant that he may, in consequence of the improved state and condition of the farm, be called upon to pay an increased rent, at the time of making a new contract, or that others may be induced to offer a larger sum than he may be willing to give. It is needless to dwell upon the subject of such improvident modes having existence, and it is to obviate them in some measure that my attention will be directed in forming the covenants of a lease to meet such objections. In framing a lease, the first essential point to ascertain is the amount of rent that ought to be paid, upon the assumption of a certain price that wheat and other produce may realize upon an average of years during its continuance;

but, as human foresight never could anticipate events, so it never will be able to anticipate prices. Peace or war, productive or unproductive seasons, the influx or withdrawal of the precious metals, an extensive or limited importation of grain, and the gradual increase of the population—all must tend greatly to operate upon the value of farm produce and the cost of labour; therefore, if a fixed rent is resorted to for a series of years to come, it may tend greatly to the injury of the landlord or tenant respectively. But, inasmuch as the cultivation and in improvement of land require considerable investment, which must take many after-years to repay, it is presumed that no prudent tenant would risk a large amount of capital, without some description of written document to secure him against loss by the landlord suddenly ending his occupation. This can only be effected by giving the tenant a lease for one or more years, containing the stipulations as regards cultivation, and an undertaking upon the part of the landlord to pay for unexpended improvements by valuation, should he afterwards disturb the occupation of the tenant, of which intention notice sufficiently long beforehand should be given, to enable him to obtain another crop from the farm beyond that already in process of production; or, what would be far preferable, a lease should be granted for a certain number of years, determinable, after the two first periods, every fifth or seventh year, and should the landlord determine the tenancy, then all the improvements of a permanent character made in the last period should be paid for by valuation in proportion as they might remain unexpended. This would ensure upon an estate continuous and progressive improvement, and would secure an adequate rental to the landlord, as well as protect the tenant from sudden changes in the value of produce. The amount of rent so to be paid should be made to consist of one moiety to be rendered in money, and the other moiety to be dependent upon the value of wheat, or such other staple produce of the farm as may be considered advisable. This mode has in my own practice been adopted and found to work beneficially, and for this reason, that if the rent of land should be dependent entirely upon the value of produce, the fluctuations may be greater than either party may be able to easily meet or easily overcome. The prices in a district are rarely dependent upon the production of that particular district; but, upon the other hand, are governed by the supply and demand of the kingdom at large. The crops may generally be productive throughout the kingdom in any particular year, but may in the particular district in which the farm is situated become blighted and of inferior description, and therefore, if the rent was altogether governed by the price of grain, the tenant would have a higher amount to pay with a smaller amount of produce, which, when calculated into money value, is the most simple and efficacious mode of fixing the amount to be afterwards rendered. As, however, the rent to be derived should have a relation to the value of produce, it has in some cases been obtained by adding the averages of the two preceding years to that of the current year, and by taking the mean average of the three years the value of the farm for the current year would be ascertained, and so on to the expiration of the term, taking off the first year of the series and substituting the last year in its place. In fixing a rent permanently it must ever be borne in mind that it ought to be based upon the supposed value that produce will realise during the term, and in that case the stipulations as regards a corn rent should be introduced to guard against any sudden or great fluctuations in any given year or years, but this may be obviated in various ways beyond those specified; for instance, assuming in the year that the farm is hired that the average price of wheat would be 50s. per qr. for the next five years, for every advance of 5s. per quarter the advance in rent upon wheat-growing farms might fairly be enhanced one-sixteenth of the original rent, so that if the rent originally agreed upon was 29s. per acre with wheat at 50s., at 55s. it would be 29s. 9d., and so on 1s. 9d. additional for every 5s. advance on the price of wheat until the rent had reached the maximum of 80s. per qr., or had fallen to the minimum of 40s. per qr. Whichever mode might be adopted should become the established practice upon the estate, so far as the farms might consist principally of arable land, and all other covenants so far as they could be brought to apply upon the respective farms should be also similar. The covenants regulating the tenant's quitting and mode of payment for his fallows, hay, straw, manure, seeds, &c., should be all reduced to one principle, so that not only the tenant quit-

ting, but the tenant hiring the farm should have a clear understanding of the principle beforehand. *Liberal* covenants will be certain to secure *improving* tenants, and wherever the landlord carries out a liberal course of treatment he will find his estate yearly increasing in value, and his rent ultimately augmented at intervals of hiring; whereas by a contrary system estates are certain not to improve, if they possibly escape deterioration, buildings become dilapidated, soil becomes foul and exhausted, and landlord and tenant too frequently become engulfed in one common ruin. It would be impossible for me to enter to any extent into the nature of covenants introduced to protect the tenant from annoyance, or to secure the landlord from injury, by his improper management of the farm. As regards the latter, they should extend to the preservation of timber, pasture, fences, and erections upon the estate, from direct or indirect injury by the tenant, as well as for the proper management and tillage of the soil: these points are now, for the most part, guarded by the infliction upon the tenant of increased rents, payable during the remainder of the term upon each and every acre that may be mismanaged. But in the adoption of covenants of this nature, the amount should be adjusted so as to meet wilful and direct acts of mismanagement differently from those that may happen casually or inadvertently. Thus, for the breaking up and converting to tillage old pasture land, the sum should be sufficiently high as to deter the tenant from attempting it. The same as regards timber; but as regards the management of the land, the sum imposed ought not to be more than double rent, in addition to the current rent, and if not repeated, should be determined by the first payment. It is preposterously absurd to inflict a penalty of £10 per acre, by way of increased rent, throughout and to the end of a term, for the merely taking two white straw crops in succession, or selling off a few loads of roots or vegetables. Keeping the protection of the estate in view is one thing; proposing penalties which if inflicted would be ruinous to the tenant, is another, and must be found, as in case of punishment of minor offences by heavy inflictions, not to attain the end sought, or to prevent a repetition of the offences in others, to be useless. Leases in accordance with their present forms ought to be abolished; old and abstruse covenants that existed 300 years ago ought not to be admitted. Who that has ever read a lease ever failed in finding a long and explicit covenant against growing pernicious weeds, such as flax, hemp, woad, colesseed, and even *potatoes*? Some author, in giving a definition of dirt, states that it is something out of its right place. Coal and London mud would be dirt upon a lady's dress; flour and lime would soil a black cloth coat; but each in its *proper* place would be considered something better. So growing potatoes, made an exception in a lease, are classed with pernicious weeds, for no other reason than because they require farm-yard manure to produce them, and do not return any straw for its reproduction. And as lawyers consider the straw, when grown, to be the landlord's property, they have placed potatoes in the list before enumerated, putting as it were the square peg into the round hole, and which becomes apparent to every one that it does not fit. So also of root-crops, mangold wurtzel, awede and common turnips, as well as cabbages, vetches, &c.—a tenant is by present leases restricted from selling them off the farm, although he may be permitted to sell hay and straw, upon bringing back what is termed an *equivalent* in manure, to meet the deficiency produced in that article by the removal of the before-mentioned produce. And might not something of the same character be made applicable upon the disposal of green crops as well as roots of every description? It is very true that, when these clauses were first established, equivalent manure could not be produced to meet the demand consequent upon their removal in large quantities from the farm. But any dispassionate observer must feel convinced that the period has passed away wherein such restrictions are longer necessary; for instance, should a tenant in the first instance purchase guano or artificial manure to produce root or vegetable crops, he ought in justice and fairness to be allowed to sell root crops to the amount of the cost of such manure so brought on the farm for their production; or, upon selling them, that he should return as much manure to the farm as would reproduce them. All these things should now be put upon the footing of other commercial transactions, and full scope ought to be given to the tenant for the exercise of his talent in the cultivation of the land, and remuneration of himself for his skill and

capital employed. The covenants applicable to the quitting of farms are as numerous almost as the districts in which they prevail. They ought, however, to be governed by one principle—that of a fair adjustment betwixt landlord and tenant. The tenant being under the necessity of maintaining his farm in good cultivation until the termination of his lease, should have full power given him to work the fallows and do other team work, for which he should afterwards be paid by valuation. He should also be allowed for his expenditure towards procuring root crops—should be paid for his seed and grasses, for his hay at what it would be fairly worth at market (less the marketing expenses), and the value of the equivalent manure to be restored under the covenant. He should also be paid for his interest in the last year's straw, at its feeding value; but as that amount always is undefined, a sum per acre should be stated in the lease for wheat and other descriptions of straw, which in fairness ought to be half the marketable value of each. In cases where the entry is in April or March, the mode must be adapted to the end; but as I am now speaking of what ought to be upon a well-managed estate, I have no hesitation in stating that Michaelmas tenancies are attended with far less inconvenience than those occurring in the spring, reserving however the right of the incoming tenant to enter upon the lands immediately after harvest is concluded, upon all such fields coming in regular course for root crops in the succeeding year. I feel certain that, however perfect such mode may be rendered, it will not meet the views of all farmers; but I am rather attempting to adjust the discrepancies that already exist than of creating new fallacies, or of carrying out any particular theory. I have omitted to touch upon a subject connected with the landlord's interest materially, viz., the manure arising in the last year of the tenancy. In some cases it belongs to the landlord without compensation; in others, the labour only upon carting out is allowed the tenant. I must, however, recommend that the most general practice should be adhered to, of its remaining the property of the tenant, who should not be allowed to remove it, but that it should be taken by valuation by the landlord at the expiration of the term, and if oilcake has been expended in the last year, that one-third of the cost should be allowed in addition. I am, however, of opinion that the tenant should have no claim for any manure whatever beyond that left in heaps or applied for the production of root and other crops of the current year, or that may have been applied to the clover or artificial grasses only once mown; in that case the amount might be stated at one-third of the original cost. Then comes another important item applicable to all tenancies—the state of repair under which the buildings are left. If the landlord, as at first suggested, takes the repairs entirely upon himself, and charges the tenant with a moiety of the labour only, little need be offered beyond stating that the tenant is not to be charged with any restoration of buildings beyond their immediate requirement externally. Every tenant is entitled to fair use of the premises, the defects by time constituting in law terms "fair wear and tear." He should be bound to keep and maintain the buildings, gates, and fences in perfect order, but should not be called upon to restore any portion of the external covering, however worn, so long as it excluded the weather from injuring the internal framework of the buildings; but if, by the removal or decay of the external covering, the framework had become injured, then he might be called upon to restore it also. It is not, however, to be understood that a tenant would be liable to anything beyond dilapidations, repairs which are frequently confounded with those belonging to the landlord. A portion of weatherboarding upon a building might be so worn as to require restoring for the further preservation of the building; but if every board was perfect and in its proper place, an outgoing tenant, under the ordinary covenant, would not be called upon to restore it; and so of gates, stiles, fences, &c., all should be perfect, however old and worn they might be. I shall not digress longer upon the subject which may not be considered directly applicable, but inasmuch as every landlord in adjusting the management of his estate would have a multifarious description of existing customs to contend with, it therefore is the mode of adjustment of that system that I am endeavouring to promulgate. It is the custom upon many estates to encumber the tenants with various payments in kind; some landlords exact a fat goose at Michaelmas and a fat Turkey at Christmas, to

the great dissatisfaction of the farmer's wife, who would in nine cases out of ten feel great pleasure in sending them gratuitously, but who measures these exactions at double their value. Other leases call upon the tenant to do a certain amount of team work annually by carting coals, timber, or by supplying straw, &c.; but all such customs ought to be abolished, and the rents reduced to a money payment. It will prevent much trickery, and place the landlord and tenant in relation to each other upon better terms than could be attained by such various descriptions of payments, which frequently tend to very disagreeable results. In one case within my knowledge, the farm work, amounting to several days in the year upon each farm, had not been demanded for several years together; but upon the decease of the landlord, his son called upon all the tenants, to render the farm work in arrear, either in money or kind, and which, although complied with, produced disagreeable feelings between them at the outset. Another subject I have hitherto not adverted to, and that is as regards the preservation and restrictions upon killing game. This is a point that deserves consideration upon the part of the tenant at the time of entering upon the farm. If the landlord has reserved the exclusive right to the game, the tenant has no right whatever to interfere, but ought in the first instance to have calculated the disadvantages, and have subtracted them from the rent. It is useless to endeavour to supersede this right; the depriving the landlord of it would be, in his estimation, depriving him of the best portion of his estate. I will, however, suggest that upon ordinary farms the landlord will find it his interest to allow the tenant to participate with him in the game, if not in the sporting; but if the tenant is desirous of participating in both, it is very desirable that concession should be granted. Upon estates where game is strictly preserved, the tenants are ever coming into contact with gamekeepers. These persons exercise their "little brief authority" with no ordinary degree of severity, that becomes unendurable. They also have the power of reaching the ear of the landlord, and frequently are not scrupulous in their communications. Wherever this is the case, feelings are engendered that are not easily allayed, the *quid pro quo* system becomes secretly carried out, and the progress of an estate so greatly impeded, that the benefit derived by excluding the tenants entirely is obtained at a greater sacrifice than is generally imagined. I have thus briefly touched upon most of the points that have occurred to me as necessary, touching the relations of landlord and tenant. There will be, as there always has been, a great diversity of opinion upon all these subjects, and without pretending to a clearer view of them than others, I may state that, throughout a long and extensive practice in the management, directly and indirectly, connected with landed property, I have observed the greatest inconvenience arise by reason of no systematic or beneficial plan being adopted in its detail and management. It too frequently happens that the persons having the management of estates know nothing whatever practically of what is requisite to produce full development of what is necessary to their improvement; encumbered with abstruse leases and obsolete covenants unnecessarily restricting the tenant at every point, it becomes difficult to establish another order of things. Upon such estates, men of capital and enterprise are debarred from entering into treaty for them; no leases may probably have been given, or, if given, may be so full of unnecessary restrictions as to render farming under them a task fraught with difficulty and disadvantage. Small enclosures, thickly studded with timber and fences, and shaded by plantations abounding with game, dilapidated and inconvenient farm buildings, and inferior roads, indicate the existence of ignorant and needy tenants and half-starved labourers; and, unfortunately, too many of us are enabled to point to such estates in the immediate localities in which we severally reside. But however this may prevail, thanks to the liberality of other landlords, who have become pioneers in the *advance of agriculture*—not only by their own example, but by the advantages they have offered to intelligent agriculturists—a revolution has been effected in a very short space of time upon their estates. We trust that such management is becoming the rule rather than the exception; and we also feel that it is so. Let us for one moment turn our attention to the estate of the late Mr. Coke, of Holkham, and trace the improvement that converted a barren rabbit-warren into a highly cultivated district, having farmers whose yearly returns exceeded those of

the petty princes of central Europe, or the rent-rolls of the landowners of important France. Before I conclude this address, I beg to offer a few remarks upon the state and condition of labourers in connection with an estate; and when it is considered that this humble but useful class is second to neither landlord nor tenant when estimated upon its immediate utility, I shall enter upon this portion of my task with infinite pleasure. I have long been an observer of their habits, and, as a humble labourer in the vineyard, have endeavoured to advance and ameliorate their condition; as I had seen and felt that, under the old poor-law, their independence had been compromised, and their position reduced to almost a state of serfdom. A labourer having the subsistence of his family entirely dependent upon the produce of his own labour, at no time more than barely sufficient for his support, would, of necessity, be compelled to seek assistance from the parish funds during sickness or absence of employment; and consequently, being compelled to reside within the parish or vicinity of his place of legal settlement, would have little chance of obtaining employment in a district remotely distant, or of procuring it at all, except during periods of extraordinary demand for labour; and therefore, from necessity, he becomes identified with the estate upon which circumstances have combined to place him. But at the same time, it must be borne in mind, that just in proportion as he might find a generous and intelligent landlord at the head of an estate, with enterprising and liberal tenants in its management, so proportionately would be the chance of his position becoming improved, and thence, indirectly, would the improvement of the estate become advanced. But as this advantage would depend greatly upon the landlord himself, I have felt it my duty to advert to it in a spirit that, I trust, hereafter, may to some extent become beneficial to that numerous and deserving class, to whom much has been imputed of late of tendencies to greater demoralisation than formerly, and which drunkenness, promoted by the introduction of beer-houses, has, to a great extent, been considered accelerated. To this I totally demur. I believe that the habits of the labourer, on the other hand, have become greatly improved. He has been better instructed, and consequently has become better informed; and although there are, as there always have been and will be, individual exceptions, there is less drunkenness exhibited, and a higher moral tone pervading his whole class, than has prevailed at any former period during the past fifty years. This I assert from my own experience and observation, and I believe I shall be borne out in my remarks by most of the members of this club. One fault he has in common, and which, allow me by way of digression to state, also applies more or less to all classes of Englishmen, who upon occasions of feasting or merry-making think that they do not end satisfactorily unless potations of drink are swallowed in excess, and if not exactly concluded by drunkenness, attended by excitement and rioting. But let it be recollected that this is a national failing, and I may add a national calamity, which it will take another century probably to eradicate. But it must be recollected that it does not occur with the majority of our labourers more than twice, or, at utmost, thrice in a year—unless with those who nightly frequent the beer-shop or ale-house, and who, as I before stated, constitute an exception. I may now be allowed to offer a few remarks upon this important subject, and by pointing out how it has been promoted and encouraged, shewn by introducing an opposite system, how to a great extent it may be mitigated. One of the main causes is the building of cottages by villages, with but limited accommodation in each for a family, and also without the necessary adjuncts of an oven, wholesome water, and garden-ground sufficient to engross the attention of the labourer during his leisure hours, or of becoming as it were a savings'-bank for the small deposits of labour that his family from day to day might be able to bestow. Besides, from the situations of such dwellings being congregated together, he may become necessitated to walk from two to three miles morning and evening from the place of residence to the place of employment. The remedy is obvious, and the advantage to be derived great. In proportion to the extent of the estate, let a certain number of cottages be erected upon the waste-corners of fields in the vicinity where water can be obtained, and, if possible, they should be easy of access from a hard road. Let every cottage contain two tenements, and each tenement four rooms, with not less than twenty square perches

of garden-ground to each, and, in conjunction with a moderate rent, the comfort to be derived by the labourer will be greater than could be obtained by his occupying any of the paltry description of dwellings found to prevail in large villages; and thus a foundation would be laid for a good labourer, and which can only be fully accomplished by rendering his position better than he could make it elsewhere, should he remove. Good cottages may be built in pairs at a cost of from £40 to £50 each; and by the erection of two of such tenements yearly, all that might be required would be progressively obtained, especially if assisted by a parochial distribution of rewards to the meritorious resident labourers of the district. Two especial seasons of jollity among them generally occur in each year—the harvest-home, obtained gratuitously at the master's table; and the largess feast, procured by the contributions of the tradesmen and farmers of the district. Over the former the farmer has the entire control; let him enter as he ought to do into the feelings of his labourers, preside at his own feast, and call upon them all to appear in their best attire; and having partaken of it, let him at a suitable hour close the proceedings. And as regards the largess feast, let him endeavour to impress upon them the importance of carrying it out in a rational manner, by bringing their wives and families to partake; and with a little such advice, and a little pecuniary assistance, I venture to say all would be easily accomplished. Another point on the part of the tenant requires consideration, and that is, on no account make the weekly payment on the Saturday evening. With the money in hand, and Sunday before them, the labourers are induced to assemble together at the alehouse, and expend their earnings; whereas, if paid on any other day of the week, such would frequently not be the case, as they could not afford to sit up late at night drinking and carousing, with the knowledge that their services would be required on the farm upon the following morning—and which, from being paid on Saturday evening, they have full opportunity of carrying into effect. I have thus far endeavoured to point out the necessity for a good understanding existing between landlord, tenant, and labourer. Without it, covenants and restrictions will be nugatory. An enterprising and intelligent tenant can be trusted to any extent; but a niggardly manager, with stinted means and lack of intelligence, would, if possible, be better got rid of by a direct sacrifice in money payment. In the present day the letting and hiring farms must be treated and carried out as any other commercial transaction. The large amount of capital necessary to render them productive demands to be secured to the tenant, and the necessity of the case must be met by such adaptation of means as will secure the end, and become conducive to a beneficial result: this can only be accomplished by sufficient capital becoming embarked, directed in the outlay by adequate skill, for ensuring such an object. If a landlord should be desirous of bringing his estate to perfection, he is certain to succeed best by allowing his tenants their fair share of the proceeds, and not to restrict them unnecessarily in their management by useless and obsolete covenants. These are made only to bind the selfish or to restrain the ignorant from injuring the estate confided to his management. It is folly to suppose that a tenant can be taught how to cultivate in a proper manner by such restrictions as regulate rotation and management. If a conviction has arisen that he really is not competent, it will very soon become apparent by the result; and, as before intimated, his place had better be filled as soon as possible by one capable of bringing out the capabilities of the land. I beg of you to recollect that I am endeavouring to show how an estate can be improved and brought into a high state of perfection. I am not treating the subject with any other view, and I feel there may be many that will consider my observations too severe, and perhaps uncalled for. I am aware that upon those extensive demesnes of our noble proprietors of many thousands of acres each, a kindly feeling has been carried out to the resident tenants and their successors for centuries; but at the same time that I admire the motive I deprecate the end, if it leads to *no improvement of their estates*, and more especially if it becomes the means of their depreciation. The interest of the commonwealth I hold to be paramount to every other consideration, nor can a landlord justify himself to his fellow-citizens if he neglects his duty, and suffers his estates to fall into dilapidation and impoverishment. This can only be prevented by bringing talent to bear upon every department. We all feel, because we all know,

that an army may be sacrificed by the incompetence of its commanders. So, whatever may be the attempts towards the improvement of an estate, they must be carried out by persons competent to give and to take directions. Upon many of our largest and most important estates the management and direction are frequently confided to some college or professional friend, who may have more time than money at command, and that alone his only qualification; in other cases, to professional agents, who know nothing whatever of the estate which they undertake to manage, and, probably, may have never seen, or, if seen, only by that cursory inspection that is sometimes obtained by a *road survey*, made on horseback, on a summer's day, at the edge of harvest, when improvements appeared to the casual observer to have been carried out to perfection, and which, from being extolled or applauded over the afternoon bottle, has led the owner to imbibe an idea that he had not only got a first-rate tenantry, but a first-rate agent to manage them. Depend upon it, nothing effectual will ever be obtained by such means. The rent-roll, it is very true, may be increased; but unless a corresponding return can, at the same time, be obtained from the soil, it will in the end be as a shadow that eludes the grasp of those who may have followed it as a substance. I know the prejudices that must be overcome before this *desideratum* can be obtained. Landlords, unfortunately, place little dependence upon their tenants, and are disposed to turn a deaf ear to their complaints. Tenants, on the other hand, are frequently found to impose upon their landlords, and at times to prefer unfounded complaints, and especially if they feel convinced that he has not sufficient experience or sagacity to detect them. This, so far, is natural; but it may be met by interposing agents of intelligence and practical knowledge, who are not only able to regulate and adjust the various business matters that come before them in a proper manner, but whose knowledge will be a guarantee against fraud and imposition. The agriculture of this country may well be said to be the boast of the nation and the admiration of the world. "We may," said an eloquent foreigner, "rival you in arms, in sciences, in arts and manufactures; but your agriculture is unrivalled, and with a people so enlightened and free, must remain so until the end of time." Complimentary as such language may be considered, it must to a certain extent be accepted as true. England is, however, but a large garden; the various farms are but divisions and borders, under various systems of management; her population large and increasing, and which happily estimates the value of good wheaten bread, and an abundance of it; the demand for meat by the middle and upper classes has rendered its production enormous; the improved system of management, by the introduction of root crops, has rendered arable land equal to grass land in its production of animal food, over and above an increased production of grain by the ordinary modes of cultivation; the production of one description of food has become subservient to the other; vegetables are converted into meat, to be again returned to the land by their proper application in the shape of manure; this in its turn reproduces grain in abundance, the straw of which is also rendered equivalent to the hay, for the uses of cattle and sheep. Production and reproduction thus follow each other in rapid succession, until the face of the country becomes transformed from barren and ill-cultivated farms, to rich waving fields of grain, and superlative roots and grasses: boundless flocks of sheep moulded in nature's best form, and herds of cattle of superlative excellence, become spread over the entire face of the country. "And who are the authors of all this plenty?" the inquirer seeks to learn. "The mind that directs, and the hands that execute," is the reply. And shall that mind be "cribbed and caged and confined?" and shall those hands not partake of the benefits they have produced? may be reasonably inquired; and if the barriers that have existed from the days of yore to the present time be but removed, the vigorous efforts that have already effected so much will in a few years turn that which is even now a garden into a terrestrial paradise.

Mr. B. WEBSTER (of Weston-super-Mare) said he could corroborate every word Mr. Baker had said with regard to the Keythorpe drainage. At agricultural meetings it had been customary for landlords to give advice to tenants; but he thought the time had now come for tenants to give advice to landlords. To sum up the points on which advice was required, he would say that tenants should recommend landlords first to make good roads on their

estates, as time and circumstances would permit; secondly, to set all stagnant water in motion, whether by opening main outlets or by under-draining all land that required it; thirdly, to erect the necessary farm-buildings for their tenants, pulling down or repairing old ones, and especially keeping in view the manufacture of manure; fourthly, to grub up all useless fences, and cut down all superfluous timber; fifthly, to plant for shelter—a most important point, and one much neglected in the colder districts of England; sixthly, to provide for a due supply of water on all feeding lands, and for irrigation where requisite and practicable; seventhly, to take care that tenants had an interest in keeping the land in good condition, and the buildings in repair; eighthly, to introduce good stock on their estates; ninthly, to interest themselves in the education of their tenants' sons; tenthly, to endeavour to improve the condition of the labourer and his habitation; eleventhly, to put a fair rent on the land, to take care that it was paid to the day, and not always to accept the tenant who promised to pay the most rent (Hear, hear); and lastly, if they preserved game, not to expect the tenant to keep it for nothing (Laughter.)

Mr. B. DENTON (of Stevenage) dissented from the opinion of Mr. Baker, that in the carrying out of improvements the landlord should find materials, and the tenant labour. And he put it to those present whether, as tenant farmers, they would not in all cases prefer that the landlord should make the requisite permanent improvements, charging them interest for the money expended? Situated as they were, it was impossible for tenants to find capital to execute permanent works. Leases, though very beneficial in proper hands, might be abused. He would not then make any remarks on the Keythorpe system of drainage, but would content himself with saying that he took exception to all that had been said by Mr. Baker with regard to it.

Mr. ACION (of the Temple) agreed with Mr. Baker as to written contracts, legal security, with conditions, restrictions, and covenants, being essential to the proper management of land and its further development; but he was rather surprised Mr. Baker did not allude to the great changes which had taken place in what is termed agricultural law within the last few years, so essential to contracts, whether by lease or the now more fashionable mode in high farming counties—tenant-right agreement. Mr. Baker made very slight allusion to tenant right generally; and as its correct definition, especially as it in great measure emanated from this club, was not given, perhaps it would be as well to state what it is. There is a custom in almost every county in England for works of common husbandry, which, in the absence of any agreement, the tenant is allowed to fall back upon; and from this circumstance, and in order to increase produce and support a new era of agricultural improvement, a modern tenant-right or claim has arisen, as in Lincolnshire and some few other counties, giving the out-going tenant a compensation for unexhausted improvements over and above those of common husbandry which he had before enjoyed, and of which he had not time of beneficially enjoying, considering the outlay of capital, skill, and labour employed in carrying out these extra improvements. Everything, then, depends upon stipulation, by either landlord or tenant, on entering a farm; and if public legislation has failed, owing to its creating a fixity of tenure, why not try private arrangements? although much good has been effected by the Landlord and Tenant Act, the 14th and 15th Vic., and other acts of inclosure and exchange, the enfranchisement of copyholds and the better management of church property, and of different other acts for the purpose of drainage. Improvements could never become general without some sort of security, so as to develop the capabilities of land, and so as to allow the tenant more liberal covenants; thus a tenant will be able to employ more labourers, and a better understanding will exist between landlord and tenant than at present, and the tenant will be able to do more for the labourer, and by increasing produce give a benefit to the community at large.

Mr. MERRI (of Tiptree) said there was one very singular omission in Mr. Baker's excellent paper: he did not hear the word "steam" in connection with the improvement of estates. If there were one improvement which more than any other was gradually and daily forcing itself on the attention of the agricultural public, it was the introduction of steam. A question had arisen with regard to the comparative

advantages of fixed engines and moveable ones; and he believed that those who had moveable engines had come to the conclusion that, except on very large and scattered farms, fixed engines were preferable. Having had a fixed one himself for ten years, he would observe that such an engine should not be kept merely for the purpose of thrashing corn, but should be applied to the grinding not only of their own corn, but of corn for the miller when he wanted wind or water—to the cutting of chaff, the crushing of oilcake, and the economising, as far as possible, of horse-labour. The use of steam was a matter of the greatest importance to agriculturists. If they could succeed in making one acre produce as much as two had done previously, the result would be a saving of one rent per acre, one rate, one tithe, and so on. He did not think it possible to lay down any fixed rule with regard to the relations of landlord and tenant. They knew very well that the best tenantry are those who could command landlords (laughter). In his own county there were persons who, being known as agricultural improvers, were sought for by landlords, and could command almost their own terms (Hear, hear).

Mr. WALTON (of Godsfield, Hants) said Mr. Baker, in his able discourse, had turned north and east, but had never come south and south-west, where he would have found cultivation in a very bad state, the couch being in many cases up to the knees, the principal cause of this being, in his opinion, want of security. Mr. Baker had laid it down that landlords should do such and such things. He (Mr. Walton) thought all that should be expected of them was that they should give comfortable dwellings, according to the size of the farm, and good sheds for the management of stock and the making of manure, leaving the tenant to pay rent for the naked land. There ought to be no restrictions as to what was grown on the land (laughter). Very lately Lord Stanley remarked that English farmers already produced sufficient food for a population of twenty millions, and that, with the aid of science, they could produce enough for sixty millions. He appeared to forget that increased production could not be obtained without increased capital: science alone would never secure it. It rested with the political and game-preserving landlords to determine whether the people of England should be fed out of the produce of their own soil, or out of that of foreign lands.

Mr. TRETHERY (of Silsoe, Beds) said, though he agreed with Mr. Baker that there was yet great room for development, he thought they might congratulate themselves on the fact that during the last ten or fifteen years there had been greater improvement in agriculture than in almost any other occupation (Hear, hear). One very important feature of that improvement was that mentioned by Mr. Mechi—namely, the use of steam. He thought all landowners and all land-agents who turned their attention to the erection of farm buildings would do well to give that subject careful consideration. More economy, he believed, would be found to result from steam than from almost any other system of management that could be pursued. The first step, Mr. Baker told them, in the improvement of estates, was the selection of a good tenantry. No doubt that view was correct; but it should be recollected that there were great difficulties in that respect, inasmuch as there was a feeling—and a very proper one—on the part of many landlords, that existing tenants, who, with their families, had perhaps occupied the land for generations, should not be lightly disturbed (Hear, hear). This feeling, though good in itself, was undoubtedly an obstacle to improvement. He thought it unreasonable to call upon tenants to make permanent improvements: they should, in his opinion, be made by the landlord. As to the landlord's finding material, and the tenant labour, it might sound very well in theory; but in practice he had always found it very inconvenient (Hear, hear). If improvements were made by the tenant, there should be a proper understanding before the work commenced. Everything should be done on a certain scale of charges, and not left for subsequent valuation. As regarded drainage, the system laid down by act of Parliament appeared to him a very good one, and he thought agriculturists generally would do well to accept the proffered boon (Hear, hear).

Mr. GIRDWOOD (of Pall Mall) could not agree with Mr. Baker, that farms ought never to be laid out for less than 200 acres of arable land. In practice there would be great difficulty in acting on such a rule; they all knew that for one tenant who occupied 400 acres of land, ten would be found occupying only 200. Up to a late period, the most highly-cultivated

farms in the Lothians of Scotland did not exceed the latter amount. He thought the best rule to lay down was that of trying to accommodate the size of farms to the means of those who had to cultivate them. After suitable tenants had been found, the next requisite was that the landlord should erect suitable buildings at his own expense, abundant means being available for that purpose, through the medium of parliamentary enactments. As regarded farm buildings, he must say that farmers could not have a proper respect for themselves while they lived in such buildings as were to be found in Gloucestershire, Wiltshire, Somersetshire, and Hampshire; and he repeated that proper buildings ought, in his opinion, to be provided by the landlord. He next came to drainage. Having inspected for the Government, he would assert that Mr. Baker was totally wrong in supposing that the only kind of drainage sanctioned under the parliamentary system was drainage four feet deep and thirty feet apart. It had never been the practice to apply such a rule to all kinds of land.

Mr. BAKER intimated that he had not intended to apply what he said on the subject solely to the parliamentary system.

Mr. GIRDWOOD said such certainly appeared to be the case, and knowing it to be an error, he had wished to correct it. He had himself sanctioned and passed drainage under 4 feet deep, where it was absolutely necessary that it should be less. He had passed drainage 5; 7, 8, 9, and 10 feet deep; and he had passed drainage 8, 10, 12, 14, 16, 20, and 60 yards apart. At Mr. Wilmot's, at Congleton, the drainage was 60 yards apart and 10 feet deep, and it was paid for with public money. The pipes used were glazed pipes of 6, 9, and 12 inches diameter. He thought the landlord should do all the draining, and the tenant merely pay interest for the outlay. As to giving tenants tiles, and leaving them to do the work, it was all nonsense. Four years ago, he saw tenants on the Duke of Cleveland's estate, in Shropshire, ploughing up tiles which had been buried by their predecessors (laughter).

Mr. SIDNEY (of Peckham) thought that in most of the conclusions of Mr. Baker they must all concur; what he found fault with was, that they were not addressed to an assembly of landlords as well as an assembly of tenants (Hear, hear). What was the origin of all the farming improvements of this country? What was the reason that they were in this respect superior to continental nations? It was to be sought in the conduct of improving landlords. The first great landlord who devoted his attention to the improvement of agriculture was Francis Duke of Bedford; who was followed by Mr. Coke, of Norfolk, and by Lord Yarborough. The estates which belonged to them were, he believed, on the whole, better cultivated than any others; and there was, on the whole, a better class of tenants there than almost anywhere else. And what else did they find there? Why, security of tenure. Wherever they found an enlightened landlord and security of tenure, they would find also good cultivation. He had ascertained from two tenant-farmers—one on the Holkham estate, the other on the Bedford estate—that without a penny being laid out on buildings, draining, or permanent improvements of any kind, they had £10 per acre invested in their farms. The average amount of capital invested in the farms of this country was, he believed, little more than £3 per acre ("Oh, oh!"). At all events, it must be admitted that the tenants of this country generally had not sufficient capital for the purposes of cultivation; and if their money were diverted to permanent improvements, the farm must to that extent be robbed.

Mr. JACKSON (of Cheshire) said, that county, which was for a long time considered backward in cultivation, had recently taken a leaf out of the book of the Central Farmers' Club. Discussions had taken place in the town-hall of Chester on the subject of the relations of landlord and tenant; and a committee had been formed, consisting of landlords, land-agents, and tenants; and the result had been very greatly to widen the liberties and improve the position of the tenant, quite compatibly with the security and interest of the landlord (Hear, hear). If any one wished to see the discussions, he could obtain a report of them from the office of the *Chester Courant*. As regarded leases, where there was a mutual desire for them on the part of landlord and tenant, they might of course be granted; but it should be borne in mind, that while leases had in some instances done immense good, they were open to objections on both sides, and that a system which suited one part of the country was not adapted to another.

He should be glad to see the example of Chester generally imitated; there, there had not been the slightest difficulty in getting landlords and tenants to meet together in perfect amity, and arrange terms mutually advantageous.

Mr. BONE (Chairman of the Avon and Stour Vale Club) said, as so much had been said against the cultivation in the south of England, he felt bound to observe that in the county of Dorset more artificial manure had been used per acre than in almost any other county in England. It appeared to be the prevalent impression of the meeting that the chief requisite for the development of estates was the securing a good tenantry; and further, that a good tenantry could not be obtained without adequate security for the investment of capital. How was security to be got? As a tenant-farmer, he had no hesitation in saying that the establishment of a tenant-right, founded on legal enactments, was now out of the question: there was no use in discussing the matter. But there was another sort of tenant-right which might be secured—he meant one to be set up between landlords and tenants themselves. If a tenant wanted to take a farm, and the landlord was indisposed to grant a lease, why should there not be, instead of a lease, a *bona fide* agreement on a definite basis? He admitted, however, that the best security for the tenant, and the best guarantee for improvement, would be a lease; and the term should, in his opinion, not be less than 21 years. (Hear, hear.)

Mr. BAKER, in reply, said with regard to the parliamentary system, his remarks, as commented on by Mr. Girdwood, had not been intended to state that the drainage under that system was all of the same width and depth; what he meant chiefly to convey was, that no drainage of less than four feet in depth was allowed.

Mr. GIRDWOOD said he had previously stated that drainage had been done at three feet in depth.

Mr. BAKER said he had certainly thought the lowest depth was four feet. He could mention an instance in which the parliamentary system had entirely failed. The rents had been raised 9s. an acre, and the tenants were leaving. In fact, the money had been expended with great disadvantage to the proprietor of the estate and his successor. He had seen a large amount of drainage executed at the cheap rate which he had stated that evening. For 40s. an acre land had been effectually drained for 15 or 16 years, and the process was repeated two or three times for the same amount that was expended on one pipe draining. He was not speaking of an isolated case, but of hundreds of thousands of acres. Mr. Smith of Deanston having doubted what he said on the subject, he invited him to visit the district; he did so, and afterwards said, that as far as he could judge, the land was permanently and effectually drained. He (Mr. Baker) maintained that there was no such thing as a permanent drain. As regarded the size of farms, Mr. Girdwood remarked that they were obliged to take tenants as they found them. That he admitted; but still he maintained that the farm which could be cultivated to the greatest advantage was one of 200 acres and upwards, it being impossible to employ an adequate force of men, horses, and machinery on one of smaller extent. The case of very small farms was peculiar. The man who farmed only 100 acres must go and work in the field himself, with the assistance of a labourer and a pair of horses. Such a man lived, not by his management but by his industry, and was therefore compelled to farm on different principles from those which regulated the conduct of larger farmers; and his observations led him to the conclusion that men of that class were fast wearing out. (Hear, hear.)

On the motion of Mr. BAKER, seconded by Mr. RUSSELL (of Chepstow), the following resolution was passed unanimously:—

"That the improvement of estates can only be successfully attained by the co-operation of landlord and tenant, the interests of both being secured by a written contract well considered and defined, and by having both landlord's and tenant's interest at the termination of the lease fairly secured."

On the motion of Mr. WALTON, seconded by Mr. PAIN (of Beds), thanks were voted to Mr. Baker for the able manner in which he had opened the discussion.

Thanks having been also accorded to the Chairman, on the proposal of Mr. GRAY (of Courteen), seconded by Mr. MECHI, for his conduct in presiding, the meeting broke up.

## THE ANNUAL DINNER.

On Thursday evening the Annual Club Dinner took place at Radley's Hotel, Bridge-street, Blackfriars, under the presidency of Mr. P. B. Shearer, the Chairman of the Club for the past year. About seventy gentlemen sat down, and among them were Lord Berners, Mr. R. Baker, Mr. Ramsay, Mr. Trethewey, Mr. R. Smith, Mr. J. Hudson (of Castleacre), Mr. Thomas, Mr. O. Wallis, Mr. B. Webster, Mr. Skelton, Mr. C. Johnson, Mr. Mechi, Mr. Tuxford, Mr. Jonas Webb, Mr. Williams, Mr. Girdwood, Mr. J. C. Nesbit, Mons. Robion de la Tréhouais, &c.

After the usual loyal and patriotic toasts,

The CHAIRMAN proposed "Success to the Central Farmers' Club of England." It was not necessary, he said, for him to assert the success of that Club; for it could hardly do otherwise than succeed. As surely as agriculture itself made progress, so surely must the Central Farmers' Club extend its usefulness, and enlarge the circle of its benefits (Hear, hear). As there were some members present who did not attend the annual general meeting held that day, and as there were many persons belonging to different parts of the country whom they might hope soon to enrol as members of the Club, he would read two or three extracts from the report which had just been presented by the committee:—

"The Committee can report with more than usual satisfaction on their experience of the past year. The call they made on their brother-members at the last general meeting has been ably answered. Since then seventy-six new members coming from all parts of the kingdom have been proposed and elected. This is the largest accession of strength the club has ever received in any one year, and its effects are proportionately encouraging for the future prospects of the society. There are already twenty-seven new members proposed for the ensuing year. \* \* \* The Committee can accordingly leave the balance sheet of the year, as passed by the auditors, to the examination of the members, feeling that it never showed the club to be in a better position than it is at present. As the means at their disposal increase, it will of course be the endeavour of the committee to add to the inducements for others of their friends to join; and they are glad to say they have still further proof of the good policy of publishing the reports of the discussion meetings. It is at the same time satisfactory to know that the subjects selected during the past season have been both appropriately timed, and well treated."

Such, then, was the present position of the Club, as described by those who were entrusted with its management. But it was not to the position of the Club itself alone that they must look—they must consider the benefit which it was instrumental in extending to agriculture generally throughout the kingdom (Hear). He himself believed—and he thought it was the opinion of most of those who had read their reports—that the Central Farmers' Club had assumed that year, and was likely to maintain a very superior position to that which it previously held (Hear, hear). He thought it would now really become what it ought to be—the great centre of communication for all other clubs (cheers). For that Club to pretend for one moment that it excelled other clubs as regarded science and eloquence, would be absurd; they had only to read the reports of other clubs to learn that the extension of knowledge was quite as great in them as in this Central Club. Without, however, a central point it would be impossible to direct the machinery of enlightenment in the manner in which it ought to be guided. (Hear, hear.) Hence he entertained very sanguine hopes with regard to the future career of that institution. There was every reason to believe that within a very few years at all events, perhaps within a year or two, the Central Farmers' Club would stand at the very highest point which such an institution could attain, and confer the most extensive benefits upon that great and important interest with which it was so closely connected. He would not take up any more of their time, but, coupling the toast with the name of the gentleman who last year read the admirable paper on the necessity of having a central farmer's club, he would at once propose "The Central Farmers' Club, and Mr. Ramsay." (Cheers.)

The toast having been duly responded to by the company,

Mr. RAMSAY rose to reply. He said it was highly gratifying to him, as it must have been to any man similarly honoured, who wished well to the interests of the Club, to have been so prominently noticed on that occasion. When, on the occasion

referred to by the Chairman, he used his humble efforts to prove the advantages which must arise from the existence of such a club as that, he little thought that within so short a period the club would assume its present position—the position of having recently enrolled no less than 76 new members, and of anticipating the accession of 27 more. (Cheers.) This showed that it had risen of late in the estimation of the agricultural body, and that its usefulness was becoming generally appreciated. (Hear, hear.) Whatever advantages the club might have conferred on agriculture before, there could be no doubt that those who had joined it within the last year, and those who contemplated entering its ranks, looked forward to its still greater advancement in usefulness; and probably they sought to become members with the idea that by adding strength in intellect and strength in money, they would aid the club in its efforts at improvement. (Hear, hear.) He could not believe for a moment that this feeling on the part of the agricultural body would undergo any abatement; on the contrary, he thought it must continue to be developed, and, remembering of whom the agricultural body was composed—that it embraced farmers, landlords, and members of Parliament—he could not but regard the support and prosperity of a club like that as absolutely certain. He claimed no merit for himself as the author of the paper referred to by the Chairman; but he believed that, with proper efforts on the part of its members, that club might be brought to the highest perfection, and placed at the head of all such institutions. This club had necessarily a wider field of operations than any other; and the more other clubs advanced, the more would this advance, and it would be regarded as the parent of all the rest. He was extremely gratified that the committee had adopted the practice of publishing the reports (Hear, hear). He never could imagine why this was not done earlier; but, instead of looking back to the mistakes of the past, they must consider what could be done in future, sustained and impelled by the conviction that the subsistence of the people depended in a great degree upon their efforts (Hear, hear). As regarded the demand for their produce, and the question of high prices or low prices, he need scarcely remark that, when there was a good demand for agricultural produce, the producer must be proportionately in a comfortable position (laughter). They had seen adverse times, and perhaps such times might return. Be this, however, as it might, no one could doubt that the interests of the people of this country required that agriculturists should exert themselves. For a long period they had not produced sufficient food for the subsistence of the community; and they must now endeavour, with the aid of science, to increase the amount of production. The production of the food of the country was a great object; and it was a delightful pursuit, when attended with the hope of reasonable prices (laughter). In connexion with that subject, he was gratified to find Lord Berners, and other influential men in both Houses of Parliament recognizing the necessity and value of statistics. It was their fault if they did not follow the example which was thus set (Hear, hear). Notwithstanding the great strides already made in agricultural knowledge, there was a great deal yet to be learnt. This was but the beginning of great events; and he hoped that, with judicious management, their club would prove the first in the world as an auxiliary in the march of agricultural improvement. In conclusion, he thanked them sincerely for the honour they had done him in drinking his health in connection with the toast of the Central Farmers' Club, and expressed his conviction that it must attain increased prosperity if its affairs continued to be conducted as they had been recently (cheers).

Lord BERNERS said, it was not only as a matter of duty, but as an act peculiarly gratifying to himself personally, that he now asked them to drink to the health of their worthy president Mr. Shearer (loud cheers). That gentleman was one of the oldest of their members; he had also been most attentive to the interests of the club (Hear). He (Lord Berners) derived additional pleasure, therefore, from that circumstance, in having the toast entrusted to him. He felt highly gratified at the report which his hon. friend had read to them with regard to the financial and general prosperity of the club, and he fervently joined in the aspiration of Mr. Ramsay, that it would become one of the most influential clubs in the country (cheers). Mr. Ramsay had made some allusion to agricultural statistics. His (Lord Berners') opinion respecting that subject was well known,

and had been formally placed upon record in another place. All he should say upon this occasion, therefore, was, that if in any way it was in his power to contribute to the welfare of the farmers of Great Britain, they might at all times command his services, whether as a member of the House of Lords, or in his capacity as a country gentleman (cheers). In addressing them on a similar occasion last year, he ventured to make a few observations upon the method at present adopted of taking the corn averages. The question, it was true, was not of so much importance now as formerly; but it was one which affected their interests to a certain degree, and it was impossible to say of what importance it might become hereafter. As an occupier of land, he could take upon himself to assert that the manner in which the averages were taken was extremely defective and imperfect. They were well aware that the tithe commutation was regulated by the averages, and those who, like himself, thought that the fair and honest system, as between landlord and tenant, was a corn rent, felt that it operated most unfairly. He would give them an instance. Only a fortnight ago he sent his bailiff to sell his corn at Leicester market; but upon his return he stated that he could not sell it unless he "made up the weight." Now, in the month of July last, he (Lord Berners) had upon his strong land in Leicestershire as fine a crop of wheat as any man could wish to see; but the storms came and knocked it down, and instead of getting six or seven quarters from the acre, the quantity as well as quality was very deficient. What happened? Why, that when the bailiff took the corn to market no buyer would purchase unless the weight was made up to 18 stone the sack. His wheat last year certainly had weighed 18 stone the sack; but this year he had to send no less than three extra sacks to make up the weight upon 36 sacks; and he complained of this system, that it led to fraud and produced erroneous impressions (Hear, hear). His was not a singular case of the sort; for the like cases were common in all directions, and in every part of the kingdom; and he thought it behoved the farmers of England and this club in particular to consider whether a legislative enactment should not be passed, to compel all parties to sell by one uniform scale of weight and measure (Hear, hear).

The toast was drunk with loud and prolonged cheers.

The CHAIRMAN said, it was impossible for him adequately to express his gratitude not only for the kind manner in which the toast had been proposed and received, but for the uniform kindness which he had met with in the discharge of his duties as Chairman of the club during the past year (cheers). He was surprised when he found himself selected for the office, but to the last hour of his life he should feel that he had been deeply honoured, and had received the greatest kindness at the hands of the members (renewed cheers).

Mr. B. WEBSTER said that all men now agreed in opinion that the agriculture of England had made considerable progress within the last few years; one of the chief causes of this was, that landed proprietors had wisely devoted their attention to the improvement of their estates, and the neighbourhood around them (Hear, hear). In the next place they found the best practical farmers combining "practice with science," and thinking nothing of expending thousands of pounds sterling in artificial manures and oil cake. He alluded to such men as his friend Mr. Hudson, of Castleacre, who sat near him (Hear, hear). Then there was another class of men who, going from the towns into the country, expended their capital in experiments, liberally diffused the benefits of the experiments which succeeded among the agricultural community, and paid for those which failed, without grumbling; and such was his other friend, Mr. Mechi (Hear, hear, and laughter). But besides these gentlemen they were also much indebted to the three great agricultural societies of the United Kingdom, without whose efforts he did not believe they would have been able to carry on their experiments, and do what they had done. He had great pleasure, therefore, in proposing "Success to the Royal Agricultural Society of England, the Highland Society of Scotland, and the Improvement Society of Ireland," and in asking them to drink "The Health of Mr. Robert Smith," a member of the council of the first-named body (loud cheers).

After a suitable response to the toast,

Mr. R. SMITH said, if other gentlemen whose names are coupled with toasts felt honoured, he surely ought to feel highly flattered at being called upon on that occasion to represent the three great national societies of the three kingdoms. Allusion had been made to his name more particularly in con-

nection with the Royal Agricultural Society. It was true he became an early member of that national institution, as he had also been of most local societies in neighbourhoods where he had happened to reside; but he did that only in common with many others, and he had certainly received his reward in being nominated a member of the Council of the Royal Agricultural Society. This was an honour which he felt deeply, and he hoped that while he filled that capacity he should endeavour to discharge the duty which he owed to the agricultural body. This was an important period in the history of agriculture. Although a young member of that institution, he could recollect a period when the show of the Smithfield Club was held in a yard in Goswell-street, when it was difficult to assemble half a dozen members of the committee, and when everything connected with agriculture was in a very low state of development. And, looking back to those times, he must say that, much as they had been abused, the farmers of England had been moving with the age (cheers). Who, moreover, ever heard in those days of an Irish Improvement Society? (Hear, hear.) Who ever heard even of the Royal Agricultural Society of England? From a little gathering in Goswell-street, aided by the energies of a few persevering men, sprang the great enterprise in Baker-street. The time at length arrived, too, when the late Lord Spencer proposed the formation for England of a Royal Agricultural Society, similar to the great institution which had done so much for Scotland. The result was, that such a society was formed; and this event was succeeded by the establishment of the Improvement Society of Ireland. Now these societies, he asserted, each had their merits; and though many men in that room could speak on those merits with far more ability than he could, no one was more sensible of their importance to agriculture. The Royal Agricultural Society of England had done much for this country. There were, he regretted to say, many who did not hesitate to find fault with and abuse it; but such persons little knew the difficulties which the council had to contend with, and many who grumbled did not come forward to uphold and support the society in the manner that they ought to do as English farmers. (Hear, hear.) Many persons were gratified at hearing that the society numbered some five or six thousand members. Why, it was a disgrace to Englishmen that its numbers were not ten times as great. (Hear, hear.) They heard complaints that it did not try to make improvements in this direction and in that, while, perhaps, those who indulged in such complaints did nothing themselves to assist its efforts. He hoped he should be excused for having exhibited a little warmth on the subject; but they might depend upon it that this was an important period in their lives, and that while they looked back with some degree of pleasure and satisfaction to the past, they should look forward with resolution and hope to the future. In common with Mr. Ramsay, he was delighted that there had been an accession of 76 members to the Club within the past year, and that 27 persons were awaiting admission; and he further hoped the time would soon arrive when, instead of their having to go to others to ask them to join the Club, others would come to them entreating them to enlarge the accommodation of the Club, in order to receive them. In conclusion, he would only say, with regard to the three societies included in the toast, that he hoped those whom he addressed would become members of one or other of them if they were not so already, and would give them their best support. (Cheers).

Mr. MECHI said he rose to propose the Central Agricultural Society of a neighbouring country with which our own was now happily in alliance—he meant France (cheers), coupling with the toast the name of a French gentleman who had recently become a member of that club, and who happily united in himself the three-fold position of a considerable agriculturist in France, a literary man, and a large purchaser of cattle in this country for exportation to his own—a man who was useful to the agriculture of England, and especially so to that of his own land. (Cheers). As had been remarked by Lord Berners, it became them on such occasions as that, instead of confining themselves to paying compliments to each other, to express their sentiments to some extent with regard to the position of agriculture. They had just been congratulated on the progress of agriculture now, compared with its position some time back. He, for one, did not think they were going to stop where they were. On the contrary, he

thought that if any of them were to come to that table half a century hence, they might find their successors wondering how they could have been such slow coaches (laughter). It was gratifying that within the last year an excellent opportunity had been afforded to them of seeing what was going on, on the other side of the water; and, as one of those who had availed themselves of it, he had great pleasure in acknowledging the urbanity and kindness of their neighbours, and the readiness which they had manifested to impart information (cheers). Next May there was to be an exhibition of live stock in Paris, and he hoped that many English breeders and farmers would attend on the occasion. Gentlemen who were not acquainted with France might require to be informed that the Central Agricultural Society of France in some respects was not like the Royal Agricultural Society of England. The number of its members was very limited; so limited, indeed, that it was supported principally by the French Government. It comprised among its members many men of great eminence in science; but he believed it was generally felt by those gentlemen themselves that it would be much better for the agriculture of France if it more resembled the English society, and were supported by the great body of the agriculturists of France (Hear, hear). However, though that was not the case at present, he had no doubt that would be one of the beneficial results of increased intercourse with this country. While he (Mr. Mechi) very often severely criticised British agriculture, and expressed his conviction that it fell far short of what it ought to be, and what he hoped it soon would be, he must say, founding his remark on the statements of some of the greatest authorities in France, that bad as the agriculture of England was, it was twice as good as that of their neighbours (laughter). In both countries, however, he hoped to witness great improvement.

The toast having been cordially received,

M. ROBIOU DE LA TREHONNAIS, who was received with loud cheers, said he considered it a very high privilege that the duty of responding to this toast should have devolved on him; but his gratification was somewhat diminished by the consciousness of his want of power to do it with the efficiency which the very flattering manner in which the toast had been proposed, and its own intrinsic value and importance demanded. They had drunk to the prosperity of the Central Agricultural Society of France in connection with his humble name. He must, however, admit that he was not connected with that society; he could, therefore, only answer in his own capacity as an humble representative of French agriculture rather than for the Central Agricultural Society of France, of which he confessed he knew very little. Unfortunately his country was very differently situated as regarded agriculture from this. In every district of England agricultural societies were established. Here there were central, national, and local societies, and all these were composed of the bones and sinews of the agricultural community (cheers). They were not composed merely of men appointed by the government (Hear, hear)—men who had distinguished themselves by writing deep and profound books, which no practical man could read (Hear, hear, and laughter). It was not of such men that the English agricultural societies were composed. No; but of the tillers of the soil, the tenant farmers (loud and protracted cheering). They were also often distinguished by the names of great men—names which every nation had need to be proud of (Hear, hear)—and these men, though not unfrequently elected as their presidents, were, notwithstanding their high social position, the glory of their ancestry, and the emblazoned distinctions which shone around them, well content and satisfied to take rank as members of those societies with their own tenant farmers (cheers). Happy was that country which could gather around the convivial board such an assembly as the one he then saw before him, in whose countenances he could perceive blended in happy delineation, the intellect of theory and the solidity of practice (cheers). Happy was that nation which could read in the annals of its agricultural history that noble array of names which commenced with Arthur Young, Bakewell, Collins, Bates, Lord Spencer, and Lord Ducie, and could point to such names in our own times as the Duke of Richmond, Lord Berners, Jonas Webb, and Mechi (much cheering). Happy was that country which exhibited the beautiful spectacle of all branches of the community, beginning at the first step of the throne, and going through every gradation of the social scale down to the humblest agricultural labourer,

uniting their efforts for the attainment of one end; all vying with one another, exerting their powers, and having no other rivalry than that of a desire to contribute the most to the cause of progress, in order to reach at last that high pinnacle of perfection to which English agriculture was speeding, and to which the energy of such men and such societies as he had mentioned could alone speed it (cheers). With regard to the union which so happily bound this country to his own—that that alliance would be permanent he felt confident (cheers). True, there might be times when difficulties would arise; when diplomatists might exchange angry notes, and grave plenipotentiaries advance what they called their “points” (Hear, hear, and laughter); but let them depend upon it, that the union and the bond of brotherhood which France and British heroes had signed on the Crimean shore with the point of the bayonet dipped in Russian blood would never be rent asunder (immense cheering). But we must look forward to something else besides the gratification of our patriotism and our patriotic pride. Military glory was, no doubt, well calculated to excite in one’s bosom the most exalted feelings of pride; but military glory was no boon to a community. (Hear, hear). And in passing through the streets of this huge metropolis how frequently did they perceive the mourning escutcheon affixed to the fronts of aristocratic mansions! What tale did that tell? (Hear). Hark to the wail of the widow and the orphan! Hark to the gloomy mutterings of hungry people demanding cheap food. Hark to the ominous and portentous associations of the labourers in manufacturing towns connected with strikes. These things told us, as thoughtful men, that military glory was no boon to the community (Hear, hear); but let us hope that, united in military glory, and in the power of destruction, the two nations might also be united in the power of production (loud cheers). Let us hope greater fruit from that union, and that the agriculture of France and of England might be so united that one day we should see French agriculture, which they were told was now so inferior to that of England, brought more and more within the vortex of that great and glorious movement which was speeding English agriculture to the highest pinnacle of perfection, and the agriculture of both countries in so happy a position that we might contemplate them as leaning arm in arm against one another in the dignified consciousness of a glorious equality (loud and prolonged cheers).

The CHAIRMAN next proposed “The Smithfield Club.” He observed that at this season of the year the show provided by that Club was the great attraction of London, and that the agriculturists of Great Britain generally, and the members of that Club in particular, ought to feel deeply indebted to the managers for the care which they had bestowed on the splendid exhibition of that week. The greatest praise of the Smithfield Club was to be found in the fact that it had so many imitators in different parts of the country. He regretted that the Birmingham Cattle Show was held in the same week as the metropolitan one; but, at all events, the midland counties had to thank the Smithfield Club for originating the idea of their exhibition; and he was happy to say that they had in fact acknowledged the great utility of the Smithfield Show, and their obligations to its promoters. In asking them to drink “The Smithfield Club,” he felt that he should greatly enhance the interest of the toast, and the cordiality of its reception, by coupling with it the name of a gentleman whom he had not the least hesitation in calling the first farmer in England—he meant Mr. Hudson, of Castleacre (cheers).

The toast having been drunk,

Mr. HUDSON said he begged to return thanks for the honour which had been conferred on himself personally, and on the committee of the Smithfield Club, of which he was a member. He was very much gratified that the exertions of the committee had secured the approbation of the company assembled; and considering the great numbers who visited the yard, he felt convinced that the Smithfield Club had secured a large share of public interest. A few years ago the cattle exhibited were condemned, on the ground that they were too fat; but the supply of food in this country was not so extravagantly large at present that they need be under any apprehension of being called to account for raising as large an amount of meat as they could on the smallest frame. (Hear, hear).

Mr. R. BAKER proposed “The Local Farmers’ Clubs.” There was, he said, a gentleman in the Club-room who had

recently obtained great honour in a neighbouring country, now happily in alliance with our own, he meant Mr. Jonas Webb (cheers). How did that gentleman first appear before the public? Why, as a member of a local farmers' club (Hear, hear). Beginning thus, he gradually acquired distinction in his own county, and latterly his fame as an English breeder had been diffused over the whole continent of Europe. The local farmers' clubs might be regarded as at once a cause and an effect of the proceedings of the London Farmers' Club; and the two, acting in unison, have done much towards bringing science to bear constantly and generally on the pursuits of agriculture. It was through local clubs that those who desired the general improvement of agriculture must seek to promote that great national object. He would couple with the toast the name of Mr. Lear, of the Arundel Club.

The toast having met with a due response,

Mr. LEAR returned thanks; and, in doing so, he took occasion to express regret that in his own district the local clubs were not now receiving so much support as they did formerly; adding, that he attributed the falling off to a complaint which he termed "£20 a load" (laughter); and that he supposed this evil would be cured by the return of adverse times (Hear, hear).

The CHAIRMAN then proposed "The health of Lord Berners," remarking that his lordship was one of the original founders of the Club, and that on occasions like that he had almost invariably honoured the members with his company.

The toast having met with a very cordial reception,

Lord BERNERS, in acknowledging the compliment paid him, said he had from his earliest youth taken the deepest interest in agriculture; and, having been brought up, if he might so express himself, in the school of which Mr. Hudson of Castleacre was a member, he meant the Holkham Sheep-shearing School, he had always endeavoured to carry out the principles which he was there taught, and which he thought ought to guide alike landlord and tenant. If he might allude to a subject which had just been disposed of, the proceedings of the Smithfield Club, he would, as Vice-president of that society, congratulate every member of it on the position which it then held. An attempt had been made in a certain quarter to set one class of agriculturists against another. He was utterly surprised, on his recent arrival in London, to see the Smithfield Club heralded before the world in the manner that it was, in the "leading journal;" he was astonished to find an attempt made there to draw distinction between the interests of the consumer, and those of the breeder and feeder. As a breeder and feeder, he knew perfectly well that the interests in question were identical, as those of landlord, tenant, and labourer were identical; they must all sink or swim together. He would not enter into an examination of the remarks to which he referred; but he would be sorry if the statement went forth to the smaller tenantry, with anything like the appearance of authority, that the farmers of England did not know how to breed their cattle, and that the Smithfield Club did not know what prizes they ought to offer. They were not to be dictated to by any person, or by any class of persons; they knew, he believed, what was best for the interests of agriculture, and in promoting the interests and prosperity of agriculture, they were promoting the interests and prosperity of this great kingdom (cheers). As their worthy Chairman had alluded to improvements which were being made on his (Lord Berners') estate, he would repeat what he had said formerly, that regretting, as he did, that his house would not accommodate a larger number at once, he should be happy to receive a visit from a party of five, ten, or fifteen members of this club, who might be disposed to examine the improvements referred to, in order to satisfy themselves as to their merits (Hear, hear).

Mr. Williams gave "The Committee," which was responded to by Mr. Cuthbert Johnson; Mr. Trethewy proposed "The Secretary," answered by Mr. Corbet; and the Chairman, "The Visitors," with which the company broke up.

#### THE ANNUAL GENERAL MEETING

took place on Thursday, B. P. Shearer, Esq., in the chair. Mr. Corbet, the Secretary, read the following report from the Committee, which was received and adopted:—

"The Committee can report with more than usual satisfaction on their experience of the past year. The call they made

on their brother Members at the last General Meeting has been ably answered. Since then seventy-six new Members, coming from all parts of the kingdom, have been proposed and elected. This is the largest accession of strength the Club has ever received in any one year, and its effects are proportionately encouraging for the future prospects of the Society. There are already twenty-seven new Members proposed for the ensuing year.

"One of the first and necessarily most important consequences of this additional strength is a material improvement in the financial condition of the Club. The Committee can accordingly leave the Balance Sheet of the year, as passed by the Auditors, to the examination of the Members, feeling that it never showed the Club to be in a better position than it is at present.

"As the means at their disposal increase, it will of course be the endeavour of the Committee to add to the inducements for others of their friends to join; and they are glad to say they have still further proof of the good policy of publishing the reports of the Discussion Meetings. It is at the same time satisfactory to know that the subjects selected during the past season have been both appropriately timed and well treated.

"The Committee can only further report that these Meetings have now a hold on the attention of the country, and that they shall feel obliged by their brother Members responding to the invitation, and increasing the list of subjects from which they have to select. As a Central Club, they would wish to give the claims and rights of agriculture the fullest hearing."

A discussion took place on the adoption of the report, when the following motion—proposed by Mr. Trethewy, and seconded by Mr. Bullock Webster—was put and carried: "That the Committee be requested to consider the expediency of obtaining such increased accommodation for the Members of the Club as their numbers and position require."

It was then moved by Mr. S. Skelton, seconded by Mr. Carter, and also carried: "That the following Members of the Club, with power to add to their number, be appointed to confer with the Committee on this subject—J. Bailey Denton, E. Purser, G. H. Ramsay, J. Thomas, and J. Wells."

The appointment of Mr. Robert Baker as a Trustee of the Club was confirmed.

Messrs. J. Bailey Denton, E. Purser, and J. Thomas were re-elected Auditors, and a vote of thanks passed to them for their services.

The names of the Committee going out by rotation were read, and the majority re-elected—Messrs. W. Crosskill, L. A. Coussmaker, J. Thomas (of Bletsoe), and J. A. Williams being elected to fill up the vacancies which occurred.

It was recommended to the Committee that for the future the discussion in the Smithfield week should be held on the Monday, and the dinner of the Club follow on the Tuesday.

The proceedings terminated with a vote of thanks to the Chairman.

IMPROVEMENT IN THE MANUFACTURE OF CHEESE.—Considerable interest was excited in Gloucester market by the exhibition of "apparatus for cutting, filtering, and pressing the curd, and for more readily and effectually separating the whey from the curd." The apparatus, which promises to be exceedingly useful in the manufacture of cheese, is the invention of Mr. Keevil, of Stroud Farm, Lacock, near Chippenham, Wilts. By the process hitherto observed, after the milk has stood to curd for one hour it is broken up with the "stirring stick," which generally badly bruises the curd, and separates much fat or whey cream from it—a source of complaint among the cheesefactors, and a continual and serious loss to the farmers. By the use of this apparatus these evils are entirely avoided; the curd with very trifling labour is cut sufficiently small, by means of a set of knives, which pass gently through the curd and cut it so cleanly that no whey, cream, or fat is separated from it. The cutting of the curd is thus effected with very little labour, no waste, and in such a simple manner that the most inexperienced dairy-maid can readily perform the operation. The labour and waste attendant upon the existing process of separating the whey from the curd, after the latter has been broken up, are also obviated in this apparatus by the use of a self-acting filter and tap, through which the whey is drawn off.

## CALENDAR OF AGRICULTURE.

January is often the most stormy month of winter, with lasting frosts and heavy snows, though fresh weather not unfrequently happens. Stubble grounds are to be ploughed and subsoiled for green crop fallows, and leys for Lent crops. All water furrows and cuts must be opened, to allow the free discharge of water. In favourable weather pull and store turnips for a supply during storms; thatch the heaps lightly with straw, or lay the turnips under cover, not exceeding four feet in height. Collect manures of all kinds about the farm-yard.

In frosty weather deliver grain carry fuel, and do other necessary carting. Carry out dung from the yards to the fallow-fields; lay the heap in a convenient corner, and make it square, sloping at the ends that the carts may pass over it. Spread thinly and mix evenly the rough and finer materials, and the dung of the different animals, to have the heap of equal quality; when finished, dress the heap neatly and lay soil on the edges.

Clean water-courses and scour ditches, and carry the materials to a heap for lime compost. Prepare artificial manures for top-dressings. Cut hedges, underwood, and copses.

Sow common and spring wheats on lands cleared of turnips, and on fallows where stopped in autumn.

Cut drains in fresh weather to half the depth, the other half to be taken out when filled. A yard in depth will allow 18 inches of broken stones, and 18 inches of earth over them. Tiles are better, with a covering of stones or gravel. Float water-meadows, and lay dry occasionally.

During this month live stock of all kinds will require the most earnest and constant attention of the farmer, and that attention must be his own. Milch cows must have cleanliness and comfort, regular feeding with steamed chaff, dry hay, steamed roots, cabbages, and beet; ample littering must be provided. Suckle both veal and weaning calves: no substitute yet known can take the place of nature's mode. Have the calf-pens opening into the cowshed for convenience of suckling, each calf in a single apartment of four feet by six or eight, bottom raised and boarded, latticed or bored with augerholes to carry off the water, and to afford a dry bed change the litter frequently.

Feeding bullocks in the yard, or tied up, require

a regular supply of roots from the store pits in hard weather, as much as can be eaten but not wasted, and the troughs cleaned at night. Cribs latticed or bored let off water most freely. Litter the yard often and thinly. Keep them level; spread over the surface all substances equally, the contents from the working-horse stable especially, and no heating or scorching will happen. It is most essential that all animals lie dry.

Arrange the sheep flocks in proper lots of age and quality in the fields, and give keeping ewes one feed of turnips daily, carried to a field of grass or stubble; the feeding flock a full allowance, eating on the turnip ground, confined, or carted to an adjoining field if the former be too wet; the last year's lambs a very full allowance, easy treatment, and a dry lair: no future usage will compensate neglect at this tender age. Early ewes will begin to drop lamb; a master of his business will have provided good shelter, both for day and night, in a paddock or small field, with a covered shed standing dry, and an ample supply of juicy food in turnips, beet, and cabbages. One thing in abundance or superfluity is lost, without the necessary adjuncts. Attend to the feeding hogs with ample food of steamed roots mixed with meal, and towards finishing give one meal a day of hard corn, in order to produce solid flesh. The food of brood sows may be more watery. Feed store pigs with raw and steamed roots occasionally. A dry bed and warmth are essential to the thriving of pigs, and cooked food is more useful to them than raw, in a much greater proportion than to other animals.

Feed poultry with light grains, and with steamed potatoes mixed with meal, put into troughs for them in a shed under cover. Have a hatching house separate from the roosting-house, and both heated by pipes below the fire, by fire or hot water.

Bacon hogs and good store pigs will sell well during this month, and the fattening bullocks foremost in condition, when put up in the end of autumn, will come out for the butcher; such articles being often scarce at this early period, a better price will be obtained.

Feed work-horses with cut chaff of clover, hay, and straw, steamed and mixed with potatoes, or both singly. Give a hot meal in the evening when they come home from work.

METEOROLOGICAL DIARY.

BAROMETER.			THERMOMETER.			WIND.		ATMOSPHERE.			WEAT'R.
1855.	8 a.m.	10p.m.	Min.	Max.	10p.m.	Direction.	Force.	8 a.m.	2 p.m.	10 p.m.	
	in. cis.	in. cts.									
Nov.22	29.86	29.85	33	41	35	S. West	gentle	cloudy	fine	fine	dry
23	29.79	29.79	36	40	38	Westerly	gentle	cloudy	sun	cloudy	dry
24	29.79	29.91	35	40	37	N.N.E.	brisk	cloudy	cloudy	fine	rain
25	30.05	30.20	35	41	33	N. East	lively	cloudy	fine	fine	rain
26	30.33	30.20	28	43	39	E. by N.	gentle	fine	sun	fine	rain
27	30.05	30.05	34	45	43	N.N.E.	gentle	cloudy	cloudy	cloudy	drizzle
28	30.05	30.12	40	45	41	N.N.E.	gentle	cloudy	cloudy	cloudy	dry
29	30.12	30.05	38	42	40	N.N.E., N.	calm	cloudy	cloudy	cloudy	dry
30	30.05	30.06	35	43	35	West	calm	cloudy	cloudy	fine	dry
Dec. 1	30.08	29.84	32	41	39	Westerly	gentle	haze	sun	cloudy	dry
2	29.84	29.83	37	41	39	N. by East	var.	cloudy	cloudy	cloudy	drizzle
3	30.00	30.00	28	39	34	N. by East	calm	haze	fine	cloudy	drizzle
4	29.90	29.76	28	44	44	W. by S.	var.	haze	cloudy	cloudy	drizzle
5	29.58	29.52	41	42	33½	N. West	lively	fine	sun	fine	dry
6	29.38	29.46	31	39	34	N. West	lively	cloudy	fine	fine	snow
7	29.46	29.52	30½	36	31	N. West	lively	fine	cloudy	cloudy	dry
8	29.52	29.80	30½	33	29	North	lively	cloudy	fine	cloudy	dry
9	29.92	30.06	24	32	32	N. by East	gentle	cloudy	cloudy	cloudy	dry
10	30.06	30.05	30	34	31	N. West	gentle	fog	cloudy	cloudy	snow
11	29.99	29.91	28	32	31	W. by N.	gentle	haze	cloudy	cloudy	snow
12	29.72	29.83	27½	33	24	W. by N.	gentle	haze	cloudy	fine	dry
13	29.94	30.06	20	32	29	West	gentle	fine	sun	fine	dry
14	30.05	29.85	25	38	42	West	lively	cloudy	cloudy	cloudy	drizzle
15	30.05	30.18	42	45	40	West	airy	haze	cloudy	fine	dry
16	30.28	30.20	32	45	39	Variable	calm	fine	sun	cloudy	dry
17	30.14	30.04	33	38	36	Variable	gentle	fine	cloudy	cloudy	dry
18	30.03	30.20	36	36	30	E. by S.	brisk	fine	cloudy	fine	dry
19	30.22	30.20	20	32	25	East	brisk	fine	cloudy	fine	dry
20	30.12	29.90	22	32	23	East	brisk	fine	cloudy	fine	dry
21	29.79	29.70	19	25	17	East	airy	cloudy	fine	fine	dry

ESTIMATED AVERAGES OF DECEMBER.

Barometer.		Thermometer.		
Highest.	Lowest.	High.	Low.	Mean.
30.32	29.12	55	17	39.3

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
38	31.0	34.2

WEATHER AND PHENOMENA.

November 22. Morning dreary; fine afternoon.—23. A fine day.—24, 25, and 26. Frosty; more or less showery or drizzly.—27. The same.—28, 29, and 30. Dry, but generally overcast. Total rain of November 1.598.

LUNATION.—Full moon, 23rd, 7 h. 51 m. P.M.

December 1. Beautiful; noon dull, cloudy.—2. Changeable.—3. Much ice.—4. Small, drizzly rain.—5. Cold change.—6. Snow; thawing.—7 and 8. Similar.—9. Sharp frost and ice.—10. Partial thaw.—11. Another sprinkle of snow.—12. Hazy; yellow mist all day.—13. Keen; no sun.—14. More drizzle; variable temperature.—15. Much

warmer.—16 and 17. Sunny; no frost during the westerly winds.—18. Wind veers to east, and frost returns.—19 and 20. Keen, clear frost.—21. Red sunset, followed by various forms of cloud.

LUNATIONS.—Last quarter, 1st, 2 h. 11 m. P.M.; new moon, 9th, 10 h. 18 m. A.M.; first quarter, 16th, 6 h. 57 m. A.M.

REMARKS CONNECTED WITH AGRICULTURE.

It will be evident that the entire period has been unusually cold. Frost commenced on the 26th of November and recurred on several occasions. The snow did not cover the grass (here, at least); but it remained several days unthawed. The roots have been well secured, and in great abundance, as refers to mangel-wurzel, and will be found a great supply. Ploughing progresses safely till the very severe access of frost on the 19th. The rigour is increasing, and while I write the mercury is reduced to 23 degs. Fah. Hitherto all is safe; and over-luxuriance is completely prevented.

Dec. 21.

JOHN TOWERS.

## AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR  
DECEMBER.

The continuous fall in the value of all agricultural produce, notwithstanding that the supplies brought forward have been by no means extensive, has created surprise in some quarters. Those who calculated upon almost famine prices, as the result of the war with Russia, and the partial failure of the crops on the continent, have been greatly disappointed. The fact appears to be, therefore, that our means of drawing importations from abroad have been greatly underrated, and it is possible that the yield of our own crops has been larger than had been anticipated. It would be manifestly unfair to draw an unfavourable picture of the future as regards imports of food from abroad, or to maintain that a general deficiency in Europe will be inevitable from the war, because other sources of supply than our own have yet to be tested, and we doubt not that they will prove nearly, or quite, equal to our wants, in the event of our offering a good and remunerative value for produce. The great source of supply must unquestionably be the United States and Canada. Accustomed as we have long been to exaggeration in reference to the progress of the States, we frequently look with suspicion upon statements derived from those quarters; but when we regard the exertions already made to supply Europe with wheat and flour, and when we look to the moderate prices and drooping markets on the other side of the Atlantic, together with the effects produced by them in this country as well as in France, we may safely conclude that very large supplies have yet to follow. In the present state of our markets, however, there is very little room for profit; and the extent of our future importations will, in a great measure, be regulated by the value at which corn is held on the Atlantic seaboard.

Considerable inroads have already been made upon the new crop of wheat; yet it is ascertained with some degree of accuracy that the stocks of that grain on hand are still seasonably good. The yield of barley is turning out tolerably well as to quantity; but an unusually small supply, compared with the total bulk, has been grown fit for malting purposes. The price of this article has receded to some extent, and dealers almost generally have restricted their purchases to immediate wants. The same may be said of other kinds of corn. It is gratifying to find that the potato-crop is proving

remarkably large and of sound quality. The metropolitan and other markets have been abundantly supplied with this esculent, and the highest price realized for the best York Regents has been 110s. per ton.

Very large supplies of fat stock have been brought forward and disposed of for Christmas consumption; indeed, they have exceeded all previous calculations, and consequently have changed hands at prices which have disappointed the graziers, whose profits this month have certainly been small, considering the high value of artificial food. The great gainers have been the butchers, who, from the severity of the weather, were able to purchase largely, and to dispose of their purchases somewhat before the usual period.

The demand for English wool has continued steady, at full prices; but the trade for foreign and colonial has been in a most unsatisfactory state. Evidently the manufacturers of woollen goods are heavily stocked, and until the supplies are worked up, we may look in vain for any improvement in the trade. The supply of wool now on passage from Australia is comparatively small, and our latest advices from the colony bring firm quotations.

The turnip and carrot crops have turned out very abundant this season. The roots are keeping well, and afford a most seasonable relief to the leading graziers, as the supply of hay is small, and prices in all parts of England are very high.

Although immense quantities of guano have come to hand during the month from Callao, the price of that article still continues fixed. The small farmers are in too many instances consequently deprived of a manure which ought to arrive here in private hands, and be subject to competition as well as other commodities. In that case, the Peruvian Government would derive double its present annual income from the sale of the article, because the increase in its use would rapidly extend with a lower range of value. It does appear a perfect anomaly, in the present advanced stage of competition, that the monopoly of the sale should be held by one house; and for what purpose? Simply that the bondholders in this country may receive their interest upon Peruvian stock! To us it is a matter of astonishment that one class of men should be the instruments by which the country's produce should be kept in check.

The Irish and Scotch markets have been very moderately supplied with all articles of grain. The

demand, however, has been very inactive, and prices have had a downward tendency. The shipments of produce from Ireland have been good, and we are glad to find that large supplies of fine sheep and beasts have been received in the metropolis. Those from Scotland have been very moderate.

REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

Although a very extensive business has been transacted in fat stock, both in London and the provinces, prices, owing to the large supplies on offer and their heavy weight, have not been very remunerative, especially if we take into the account the present high value of artificial food. We may observe, however, that a finer collection of beasts than that shown in the Great Metropolitan Market on the 17th of the past month was never equalled, much less excelled, in the most palmy days of old Smithfield. There have been numerous arrivals of prime stock from Ireland *via* Liverpool, and very high rates have been realized for them; but we understand that most of the butchers have been sadly disappointed at the dead weights of both the beasts and sheep. However, the whole proceedings of the month, so far as the metropolis is concerned, have passed off remarkably well, and the butchers, as a body, have realized a large amount of profit, as the cold weather lasted sufficiently long to enable them to dispose of their supplies to considerable advantage.

The cattle shows have been most important in their character. Large numbers of unusually prime beasts and sheep have been exhibited, but chiefly of the *pure* breeds, so far as the former have been concerned. This feature does not appear to have been relished by a portion of the press, the writers in which have contended that, as these breeds are chiefly in the hands of the large graziers, and as the little men stand but a poor chance in competing with them, the bulk of the prizes in the Smithfield Club should be awarded to cross-breeds. Now, this is a most dangerous fallacy, although its effect upon the mind of the practical breeder must be that of ridicule. What we require in this country are *pure*, *not* mongrel breeds. Let crossing be extensively carried out, and these shows will speedily lose their attractions, and a much smaller amount of food would be the result. We need, we presume, scarcely say that cross-breeds, in a general way, contain less consumable food than the pure breeds; consequently the latter are deserving our first consideration; and were the committee appointed to watch over the interests of the Smithfield Club to fall into so glaring an error as to give

cross-breeds leading classes, they would betray the important interests committed to them.

The following figures show the total numbers of stock exhibited in the Great Metropolitan Market during the month:—

	Head.
Beasts .....	22,412
Cows.....	590
Sheep .....	94,030
Calves .....	1,376
Pigs .....	3,184

The bullock supplies were principally derived as follows:—Lincolnshire, Leicestershire, and Northamptonshire, 11,700 short-horns; Norfolk and Suffolk, 1,000; other parts of England, 2,600; Ireland, 1,500 oxen; and Scotland, 1,156 Scots.

COMPARISON OF SUPPLIES.

	Dec., 1852.	Dec., 1853.	Dec., 1854.
Beasts ....	21,018	23,314	20,298
Cows.....	540	484	120
Sheep ....	86,880	88,480	88,880
Calves ....	1,898	1,143	1,573
Pigs .....	2,259	2,402	2,746

Prices have ranged as under:—Beef from 3s. 4d. to 5s. 4d.; mutton, 3s. 4d. to 5s.; veal, 3s. 10d. to 6s.; and pork, 3s. 6d. to 5s. per 8lbs., to sink the offal.

COMPARISON OF PRICES.

	Dec. 1852.		Dec. 1853.		Dec. 1854.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Beef..	2 2	to 4 0	.3 2	to 4 10	.3 4	to 5 4
Mutton	2 10	5 0	.3 0	5 2	.3 6	5 4
Veal..	2 8	4 4	.3 8	5 0	.4 0	5 8
Pork..	2 8	4 0	.3 4	4 10	.3 2	4 8

The imports of foreign stock into London have been liberal, or as follows:—

	Head.
Beasts .....	3,973
Sheep .....	14,972
Calves .....	532
Pigs .....	38
Total.....	19,515

In the corresponding month in 1854 we received a total supply amounting to 18,349 head; in 1853, the numbers were 21,918; in 1852, 17,870; in 1851, 21,594; in 1850, 20,435; and in 1849, 16,368 head.

Over 100,000 carcasses of foreign stock have arrived up to Newgate and Leadenhall, in the course of the month, from various distant parts of England, including Scotland, and about 100 tons have arrived from abroad. A good business has been transacted, and prices have ruled tolerably firm. Beef has realized 3s. 4d. to 4s. 8d.; mutton, 3s. 2d. to 4s. 8d.; veal, 3s. 8d. to 5s. 6d.; and pork, 3s. 6d. to 5s. 4d. per 8lbs. by the carcass.

## AGRICULTURAL INTELLIGENCE, FAIRS, &c.

**ASHBOURN FAIR** was well supplied with store and fat stock; for the former there was a decline in price even for the best sorts, but especially so for lean stock, while fat ones met with ready sale at good prices. There was a good supply of fat sheep, but sales were heavy, there being but few customers for them.

**BODMIN FAIR** was a dull one, and though there was an average supply of cattle and sheep, but few changed hands.

**GRINGLEY FAIR.**—The attendance was numerous. The number of stock brought for sale was equal to former years. Fat beasts realized from 7s. 6d. to 8s. per stone. Heifers near calving were much sought after, and any worth attention readily changed hands. Steers fetched as much as they were worth; but yearlings moved off slowly. Well-bred drapes brought remunerating prices. The show of sheep was confined to two pens, and prices readily obtained. Pigs were considered dear; young ones from 10s. 6d. to 12s. 6d. each; and store proportionately high. There were no fat ones offered. The show of horses was small, and attracted no attention.

**PERTH FAIR** was attended by a considerable number of persons from the country. The day was very favourable, being fair, mild, and somewhat sunny. The cattle market on the North Inch was well supplied. The stock brought forward, of the various breeds, and from the different districts, was, upon the whole, a full average of what is usually shown at this market. Very fine first-class fat beasts appeared on the ground, and such as were offered brought from 8s. to 8s. 6d. per Dutch stone. We observed a number of very inferior, half-fat cattle in the market, apparently more fit for feeding purposes than for the butchers. These met with but a heavy sale, and a good many were removed unsold. The prices of such as were sold may be safely quoted at 5 per cent. below what the same quality of stock fetched at the previous market here. Rather a large supply of wintering cattle were on the stand, consisting of one and two-year-old stirks; but only those in good condition found purchasers, and that at a reduction of 10 per cent. from recent prices. Milch cows, particularly those of the Ayrshire breed, were much looked after, and found ready sales at high prices. First-class cattle of the above description sold at from £15 to £20 each; second class, from £12 to £15; and old cows of inferior kinds, from £7 to £11. In regard to the horse market the show of stock from the different districts was very extensive, particularly of draught horses. The prices were high, especially for young animals intended for farming purposes. The supply of harness horses was limited, and the sale for this description dull—as was also the demand for old horses, cobs, and ponies, of which plenty were shown. We observed two pairs of superior draught horses sold for £200, and various other pairs brought from £80 to £90. Upon the whole, the market was considered a very high priced one.

**PETERBOROUGH FAT STOCK MARKET.**—There was a very limited show of beasts, some of which had been returned from the London market. Most of them were sold, but the highest price did not exceed 8s. 6d. per stone. Mutton was a shade easier to buy. Pigs were plentiful, and many were turned out unsold; those disposed of were at a fall of full 6d. per stone upon last week's prices.

**SALISBURY GREAT MARKET** was largely supplied, but it was evident that both graziers and the public have at length discovered that it is far more profitable to consumers to purchase the well-fatted, than the unnaturally-fed animal. Of such wholesome class was the exhibition. Best ox realized 12s. to 13s.; heifers, 10s. 6d. to 11s. 6d. per score; mutton, 7d. to 8d. per lb. A first-rate business was done.

**TWICKESBURY FAIR** was well supplied with meat, that exhibited being generally of good quality. Messrs. Weaver and Moore, as usual, had a long list, containing upwards of 300 sheep and 60 head of cattle. Fat sheep sold at from 30s. to 50s.; fat heifers fetched £10 to £22; they also sold some prime fat pigs at about 11s. a score. Beef was worth from 6d. to 7d.; mutton, 6d. to 7d.

**WORCESTER FAIR.**—It was certainly not well supplied with such prime meat as would serve for the Christmas show, but a good deal of fat stock was sold off by the auction-

cers. Fat cows made from 6d. to 6½d. per lb.; mutton, if very prime, brought about 7d.; pork, 10s. 6d. to 11s. 6d. per score. A great many sheep went back unsold in consequence of the languid demand, and the determination of the holders not to sell at falling prices. Pigs went off well. The horse fair contained but a poor supply, chiefly of cart horses, with a nag or two amongst them. This department partook of the general slackness of trade.

**YORK HORSE FAIR.**—The importance of this fair, and the amount of business done, places it as the first mart in the world for horses of the best descriptions. Many very fine animals were shown, adapted as hunters, hackneys, or harness; and the demand, as usual at this fair, exceeded the supply, where quality of breeding and condition were combined. On Monday morning the stables opened for business transactions; on this day and Tuesday nearly all the first-class horses were sold at high figures. On Tuesday, Wednesday, and Thursday, the middle and lower classes of horses were brought out of the stables to be paraded in Blossom-street, and sold to the best bidders. On the whole, they met with rather a dull sale, many having been bought of the breeder at prices which could not again be realized in this mart. Horses adapted for the army had, of course, a ready call; indeed, all animals with any pretensions to good breeding realized highly remunerating prices to the breeders. Every year affords additional evidence that in breeding horses the path to profit is to take care that the brood mares are of good quality, and to secure the best sires of the day.

**IRISH FAIRS.**—ARDEE turned out one of the best held in the neighbourhood for a long time. The supply of stock was large, and the attendance of purchasers numerous. Well-finished grass beef sold remarkably well, and a good business done throughout the day. A very large supply of stall-feds were offered for sale; they were not well finished, however; some transactions took place at a high figure, but many of the beasts remained undisposed of. The supply of mutton was comparatively good, but generally speaking perhaps so much could not be said of the quality; the most numerous of the lots offered were composed of a mediocre and inferior description. The pig fair was pretty well supplied; every kind, from the best bacon down to the sucking pig, brought remunerating prices, when contrasted with many of the fairs lately held in this and the neighbouring counties.

**SALISBURY MONTHLY CHEESE MARKET.**—The supply was much less than usual; it proved, however, quite sufficient for the wants of the trade. Prices were rather in favour of buyers, and may be quoted: Skims 32s. to 36s., half-skims 52s. to 53s., doubles 58s. to 63s., Somerset 64s. to 70s., and Cheddar 72s. to 80s.

**DERBY CHEESE FAIR.**—Prices ranged from 62s. to 72s. There was a good supply, considering that the fair is but just established. There were plenty of factors present, but trade was dull.

## AGRICULTURAL QUERY.

SIR,—Observing in the *Farmer's Magazine* for this month the question asked as to the difference in the qualities of blue vitriol used for soaking wheat, and observing your answer to be (in substance) that a great deal sold for blue vitriol has no beneficial effect upon the wheat, and also that blue vitriol is only supposed to have a beneficial effect, I should be glad to know from any of your subscribers whether or not the use of it is any benefit in either preventing smut in wheat or promoting its growth, how the effect is produced; and also, if wheat is wetted with water, and lime sifted on it, will not have the same effect as the vitriol. My reason for troubling you is, that much corn in this neighbourhood is prepared by each method, and a little doubt exists in the minds of some as to the benefits of either. I am, Sir, yours truly,

PRO BONO PUBLICO.

Hacheston, Dec. 22, 1855.

## REVIEW OF THE CORN TRADE

DURING THE MONTH OF DECEMBER.

The trade has at times been considerably depressed by the reports of negotiations for peace, and these have at intervals been renewed with much appearance of genuineness, and the minds of buyers have been often influenced, so as to refrain from purchasing beyond small quantities for their immediate wants. This applies to all articles of the trade, which throughout the month have been supplied liberally by the farmers, but particularly wheat and barley; the thrashing-machines having no respite, being always engaged, and bespoken three or four deep.

The sudden changes in the weather have had their wonted effect, and whenever the frost gave way, which has in two instances of rapid thaw been the case, the condition of the wheat was materially affected; and this caused a dulness in the trade for new samples, without improving the demand for old. Prices have, under all these influences, receded on the whole nearly 1s. per bushel, without giving any confidence to the millers, who have acted with the greatest caution, and generally they are low in stock; neither will they be free buyers until the question of peace or war be entirely settled one way or other: and every despatch is waited for with great anxiety from the Russian and Austrian capitals, whence the main reports emanate.

The supply of English wheat the first Monday in the month was very limited from Kent, but moderately fair from Essex; and owing to the damp state of the weather during the previous week, the condition of many of the samples was quite indifferent, notwithstanding a sharp frost had been experienced that morning. This circumstance, combined with various reports that negotiations had again commenced, had a considerable influence on the minds of the buyers, and there was a quietness in the trade which had not been witnessed previously since harvest. Factors were, however, indisposed to give way sufficiently to bring buyers forward, and both alike kept aloof; a few transactions for immediate consumption were entered into, and prices of the best qualities were about maintained; but had business been forced, a decline of 2s. per qr. must have been submitted to. Future rates will of course depend on the progress made with the diplomatists; but Austria must be dealt with as a treacherous nation, and we think little progress will be made in bringing about peace at present. Foreign wheat remained nominally un-

altered, with scarcely any transactions in this description. The imports consisted of 900 qrs. from Bergen, 200 qrs. from Copenhagen, 880 qrs. from the East Indies, 65 qrs. from Hambro', 620 qrs. from Philadelphia, and 30 qrs. from Uddewalla, making a total of 2,695 qrs., against 7,068 qrs. in the corresponding week of 1854. The London average registered 85s. 6d. on 5,933 qrs. The weekly general average was 82s. 1d. on 134,952 qrs., against 74s. 7d. on 126,455 qrs. in the corresponding week of the previous year. The quantity returned being greater than that of 1854, many would conclude the crop of this season to be larger than that of last. This is, however, not so; but it is owing to greater vigilance on the part of inspectors, and many more returns are now made in consequence than formerly, and the correct comparison is consequently lost.

There was a good supply of wheat from Essex and Kent at Mark Lane the second Monday of the month; and although the condition had somewhat improved, the town millers took it off very slowly at a reduction of 4s. per qr. on the currency of the previous week, and even then some quantity was left over unsold for future markets. The top price of new red was 81s. per qr., and of white 88s. per qr. The sales of foreign wheat were to a limited extent, at 1s. to 2s. per qr. under the currency of the past week. The top price of Dantzic was 96s. per qr., and of fine Pommeranian red 88s. per qr. The imports consisted of 1,070 qrs. from Alexandria, 650 qrs. from Oporto, 700 qrs. from Seville, 1,200 qrs. from Swediac, which, with a few smaller lots, summed up 3,680 qrs., against 5,258 qrs. in the corresponding week of last year. The London average registered 84s. 4d. on 6,279 qrs. The general weekly average was 83s. 1d. on 117,405 qrs., against 74s. 4d. on 109,071 qrs. in the corresponding week of 1854. This week's return shows a falling off to the extent of 17,547 qrs. on the previous week; and this may continue to be the case during the remainder of the season, the farmers having thrashed more barley than wheat, and are now at full work on that article.

The quantity of wheat brought forward the third week from Essex and Kent at Mark Lane was very moderate; but being in poor condition, it met a dull sale at about the prices of the previous week, and again some quantity was left over unsold for future markets. After this date, severe frost set

in, and lasted until Saturday night, the wind blowing the whole time strongly from the east; and during these five days the weather was excellent for thrashing, and condition must consequently improve considerably. The quantity offering from distant counties was very limited, as prices at home are as high as those in the metropolis. There was a limited sale for foreign wheat, this description being held so much higher than home grown; the holders of it having no prospect of any increase in the imports. The arrivals consisted of 2,000 qrs. from Alexandria, 2,040 qrs. from the East Indies, 2,310 qrs. from New York, 2,220 qrs. from Philadelphia, 20 qrs. from St. Ubes, and 1,420 qrs. from Seville, making a total of 10,010 qrs., against 2,991 qrs. in the corresponding week of 1854. The London average registered 83s. 4d. on 4,641 qrs. The general weekly average was 83s. 1d. on 114,853 qrs., against 73s. on 114,793 qrs. in the corresponding week of the previous year. In these averages there was only a difference of 60 qrs. in quantity, but 10s. 1d. in price; and the falling off from the previous week was 2,552 qrs., although each of these two weeks was precisely the same as to price.

At the fourth Monday's market in Mark-lane there was a very short supply of wheat from Essex, and only a very moderate quantity from Kent; and although some portion of the most recently thrashed samples was in improved condition, yet a considerable quantity came forward still in a soft state; a complete change in the weather had taken place the previous day, being at times wet, with a sudden thaw: the morning was fine and mild. Business opened very dull, partaking more of a holiday market, owing to the approaching festivities than one of activity. The Essex factors refused to make any concession in price, and consequently sold very little; but most of the Kentish was disposed of at about 1s. per qr. reduction in price. There was very little passing in foreign wheat, and prices were generally unaltered. The imports consisted of 4,330 qrs. from Alexandria, 1,789 qrs. from the East Indies, 800 qrs. from Jaffa, 1,012 qrs. from New York, 1,580 qrs. from Seville, 600 qrs. from Stockholm, and 400 qrs. from Udde-walla; making a total of 10,511 qrs., against 3,119 qrs. the corresponding week of the preceding year. The London average registered 82s. 4d. on 6,439 qrs. The general weekly average was 79s. 11d. on 112,716 qrs.; against 72s. 3d. on 110,395 qrs. the corresponding week of 1854. This week's return exhibits a further falling off in the quantity of 2,137 qrs., the farmers being still on barley in preference to wheat.

The flour trade has been subject to many changes during the month, and Norfolks have

moved up and down at times throughout the same market-day, but have mostly settled down to a lower figure at the close of business. At the first Monday's market in Mark-lane there was a liberal supply of country marks, and the trade was somewhat firmer; the top price of town-made was 77s. per sack, and Norfolks were held at 60s. The arrivals coastwise were 3,116 sacks, by the Eastern Counties railway 13,403 sacks, by the Great Northern 4,215 sacks, from foreign ports 400 sacks and 10,117 brls., the last from the United States, the quality of which is very various, and some evidently has been made of sprouted wheat, and the selection in buying requires more care than usual: the highest price of fancy brands was 47s. per brl. The second Monday of the month the town millers put down the top price 2s. per sack, that being 75s., and all country marks sold at a similar reduction. Norfolks were offered freely at 58s. per sack, and scarcely any buyers thereat, the state of the wheat trade causing this reduction. The arrivals coastwise were 1,432 sacks, by the Eastern Counties railway 12,015 sacks, by the Great Northern 3,739 sacks, from foreign ports 250 sacks and 229 brls. Notwithstanding this small import of foreign, American receded 1s. per brl., the top price being 46s. per brl. Trade was lifeless for all descriptions on the third Monday's market, and from the recent and continued dulness there was an accumulation of stock generally, and the supplies have well overtaken the demand of the metropolis, notwithstanding the imports of foreign have been to a very moderate extent. The top price of town-made was 75s., households 66s. to 68s., No. 2's 62s. to 63s. Norfolks were offered at 58s., and the best brands of American were worth 45s. per brl.; other sorts down to 42s., as in quality and strength. Inactivity was still the ruling state of the trade on the fourth market of the month. There was no change in the top price of town-made, but households were offering about 1s. per sack lower, and sales of most sorts were effected at irregular and varied rates. Norfolks were offered freely at 58s., but no buyers beyond 57s. per sack. The arrivals coastwise were only 792 sacks, but by the Eastern Counties railway there were 11,390 sacks, by the Great Northern 2,095 sacks, and from foreign ports 2,700 sacks and 4,097 brls. Spanish flour sold slowly at 65s. to 67s. per sack, and American at 42s. to 45s. per brl.: colour and strength are both wanted in that from the United States this year.

The barley trade has received a check during this month. In some districts it had first touched 50s. per qr. for the choicest Chevalier samples; but once the deliveries had overtaken the demand, from the want of animation in the sales of malt, prices receded, more for secondary sorts than for

prime samples. At Mark-lane, the first Monday, there was no quotable change in the best sorts, and middling qualities were easier to purchase. The arrivals coastwise were 5,095 qrs., by the Eastern Counties railway 3,670 qrs., by the Great Northern 58 qrs., from Scotland 63 qrs., and from colonial ports 134 qrs.; making a total of 9,026 qrs. The second Monday's market, at Mark-lane, middling and inferior sorts were 1s. to 2s. per qr. cheaper. The arrivals coastwise were 3,500 qrs., by the Eastern Counties railway 4,034 qrs., by the Great Northern 1,048 qrs., and from Scotland 20 qrs.; making a total of 8,602 qrs. The trade was very limited on the third Monday's market, without any material variation in the value of any description. The arrivals coastwise were 5,721 qrs., by the Eastern Counties railway 3,977 qrs., by the Great Northern 190 qrs., from Scotland 21 qrs., and from foreign ports 1,550 qrs.; making a total of 11,459 qrs. There was scarcely any change at Mark-lane the fourth Monday of the month, but no life was experienced in the demand, the sale of malt being worse, and the large metropolitan brewers entirely out of the market. The arrivals coastwise were 6,023 qrs., by the Eastern Counties railway 3,081 qrs., by the Great Northern 227 qrs., and from Scotland 13 qrs.; making a total of 9,344 qrs. The general averages since our last have been 40s. 11d. on 103,394 qrs., 42s. 3d. on 119,076 qrs., 42s. 5d. on 128,143 qrs., and 41s. 3d. on 121,845 qrs.

There have been the most scanty supplies of oats from our own coast and Scotland throughout the month; but this article has participated in the general dulness. At the first Monday's market of the month samples of old and the best descriptions of new supported prices. There were no arrivals coastwise; but 1,070 qrs. of English by the Eastern Counties Railway, 385 qrs. by the Great Northern, 601 qrs. from Scotland, 2,860 qrs. from Ireland, and but 20,341 qrs. from foreign ports, making a total of 25,257 qrs. The supplies at the second Monday's market being limited, prices of good corn were well supported; but light parcels gave way 6d. per qr. The arrivals coastwise were 70 qrs., by the Eastern Counties 1,617 qrs., by the Great Northern 742 qrs., from Ireland 2,863 qrs., from foreign ports 3,983 qrs., making a total of 9,275 qrs. At the third Monday's market good foreign samples were steady in value and demand; but Irish and light qualities of foreign were 6d. per qr. cheaper. The arrivals coastwise were 104 qrs., by the Eastern Counties 1,527 qrs., by the Great Northern 1,668 qrs., from Ireland 28,771 qrs., and from foreign ports 19,958 qrs., making a total of 52,023 qrs. At the fourth Monday's market there was a large portion of the previous liberal arrivals left for sale, and being combined

with a fair fresh supply, trade was languid: the coming holiday interfering with working ex-ship, tended to increase the dulness, and prices were in some instances 6d. to 1s. per qr. lower. The arrivals coastwise were only 40 qrs., from Scotland 1,084 qrs., from Ireland 4,730 qrs., from foreign ports 14,019 qrs., by the Eastern Counties Railway 1,927 qrs., and by the Great Northern 1,158 qrs., making a total of 22,958 qrs. The general averages have been 28s. 1d. on 19,261 qrs., 28s. 10d. on 20,558 qrs., 28s. 6d. on 17,203 qrs., and 27s. 10d. on 16,636 qrs.

Beans have been in less favour during this than the preceding month, owing to good deliveries of secondary qualities, many of them also coming forward in a tender condition, and Egyptians offering more freely at many ports; but the consumption has been well kept up, and continues to be large: and this will no doubt continue to be the case throughout the winter months. At the first Monday of the month fine old samples brought as much money; but new receded 1s. to 2s. per qr., with a very limited demand. The arrivals coastwise were 589 qrs., by the Eastern Counties Railway 170 qrs., by the Great Northern 20 qrs., and from foreign ports 130 qrs., making a total of 909 qrs. At the second Monday's market soft samples of new were again 1s. per qr. lower. The arrivals coastwise were 435 qrs., by the Eastern Counties Railway 193 qrs., by the Great Northern 46 qrs., and from foreign ports 2,893 qrs., making a total of 3,567 qrs. At the third Monday's market there was no material change in the value of any description. The arrivals coastwise were 339 qrs., by the Eastern Counties 165 qrs., by the Great Northern 20 qrs., from foreign ports 2,365 qrs., making a total of 2,889 qrs. At the fourth Monday's market trade was languid; but good qualities of old and dry new were not cheaper: other sorts were obtainable on lower terms. The arrivals coastwise were only 153 qrs., by the Eastern Counties 195 qrs., by the Great Northern 20 qrs., from foreign ports 3,209 qrs., making a total of 3,227 qrs. The general weekly averages have been 51s. 10d. on 5,024 qrs., 53s. 3d. on 5,156 qrs., 52s. 3d. on 5,646 qrs., and 51s. 8d. on 5,227 qrs.

There have been several changes in the value of peas during the month, the severity of the weather now and then bracing up the demand for good boiling qualities. At Mark Lane the first Monday of the month there was no quotable change in the value of any description. The arrivals coastwise were 440 qrs., by the Eastern Counties Railway 152 qrs., by the Great Northern 15 qrs., and from foreign ports 1,655 qrs., making a total of 2,262 qrs. The cold state of the weather induced the buyers on the second Monday's market of the

month to take fine samples of boilers more freely; but other sorts were 1s. to 2s. per qr. cheaper. The arrivals coastwise were 375 qrs., by the Eastern Counties 115 qrs., by the Great Northern 57 qrs., and from foreign ports 1,287 qrs., making a total of 1,834 qrs. The third Monday's market of the month prices were steady and demand moderate. The arrivals coastwise were 517 qrs., by the Eastern Counties Railway 161 qrs., by the Great Northern 94 qrs., and from foreign ports 195 qrs., making a total of 967 qrs. The previous sharp weather had rather increased the sale of fine boilers at the fourth Monday's market of the month, whilst for hog samples the demand has evidently fallen off, so many swinish mouths having been stopped by the great slaughter for the Christmas week, and this description may recede in value steadily from this cause. The arrivals from the coast were 493 qrs., by the Eastern Counties Railway 218 qrs., by the Great Northern 96 qrs., making a total of 3,227 qrs. The general averages have been 52s. 8d. on 2,851 qrs., 52s. 5d. on 3,055 qrs., 50s. 9d. on 2,658 qrs., and 49s. 1d. on 2,037 qrs.

The imports of foreign grain for the month ended the 30th November, as published in the *London Gazette* of the 14th December, were 398,623 qrs. grain, and 203,799 cwt. flour, against 327,377 qrs. grain, and 43,718 cwt. flour, in the corresponding month of last year; and the different sorts stand thus, viz. :—

	1854.		1855.
	Qrs.		Qrs.
Wheat .....	104,907	....	163,929
Barley .....	9,294	....	7,881
Oats .....	66,076	....	105,774
Rye .....	551	....	—
Beans .....	43,194	....	21,814
Peas .....	34,114	....	25,426
Maize .....	69,241	....	73,379
Buckwheat ..	—	....	4
Bere .....	—	....	416
	-----		-----
Total.....	327,377	....	398,623
Flour....	43,718 cwt.	....	203,799 cwt.

The imports of November have not been so much increased as was generally expected, the prevalence of contrary winds keeping out the vessels from America, from whence parties have looked for such superabundance. The increase is in wheat and flour from the United States, and of oats from Denmark and Sweden. During the month now closing the quantity will be larger of American produce; but the gales blowing strongly from the east, from the 17th to the 22nd, will have kept many vessels at sea, and there will consequently be good imports from that quarter of the globe for the month of January, afterwards a great falling off from all quarters of the globe, and we shall

thus have worked up foreign stocks very closely by the time spring shipments begin to arrive.

The Baltic ports are all closed by the severity of the weather, and previously the supplies from thence had been of the most trivial character; their stocks are completely exhausted, and the quality of the new grain being very inferior, we shall get little assistance from thence next spring. The stocks at Dantzic were reduced to 16,000 qrs. wheat, of which 5,000 qrs. of old quality were lying there for account of mills in the interior, 5,000 qrs. of old, quite inferior stuff, and the remainder out of the new crop, divided among the dealers, who are supplying the local demand for it for want of better. The quality of the new is most miserable stuff. In the Bug quarter there are still some lots of old fine wheat, of which sales have been made at prices corresponding with 70s. to 75s. per qr. free on board. From the lower Baltic ports better qualities of wheat may be expected, but no great quantity from any, the demand to the interior being likely to be large up to next harvest, from the failing crops in those countries usually sending down supplies to the Baltic.

At Hamburg holders are very firm in their demands, from the low stocks generally held at that port: 60 to 61 lbs. Mecklenburg red wheat may be considered worth 84s. to 85s. per qr. free on board; 58 to 59 lbs. Marks wheat 84s. per qr.; Danish, 59 to 60 lbs., 81s. to 82s. per qr. Barley, 52 to 52½ lbs. from Denmark and Holstein, may be quoted at 41s. to 42s. per qr.; and kiln-dried from Jutland, 49 to 49½ lbs., at 39s. per imp. qr. free on board. Good oats, 30s. to 31s. per 336 lbs., on the spot for home consumption. Rye is there in great demand, the necessities of Germany inducing merchants to purchase this article freely.

The Dutch markets have latterly given way 3s. to 4s. per qr. for Zealand new wheat, the supplies of this description having been large. At this reduction buyers have come forward for Belgian account. Samples of red have only given way 1s. per qr., and rye has receded also 1s. per qr. Prices are however higher than in England, and none can now be shipped to this country.

In Belgium very high prices for wheat have been obtained of late, although there is little activity at the moment. Their own growth of white is worth about 90s. per qr., whilst red commands less, realising 87s. to 88s. per qr. English red wheat, 63 lbs. per bush., brought 89s. per qr.; Rostock and Stralsund, 88s. per qr. Rye in that country brings extravagant prices: Belgian, 59s. to 61s.; English, 64s. to 66s. per qr.; American, 61s. to 65s. per qr.; Belgian barley, 38s. to 39s. per qr.; Danish, 40s. 6d. to 41s. 6d. per qr.; and large beans, 48s. per qr. An improved demand is



COMPARATIVE PRICES AND QUANTITIES OF CORN.

Averages from last Friday's Gazette.			Averages from the corresponding Gazette in 1854.				
Qrs.	s.	d.	Qrs.	s.	d.		
Wheat....	112,716	79	11	Wheat....	110,395	72	3
Barley....	121,845	41	3	Barley....	114,753	34	6
Oats....	16,636	27	10	Oats....	17,446	28	6
Rye.....	507	55	4	Rye.....	472	47	4
Beans....	5,227	51	8	Beans....	5,260	48	9
Peas....	3,032	49	1	Peas....	2,933	48	3

MONTHLY RETURN.

AN ACCOUNT SHEWING THE QUANTITIES OF CORN GRAIN, MEAL, AND FLOUR, IMPORTED INTO THE UNITED KINGDOM, AND ADMITTED TO HOME CONSUMPTION, IN THE MONTH OF NOVEMBER, 1855.

Species of Corn, Grain, Meal, and Flour.	Imported from foreign Countries.		Imported from British Possessions out of Europe		Total.	
	qrs.	bush.	qrs.	bush.		
Wheat .....	158103	6	5825	4	163929 2	
Barley .....	7481	0	..	..	7881 0	
Oats .....	105774	4	..	..	105774 4	
Rye .....	..	..	..	..	..	
Peas .....	23927	7	1493	3	25426 2	
Beans .....	21812	1	1	6	21813 7	
Maize or Indian Corn ..	73378	7	..	..	73378 7	
Buck Wheat .....	3	4	..	..	3 4	
Beer or Bigg .....	416	0	..	..	416 0	
<b>Total of Corn and Grain</b>	<b>391297</b>	<b>5</b>	<b>7325</b>	<b>5</b>	<b>398623 2</b>	
	cwts.	qr.lb.	cwts.	qr.lb.	cwts.	qr.lb.
Wheat Meal and Flour ..	195942	3 18	7855	2 18	203798	2 8
Barley Meal .....	..	..	..	..	..	..
Oat Meal .....	22	2 25	6	3 0	29	1 25
Rye Meal .....	18	1 6	..	..	18	1 6
Bean Meal .....	..	..	..	..	..	..
Indian Meal .....	153	1 0	150	0 0	308	1 0
Buck Wheat Meal.....	14	1 0	..	..	14	1 0
<b>Total of Meal and Flour</b>	<b>196156</b>	<b>1 21</b>	<b>8012</b>	<b>1 18</b>	<b>204168</b>	<b>3 11</b>

Custom-House, London, Dec. 12. W. MACLEAN, Secretary.

PRICES OF SEEDS.

BRITISH SEEDS.

Tares, winter (per bushel).....	6s. 6d. to 7s. 6d
Coriander (per cwt.) .....	20s. to 24s.
Caraway (per cwt.).... new .. a. to 50s., old .. a. to .. a.	
Canary (per qr.).....	63s. to 68s.
Hempseed (none) .....	00s. to 00s.
Linseed (p. qr.) sowing .. s. to .. s., crushing 77s. to 84s.	
Linseed Cakes (per ton) .....	£14 10s. to £15 0s.
Rapeseed (per qr.) .....	new 90s. to 94s.
Ditto Cake (per ton).....	£7 10s. to £8 0s.

FOREIGN SEEDS, &c.

Hempseed, small, (per qr.) .. s. 56s., Ditto Dutch, 58s.	
Coriander (per cwt.) .....	15s. to 20s.
Caraway .....	42s. to 46s.
Linseed (pr qr.) Baltic, 75s. to 78s.; Bombay, 80s. to 83s.	
Linseed Cake (per ton).....	£13 10s. to £14 10s.
Rapeseed, Dutch .....	90s. to 94s.
Rape Cake (per ton).....	£7 10s. to £8 0s.

HOP MARKET.

BOROUGH, Monday Dec. 24.

Our market continues tolerably active for this period of the year, and there is a fair demand for all Hops of good quality. Fine and choice samples being scarce, bring rather more money, and the general currency of last week is fully maintained.

POTATO MARKETS.

SOUTHWARK WATERSIDE.

MONDAY, DEC. 24.

During the past week the arrivals have been small ;

still the trade is extremely dull, and last week's prices barely maintained.

	s.	d.	s.	d.
York Regents .....	90	0	to	110 0
Kent and Essex do. ....	75	0		95 0
East Lothian do .....	85	0		95 0
Ditto, reds .....	80	0		90 0
Perth, Forfar, and Fifeshire do.	50	0		85 0
Ditto, reds .....	65	0		70 0

BOROUGH AND SPITALFIELDS.

MONDAY, Dec. 24.

Coastwise and by land-carriage the arrivals of Potatoes since Monday last have been but moderate. The demand is inactive, as follows:—York Regents, 100s. to 110s.; Kent and Essex ditto, 90s. to 100s.; Scotch ditto, 80s. to 90s.; ditto cups, 80s. to 90s.; middlings, 55s. to 65s.; Blues, 80s. to 90s.; Lincolns, 80s. to 90s. per ton.

WOOL MARKETS.

ENGLISH WOOL MARKET.

	s.	d.	s.	d.
Down tegs .....	1	1	to	1 2½
Do. ewes.....	1	0	—	1 1
Half-bred hoggets .....	1	1	—	1 2
Half-bred wethers .....	1	0	—	1 1
Kent fleeces.....	1	1	—	1 1½
Leicester fleeces, mixed..	0	11	—	1 0½
Combing skins .....	0	10	—	1 1
Flannel wool.....	1	0	—	1 1½
Blanket wool.....	0	8	—	1 0

LEEDS WOOL MARKET, Dec. 21.—There has been a steady demand for combing wools this week, and prices are firm, with an upward tendency. Clothing wools are without any material change in demand or prices.

LIVERPOOL WOOL MARKETS, DEC. 22.

SCOTCH WOOL.—There continues that steady retail demand for laid Highland which has been experienced for some months, without any alteration in price. White is still in fair request. Crossed and Cheviot are in moderate request at late rates.

	s.	d.	s.	d.
Laid Highland Wool, per 24lbs. ..	9	0	to	10 0
White Highland do. ....	12	0		13 0
Laid Crossed do. unwashed ....	12	0		13 6
Do. do. washed .....	13	6		14 6
Laid Cheviot do. unwashed ....	14	0		16 6
Do. do. washed .....	17	6		21 0
White Cheviot do. do .....	24	0		26 6

FOREIGN WOOL.—There is on the whole a better feeling in the trade, but stocks being light prevents anything like the amount of business that could otherwise be done. The whole of the imports of East India are being held over for the next public sales, expected to take place about the middle of January.

MANURES.

PRICES CURRENT OF GUANO.

Peruvian Guano .....	per ton	£11 5 0	to	£11 10 0
Do. first class (damaged) ..	..	10 5 0		10 10 0
Bolivian Guano .....	(none)	0 0 0		0 0 0
ARTIFICIAL MANURES, OIL CAKES, &c.				
Nitrate Soda .....	..	19 10 0		21 0 0
Nitrate Potash or Saltpetre .....	..	29 0 0		30 0 0
Sulphate Ammonia .....	..	16 0 0		17 0 0
Muriate ditto .....	..	22 0 0		23 0 0
Superphosphate of Lime .....	..	6 0 0		6 0 0
Soda Ash or Alkali .....	..	0 0 0		8 0 0
Gypsum .....	..	2 0 0		2 10 0
Coprolite .....	..	4 5 0		4 10 0
Sulphate of Copper, or Roman Vitriol for Wheat steeping....	..	42 0 0		43 0 0
Salt .....	..	1 5 0		2 0 0
Bones, Dust .....	per qr.	1 3 0		1 4 0
Do. ½ inch .....	..	1 1 0		1 2 0
Oil Vitriol, concentrated .....	per lb.	0 0 1		0 0 0
Do. Brown .....	..	0 0 0		0 0 0
Rape Cakes.....	per ton	8 0 0		8 5 0
Linseed Cakes—				
Thin American in brls. or bags ..	..	13 15 0		14 5 0
Thick ditto round .....	..	12 5 0		12 10 0
Marsilles .....	..	12 5 0		12 15 0
English .....	..	14 0 0		14 10 0





W. H. & C. 10, Abchurch Lane, London, E.C. 4.

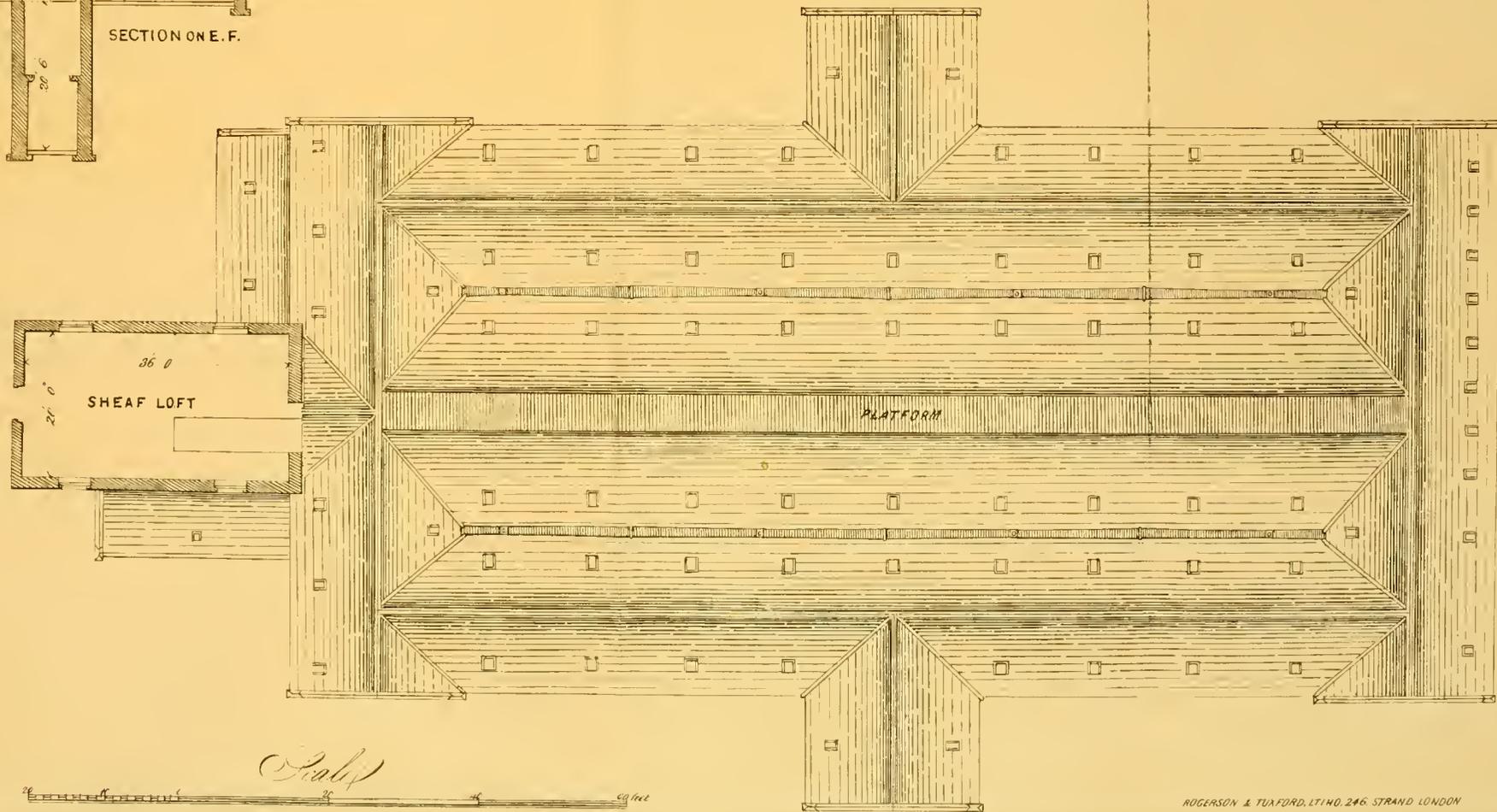
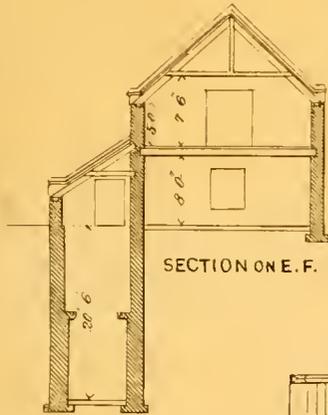
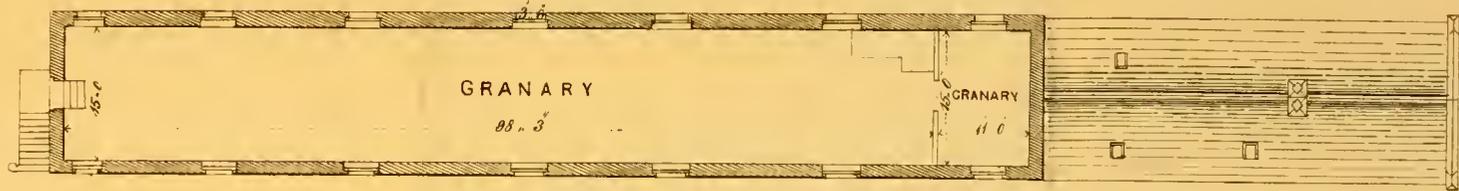
*A. M. L.*

THE ENGRAVER'S COMPANY, 10, ABCHURCH LANE, LONDON, E.C. 4.



Nº 3.

DESIGN FOR A COVERED HOMESTEAD  
AT SILLYFLATT, KINCARDINESHIRE N. B.  
DESIGNED BY DAVID DICKSON, ESTATE AGENT LAURENCEKIRK, N. B.



*Scale*



PLAN OF ROOF

# THE FARMER'S MAGAZINE.

FEBRUARY, 1856.

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## PLATE I.

PORTRAIT OF WILLIAM MILES, ESQ., M.P.

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## PLATE II.

NO. III.—DESIGN FOR A COVERED HOMESTEAD, AT SILLYFLATT,  
KINCARDINESHIRE, N.B.

DESIGNED BY DAVID DICKSON, ESTATE AGENT, LAURENCEKIRK, N.B.

(A full description was given with the first plate in the last October number of this magazine.)

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## WILLIAM MILES, ESQ., M.P.,

LATE PRESIDENT OF THE

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

Mr. Miles was born in the city of Bristol on the 18th of May, 1797; he is, consequently, now in the fifty-ninth year of his age. He was early sent to school in his native place, to Mr. Faithful's, at Horfield, from which he was removed in due course to Eton. On leaving her classic shades, he spent a year with a private tutor in Essex; and then entered at Christ Church, Oxford, where he remained three years. On passing his examination, he was immediately elected member for Chippenham at the general election which took place in 1818, thus going into Parliament immediately on attaining his majority. He sat for this borough during the short period previous to the death of George the Third; and subsequently spent much of his time in Lincolnshire and Nottinghamshire, where he was known chiefly as a keen sportsman and good rider to hounds.

Mr. Miles re-entered the House of Commons as member for New Romsey, which he represented during 1830 and '31; and contested the Eastern Division of the county of Somerset, where his father had landed property, in 1832. He was on

this occasion defeated; but at the death of Mr. Brigstock, in 1834, he was returned for this Division of the county, for which he has ever since continued to sit.

The career and opinions of Mr. Miles have from the first identified him with "the Country Party." He has always professed what were known as Tory principles, and was very strong and consistent in his opposition to the Anti-Corn-Law measures of the late Sir Robert Peel. He occasionally took part in the many discussions which arose in the memorable session of 1846; and voted in November, 1852, in the minority of fifty-three in the censure of free trade.

Such is but a brief outline of Mr. Miles' life as a public man. As an agriculturist he commenced almost as early, farming in a small way during his residence in Nottinghamshire, and afterwards occupying about 280 acres of land in Gloucestershire. As far back as 1832 we find him a vice-president of the Bath and West of England Society, while he was one of the original members of the Royal Agricultural Society of England. He took office,

moreover, from its very commencement, continuing to act as one of the stewards of implements up to the meeting at Newcastle-on-Tyne, in 1846, when a new system of steward-service was introduced, and he retired by rotation. Beyond this, he has from time to time contributed valuable papers to the Journal of the Society—the results of his own experience upon the growth and varieties of wheat, of swedes and mangel-wurzel, and the effects which followed the application of different kinds of manure.

It has been our fortune to see much of Mr. Miles, in the discharge of those duties which he has undertaken in the cause of agriculture; as president not only of the Royal Society, but also of that he is more immediately connected with—the Bath and West of England, over which he again presided in 1854. As to his conduct in either, we can only repeat what we have already had so much good reason for saying. At Carlisle we wrote—“The full attendance at the dinner—the most fully attended dinner we ever remember—was the crowning compliment to Mr. Miles’ year of office, and few could have better deserved it. From what we have seen of his kind, unassuming, and business-like conduct at many meetings of the Society, we believe we are justified in recording him as one of the best of those who have been called to the chair. This is high praise, but we feel it is merited.”

At the same meeting, Lord Berners, after referring to his character as a sportsman, thus proceeded:—“He knew there was no one who had watched Mr. Miles’s conduct in the senate, or those who had had the pleasure of being in his neighbourhood, and had watched him in the performance of his duty as a country gentleman, that would not bear testimony that there was no one who stood higher for honesty, for straightforward and high-principled bearing. He had to congratulate his honourable friend on the successful termination of his career as President of the Society. This he knew, that of all the Presidents that they

had had, they had never had one who devoted more of his time or more of his attention to the interests of the Society. Their President was one, he need not tell them, who was an ardent lover of agriculture, and a successful practical farmer; but he was one of those who knew—and who practised in their conduct—that, though he supported the cause of agriculture, and knew the prosperity of England depended on agriculture, it did not entirely depend on it. He had known the Chairman from his boyhood, and knew him to be one of those who had ever attempted, and successfully attempted, to unite in stronger bonds of union landlord, tenant, and labourer.”

We quote this as no merely friendly or flattering opinion. All who are acquainted with Mr. Miles will at once acquiesce in its truthfulness. Agriculture has seldom had a better friend, and the country gentlemen none amongst their body who have more ably fulfilled the duties of their station. In addition to great natural ability and sound judgment, Mr. Miles has much personally in his favour. With a goodly presence he unites much facility and ease as a speaker, being very remarkable for a “taking” agreeable manner. We have rarely listened to any one more thoroughly unaffected in his style, or more straightforward in his tone.

In addition to the other public duties we have already enumerated, we have to rank Mr. Miles as an active county magistrate, and the chairman of a bench. His own agricultural labours, too, have considerably increased; for he now farms no less than eleven hundred acres of his own property, at his seat, Abbott’s Leigh, near Bristol. Here, into the privacy of domestic life, we may not follow him; though, had we occasion to do so, we should still find him the same good man and warm friend. It is not always that popularity is any test of real merit. Still, if we wanted any example of its sometimes being so, we could perhaps give few better than the career and character of the Honourable Member for East Somerset.

## UNDERGROUND LABOURERS.

BY CUTIBERT W. JOHNSON, ESQ., F.R.S.

Almost every advance in pursuit of agricultural knowledge seems to increase our acquaintance with the creatures that are our fellow-labourers in the culture of the earth. We are too apt to regard ourselves as the only instruments, under God’s guidance, for and by whom the richest soils are created. We conclude much too complacently that it is *we* who till the soil, and that it is *man* only by whom it is drained, fields are ploughed, and

harvests wave. If, however, on some rainy February day, we have a little time for reflection, we then begin to remember (our plough-teams being idle) that we have a few partners in our labours, and in the enjoyment of their harvests. We think of our noble farm-horses, or our working oxen—perhaps reflect dubiously of some *steamy* scheme for supplanting them at the plough. We see plainly enough that *they* lend their aid—that *they*

put their honest shoulders to the wheel; and if we are stock farmers, we, perhaps, have a kind of small conviction that the short and the long wools too lend a helping hand. These are, however, labourers *above* the ground; they work in the daylight—we see them hourly. But are there no other of God's creatures who are at work to improve our soils?—hid, too, *beneath* the surface; labouring when we are asleep, unasked, and unthanked by us; beings apparently so abject that we are wont to exclaim "They are only common earthworms!" And yet to these mysterious and interesting creatures we are deeply indebted. At a period of the year when, owing to the increased coldness of the surface-soil, those "common worms" are led by an unerring instinct, imparted by the Great Artificer to beings such as these, to dive into a deeper and a warmer soil—at such a season, it may not be useless if we briefly inquire into the habits and *uses* to us of these little labourers, who, like some others of a larger growth, are now compelled by the frost to cease for a while from their work. Let us, then, descend with them below the surface; let us pay the earthworm a visit in his home, explore his long passages, and view him resting in his chamber. We *may* by this means slightly refresh our memories, stumble upon unnoticed facts, and have reason to see the benevolence and the wisdom of a Divine Architect, even in "only a common earthworm."

That worms swallow earthy matter is well known, and also that they eject the unserviceable undigested portion at the mouth of their burrows, in little spiral-shaped heaps or "earthcasts," the pests of our lawns, and the dislike of our graziers. These eartheaters, like the Otomacs described by Humboldt (a clay-devouring tribe of Indians of the valley of the huge river Amazon), find, it is evident, nutriment even in the earth of the poorest soils, still more in the richer and highly-manured lands abounding in organic matters. Of the great extent to which these little miners in agriculture affect the soil—aye, and beneficially too—few of us are sufficiently aware.

It was in a paper communicated to the Geological Society in 1838, that Mr. Charles Darwin proved that there is reason to believe that the layer of black mould which commonly rests immediately beneath the turf of old pastures, owes its presence to the labours of the earthworm; although this "vegetable mould," as it is commonly named, is more generally supposed to arise from the decay of the successive varieties of the grasses which tenant these lands. In the volume of the *Gardener's Chronicle* for 1844, p. 218, he recurs again to the subject, and gives the result of his observations, made in a Staffordshire pasture, since ploughed and planted with potatoes, where, thirty years previously, the

grass had been dressed with marl, the sinking of which marl into the unploughed soil, sorely puzzled the holder of the farm (as such sinkings commonly do all persons). He observes that wishing to ascertain the stated depth at which the marl now lies buried, he had three holes dug in different parts of the field, and in each the marl was found, together with some cinders and broken pottery, in a layer 13 inches beneath the bottom of the potato furrows, which were about 4 inches below the general surface, so that the marl is now buried at a depth of about 17 inches. They will never, Mr. Darwin thinks, be undermined by the worms to a much greater depth, as they now almost rest on the general substratum of pure white sand. He particularly examined the occupier, who spoke very clearly as to the fact that the field had never been ploughed to a greater depth than 6 or 8 inches. In some other fields, the examined substances were also evidently sunk lower than they were when, 4½ years previously, Mr. Darwin had noted their position. He found the layers of lime and cinders in almost every case about an inch lower than when first observed. It was curious (he continues) to notice in some of the holes how distinct the three layers were preserved; the uppermost of cinders being two inches beneath the surface (on the former occasion it was only one inch below), the middle layer of lime at four inches, and the lowest of cinders and burnt marl at from 10 to 12 inches. He found this lowest layer wherever he dug, and also the other layers, but they were less regular, owing to different parts of the field having been limed and cindered at different periods. When digging in this field, after a long drought, he noticed that one single clod of earth, about as large as a man's two hands, was penetrated by eight upright cylindrical wormholes, nearly as large as swan's quills, so that he could see through them; and this, as he well remarks, shows the amount of earth in a small space which is probably often removed by the worms, and brought to the surface. He also mentions a boggy field, on which, 2½ years previous to his observations, a thick layer of bright red sand had been strewed, and which was then  $\frac{3}{4}$  of an inch from the surface: 4½ years subsequently, or 7 years from the application of the sand, he found it 2 inches below the surface. In another rather boggy field, which had been reclaimed 15 years previously, the burnt marl was buried at a depth of 4 inches, so that the rate of sinking, or rather undermining, by the worms has been nearly the same, or about 2 inches in 7 years. In the fields, however, to which Mr. Darwin more particularly alluded, in which the marl was put on 34½ years previously, it then lay 17 inches below the surface; the rate of undermining was therefore much quicker, being nearly

3½ inches every 7 years. This field, it appears, is dry, and consists of black, poor, very light, sandy soil.

That our earthworms avoid ingesting calcareous matter seems tolerably evident; but then there are other insects, of another hemisphere especially, who feed on the lime which forms the coral-reefs. Mr. Darwin tells us that in the bright sea-water of the Pacific, he found in the stomachs of the fishes (of the genus *Sparus*) which pasture on these rocks a substance resembling an impure chalk, and the very coral-reefs are bored full of holes by a sea-worm—nay, the coral itself, composed chiefly of carbonate of lime, is the work of myriads of insects, and is probably previously passed through their bodies.

We may note then that earthworms are carriers of earth, that they mix together the strata of different depths, and thus render it more fertile: but the benefit of their labours is not thus limited. Of the value of the *borings* of the earthworm, in conveying the water to the drains, most farmers are aware. Mr. Robert Beart, when treating of the mode in which water enters land-drains, remarked (*Jour. R. A. Soc.*, vol. iv., p. 412) that on well-drained land the water does not enter the drain by the furrow, or from the surface immediately over the drain (or where the drain is not in the furrow through *the filling in*); but, as it falls, enters first the tilth, or surface, and afterwards the fissures and borings of the common earthworm. The utility of the worm in the drainage of land is unquestionable, for it loosens the soil by its boring operations; and (adds Mr. Beart) “the bores of the worms alone, on some grass-lands, would be sufficient for the infiltration of the water, if the drains were laid at a proper depth to carry it off. I have found (he adds) that the worms bore quite as deep as the main drains, and some of the bores are half-an-inch in diameter.” The observations of Mr. Josiah Parkes, another skilful drainer, are to a similar effect. He remarks (*ibid*, vol. vii., p. 266) that when examining with Mr. T. Hammond, of Penshurst, part of a field which he had deeply drained, after long previous shallow drainage, they found that the worms had greatly increased in number, and that their bores descended quite to the level of the pipes. “Many worm-bores” (he continues) “are large enough to receive the little finger, and it is possible that one worm has several bores for its family, and refuge holes from rain; I have found worms twisted up into knots, and berthed in a nidus formed by the side of the vertical bore, and in communication with it by a lateral hole about an inch long.” He adds one or two instances of the ill-effects to the land from the destruction of the worms by sea-water and night-rollings. To the very

considerable extent of these worm-borings in grass-lands, the late Mr. Pusey alluded, in one of his many interesting papers. When speaking of the considerable consumption of water in irrigation, he observed (*ibid*, vol. x., p. 475), “Even though the stream be strong, it sinks through the worm-holes, from which the escape of the air bubbles produces a general noise like the distant singing of birds: the ground indeed is said to *sing*.”

Then, again, it is certain that the earthworm is concerned in the storing up of the seeds of plants, whose reappearance is in many instances so remarkable. A Forfarshire correspondent of the *Gardeners' Chronicle* observes in a recent communication, that “whenever in that county the whin (*Ulex europæus*) is rooted up or burnt, the common pansy comes up invariably in great abundance. So far as the soil can be examined by a common-hand microscope no seeds are visible, and yet when a portion of it is exposed to favourable circumstances (as in a pot exposed to heat) the pansy makes its appearance. In that county a flagstone is very extensively quarried for; it is frequently covered to the depth of 20 feet or more by what is known provincially as the ‘till’ and as the ‘mortar’ of the geologists; this has to be removed to get at the stone, and in the deep sections of it thus exposed, the under-ground operations of the earthworm may be very commonly seen, and his route traced to the depth of 10 or 12 feet. At the bottom is a chamber which generally contains quantities of small stones and seeds: of these I have noticed particularly the rough ‘boll’ of flax (of the fondness of worms for the flax fibre, see *Jour. R. A. Soc.* vol. x., p. 178), the stones being a size larger than these: the cavities run from 1 inch to 1½ inches in diameter. The perpendicular track or tube (and the chambers also) is lined by an exceedingly fine black earth, like that which forms the ‘casts’ of the surface; and although to common observation no seeds are apparent, yet whenever the bisected pipe or chambers happen to remain exposed to the weather on the face of the hard clay section for a sufficient time, the whole becomes green from the growth of grasses, the seeds or germs of which must apparently have existed in the fine black earth.

Such evidences of the beneficial labours of the earthworm might be readily extended; but rapid as have been our surveys of those works, we may yet see that he not only mingles together our soils, but that he materially aids in their drainage, and even in the storing up of those plants which were ordained to serve, amongst other great purposes, as the pasturage for a superior order of beings.

## THE ABUSES OF THE PATENT LAWS.

In the "Clay Farm Chronicles," where Talpa expounds to Mr. Greening the principles which should guide the application of steam power to tillage, insisting upon the absurdity of any other than a rotary implement for a power whose favourite motion is circular, the worthy farmer exclaims—"Why, you'll be quite an inventor! It's just like Columbus, as discovered America. You ought to take a *pattern out, sir.*"

"Did Columbus *take out a patent, Greening?*"

"Oh my! that's capital—a pattern for America! Well, that *is* a good'un, however. No, no! I guess his diskivery was a little too big for a pattern—'Wide as a world and broad as 'umanity,' as our parson says. No, no! he died quite the wrong side o' money-making, now I think of it."

And certainly the man who enunciates a new truth, and labours to achieve its demonstration to the world, ought to be inspired by a nobler motive than that of filling his pocket. Yet so incurably has the mercenary spirit insinuated itself in every field of human thought and occupation, that if one now-a-days should happen to suggest a notion that can be embodied in a scheme for making gain, some keen-witted and quick-fingered speculator will be sure to get the profit of the proposal; and the only way in which a disinterested teacher can secure his claim of originality and priority, and establish a title to property in his own ideas, seems to be by appealing to the law courts, or taking shelter in the Patent Office. Talpa himself was compelled to the course of becoming a "patentee," in order to defend his right to his own idea against the peculating intellects of ingenious men.

By no means prepared to expunge every statute relating to patents and copyrights; holding the principle that every man has a right to call his the products of his own free labour, we are not going to advocate a socialist system as regards mechanical inventions—making all improvements at once common property, and reserving no possibility of remuneration for the labours of the patient inventor. But we do affirm that, with all its advantages, both to individuals and the public, the present system of patenting often proves exceedingly annoying and antagonistic to inventors, besides delaying, and sometimes altogether depriving, the community of important improvements. How irritated and discouraged must James Watt have felt when—after perfecting his steam-engine, and overcoming all the difficulties of valves and pumps, and the "con-

denser," he was debarred from converting the reciprocating motion of his beam into a circular motion for actuating revolving wheels and shafts because another man had patented the "crank"! But just try to hem a genius in a corner, and you will learn something to your astonishment. Watt accordingly devised his ingenious "sun-and-planet" motion, which served as a pretty good excuse for a crank until the latter itself might be lawfully employed. When, however, you are only a skillful combiner, and no genius, such a check to your scheme by a previous patent obliges you to one of two courses—either to wait until the hindering right has expired—by which time you will be lucky if some person has not pounced upon your idea; or else to compound with the patentee—which is both costly to yourself, and renders your invention so much the more expensive to customers, and therefore less likely to find them.

This kind of difficulty is strongly felt in endeavours to accomplish steam culture. Patents for field engines, boilers, traction-ropes, pulleys, anchorages, digging, forking, and ploughing machines, and even for small details of gearing, or the most unimportant parts of cultivating apparatus, exist in considerable number, as will be seen by a list in another column. Owing, indeed, to the ability of some people to expend heavy sums of money about the most trivial or ridiculous contrivances, these are still rapidly accumulating. Yet how many of these secured inventions have been practically tested upon the land; how many have been really brought into successful and economical use? Worthless, however, as the great bulk of steam cultivator schemes have hitherto been, many of them are acting or rather standing as clogs and obstructions to better ones afterwards proposed; for an utterly impracticable invention may sometimes involve a general idea, or may possess some single detail which, inoperative in its present form and application, may yet be indispensable to the working of an efficient machine different in every other part of its construction. By way of illustration, take the following case: A gentleman of our acquaintance, brimful of Mr. Hoskyns' theory of clay-communion, and well-read in the *Mechanics' Magazine*—beside being tolerably familiar with every-day husbandry in a county which, though mainly occupied by precipitous fells and mountains, possesses nevertheless some fine tracts of not over-stony soil—conceived a new notion for performing steam tillage. This was no suddenly-formed idea, but what had

been gradually and thoughtfully worked out in the course of long study and many experiments. What bundles of his papers have we seen, scribbled all over with diagrams, rough plans and sections; representing every imaginable and (as it seemed) every inconceivable forker or revolving tiller, and all methods of actuating digging-machines and arrangements of tackle for steam ploughing! Then, in the little "sanctum" at the top of the house—what wheels and riggers and pocket-knife models! what an endless variety of claw-shaped tines or cutters, and strange-locking oscillating spades with a sort of valve apparatus for delivering the dug earth! All which contrivances have been made to scratch and delve in the garden, to prove their respective capabilities. Convinced by his own observations, and confirmed by the opinion of a few confidential friends, that his finally-proposed machine is "most ingenious" and exactly the right thing to answer, this gentleman took steps with a view to its manufacture and public *début*—when he learnt, to his chagrin, that his plan comes in collision with three or four patent-rights; and he must therefore give up his projected undertaking, alarmed by the penalties for infringement. Now, had he found, as many an inventor before him has done, that he has been wasting years of inquiry, trouble, and expense upon a scheme which others have long ago tried and abandoned, he could only have blamed his own want of information. But

the *principle* upon which his machinery operates is peculiar to no patent; it is in *detail* alone that he clashes with previous inventors—in a particular form of wheel, and in the arrangement of certain parts. Again, were the obstructing inventions in actual use, this might be some consolation in having to purchase their aid; but when at least two of them—also very recent—are utterly destitute of value, it becomes very annoying that our friend cannot set his tiller in motion without paying down a handsome royalty to a previous patentee, although trenching on but one insignificant "claim."

It is true that by waiting two or three years there is a chance of the useless patents becoming void; still it is only a chance, as the patentees *may* think it worth while to secure for the whole fourteen years. Can any alteration of the existing patent law be advantageously introduced? Or must we submit to these inconveniences as unavoidable evils if inventors are to be favoured with any privileges at all? We do not know: but have written not so much by way of complaint, as to show the sympathy we feel for those mechanics, engineers, or agriculturists who may be preparing to aid us with a good steam cultivator; and, as a secondary consideration, to let the world know that there are individuals in this kingdom intent and resolved upon the desired object, and, indeed, quietly and privately waiting until the field is clear for their public announcement.

#### THE IMPEDIMENTS OFFERED TO AGRICULTURAL IMPROVEMENT FROM THE PRESENT SYSTEM OF COLLEGE HOLDING.

In that spirit of reformation, upon which the present age is somewhat inclined to plume itself, there is nothing more remarkable than the increased interest evinced in the administration of the affairs of public bodies and companies. Everybody's business has turned out to be somebody's business after all, and many the onslaught accordingly which has been made on the abuse of routine, or the apathy of habit. Few, indeed, can hope to escape. From my Lord Commissioner of this or that department, down to the worthy Alderman over his turtle soup, all alike are open to attack. The dandy clerk at Somerset House is no longer invulnerable. The national benefit of a sinecure is no further appreciated. It will be useless to argue now that public property shall not be made the most of, simply because it would be too much trouble to certain too well paid officials to do what they should do. It may, perhaps, be a work of some time and difficulty to move an obstinate man, strong in his

own right of might; but surely we must not passively submit to have improvement retarded by the inertness of any publicly-paid class of men, who should know and do better.

And yet we have been passively submitting to this kind of thing for some time. Many a gentleman who has risen in his place to tell the farmers of his district how they may do something more than they have done, is either directly or indirectly chargeable with being party to the continuance of the greatest possible obstacle to all he advises. The relation between the agriculturist and the clergyman is a close and now generally a good one. The latter, indeed, is interested in a variety of ways in the prosperity of the farmer. The more the art advances and flourishes, the better will be the position of the pastor and his flock. He will always have a practical friend to go to, whose feelings will correspond very much with his own, in promoting the good of the parish.

What, however, do we find in the face of this?

What reciprocity of kindly act and consideration? Often worse than none. A keen-eyed traveller going through districts we could name, shall note down certain plots or estates as but too palpably remarkable for the little justice done to them. He shall see good land not half farmed, wretched buildings, and dispirited tenants. If not knowing too much of the country, he will write these down as disputed properties, most likely in Chancery, or yet attaining to an owner who reaps little more from them than the mere name of possession. Natural though such a supposition might be, it would be anything but a correct one. There is no mistake as to whom these lands belong. We could almost wish there was. It is no impoverished owner, either, who still clings to them. They are in the hands of a rich family, in too easy circumstances we might say, to attend, as they should do, to their own interests. They take regularly and methodically enough what may come, but they wish for no more. They will not only not do better themselves, but they carefully provide that none else should do it for them. The great feature in the management is a system of fines—handed down and religiously observed from one generation to the other; and the more any too-aspiring occupier improves their lands, the more is he fined for so doing!

Strange as it may sound, this is all true. The farms are badly cultivated, the buildings are disgraceful, and the tenants are directly incited *not* to progress. The owners are rich, for they are no others than the heads of colleges—the Deans and Chapters, and other church dignities, who thus grossly abuse the talent entrusted to them. Not one shilling will they lay out, though many the pound they might reap by it. Should the farmer venture to do it for himself, down on his devoted head comes this admirable system of fines. The property is clearly worth more than it was, and a conscientious assessor at once declares that the man who has done this good must be taxed in proportion. The evil is by no means unknown, but it has been suffered to continue far too long, and with too little attention to its effects. There cannot be a question but that the plan on which these properties are let is essentially a bad one, though, at the same time, it is patent enough that even under present circumstances far more might be done in improving them. We cannot avoid the conviction that great blame rests with these heads of colleges, and that in a word they have proved themselves utterly unworthy of the trust reposed in them.

We speak not merely upon hearsay evidence. We have ourselves some tolerable experience of the county of Oxford, and we could name more

than one tenant of capital who has dribbled his fortune away over these college holdings. All beyond “just living on” is an impossibility. There is a general air of depression about the whole homestead, and a man feels beat and sinking, with all the means about him for doing well. If we wanted any further corroboration, we have it in a very good letter, signed “F. R. B. C.,” and published in the *Times* during the past week. The writer gives his own case as the example:—

“The Dean and Chapter of Windsor are owners of extensive farms, let to tenants on leases for 21 years, which it has been the custom to renew every seven years at a low rent on payment of a proportionate fine. The general bad condition of properties so held is notorious. These gentlemen not only set their faces against parish improvements to which they may be asked to contribute—and upon this much may be said—but it will appear they are such enemies to innovation that they not only refuse to assist their tenants in improving their farms, but will not even give them the opportunity of doing so at their own cost. I am the lessee of a large farm of theirs in Oxfordshire, which might be made very productive, but which is now almost a waste, and I am debarred from improving it by its want of draining. I therefore lately applied to their steward to aid me in obtaining a Government loan to drain it, expressing my willingness to pay the whole of the rent-charge during my occupancy of twenty-one years. It may be necessary to explain that the Government advances money for draining, to be repaid by an annual rent-charge of 6½ per cent. for 22 years; but to obtain this a leaseholder for 21 years must get the lessor to join in his application. One would think that, as I am the lessee at a nominal rent for 21 years, and the money is to be expended in the permanent improvement of the land to at least the extent of the rent-charge, the lessors would be most happy to join in an application by which they would get their land permanently benefited, at the expense of the tenant, to at least the extent of the outlay, namely, about £5 per acre—I say to at least the extent of the outlay, because it is only on condition that the draining shall benefit the land to this extent that the Government advance is to be obtained; and, in addition to the benefit from the draining, the land would further have the advantage of the other improvements which the draining would lead to, but which its present wet state is a bar to. But no! the steward sees the possibility of the dean and chapter having to pay the rent-charge for one year at the end of 21 years, and does not see that by that time the estate will have been benefited by my having made 21 payments

out of 22, and that I am desirous of incurring the rent-charge for 21 years, from seeing that the farm must each year be benefited more than the additional rent I undertake to pay, and at the end of my lease the lessors would come into the improved rent my outlay would have created, at the cost of one year's payment; and so, by this refusal, I must continue to hold the land in its present unimproved condition for 21 years; and the dean and canon will, at the end of my lease, find their farm remaining in its present comparatively valueless condition."

The very natural question which arises here is, why not, then, go on in despite of these sloths? This same admirable system of Fines is the answer:—"Were I to do so, when the time comes, seven years hence, to renew my lease, the same steward would be the first to assess the farm at the improved rent my outlay would have created; and thus I should increase the fine I should have to pay by my own act; and this, I think, every one in my position would decline doing."

Just eight years ago, Mr. Houghton spoke thus to a Committee of the House of Commons:—

"Upon another farm I have in Berkshire, which is leasehold property under the college, which I have a beneficial interest in, there I pay a fine every seven years, and a very small reserve rent; that was also in a state of nature, or nearly so, when I took to it in the year 1830. What I complain of, and what I most certainly wish to call the attention of

the Committee to, is this—the very great hardship we labour under, after going through that time; when our fine comes round at the end of the seven years, a very great increase is put upon our improvements. With regard to fines, I have known a very great increase put upon them, and I think it a very hard case, because every shilling of the improvements has been made by the tenant. It is one of the greatest impediments to the improvement of agriculture that the whole of the college property and church leases are let out for a term of years, on paying a fine every seven years. If you happen to break up your waste lands, or build a new house and premises, and lay out a large sum in making it a fit residence to live in, they come round at the end of seven years, and make you pay an increase upon your own capital expended. That is the same with respect to improvements of land, they not having contributed one shilling towards those improvements; you have the beneficial interest, and if you do not choose to pay them what they think proper to ask, they will not renew, and at the end of fourteen years more you have to give up the whole concern."

"A fox well found," says the sportsman, "is half killed." At any rate we have here a fine view; and if we only cap on to them at once, we may force them to break, and take over a better line. If they don't, we must "worry" them on their own pastures, where there is not even a drain to run to ground in. The Oxford Farmers' Club, we see, is one of the few now strong in discussion. Might we suggest to its members an appropriate theme?—"The impediments offered to agricultural improvement from the present system of college holding."

## THE DEVELOPMENT OF AGRICULTURE.

The press of this country has been aptly termed the "Fourth Estate;" and doubtless, in a political sense, it is so. Concurring in the importance claimed, it may be worth while to see how far it has influenced the department we advocate—that of agricultural development; and by reviewing the past, endeavour to trace in the future what may ultimately be its position at the expiration of the next decimal period of ten years. In carrying out this intention, we shall not take the period, in point of time, so greatly into account; but the rather compare generally farming as it *was* with what it *is* at the present moment.

It has always happened, as it always will happen, that any new or great discoveries, on becoming fully developed, are passed as of things gone by, and future generations accept them as discoveries of *the past*, without relation to time or circumstance; but should the man of investigating mind hereafter devote himself to the task of tracing their origin, he will find that the past thirty years have been more fruitful of discovery and invention, as well as the

advantages derived from their assistance have been more extensive and beneficial than all those of the preceding century put together; and he will be desirous of ascertaining how it has so happened, and why at that particular period they should have become so fully developed.

There is even in our scholastic teaching, however humble it may have been, some things impressed upon the memory, that rise upon an occasion like the present, and supply an answer—Who is there, as we hear persons of limited education sometimes ejaculate, that has not written *that* in his copybook? And who is there, we reiterate, that has not written that "Necessity is the mother of Invention?" But, on the other hand, although the moral or suggestion may be quoted, who is there that applies it to the passing occurrence, and weighing the result fairly in the balance, leaves to truth the decision of the question at issue?

If the prosperity that distinguished the farming interest during the preceding period of which we are writing had not been suddenly withdrawn, the

adversity that succeeded during the next 30 years would not have been felt in one-half that formidable severity by which it was attended. Wheat at 100s. per qr. during the first, and wheat at 40s. per qr. during the other period, showed a discrepancy so vast that at the present moment it is matter of astonishment that so many farmers withstood the shock, rather than that all did not succumb to its violence. Of the many ships that leave the port, how few return successful!—those that have gone down cease to be remembered, or leave but a transient existence on the memories of their more fortunate rivals that proudly sail into port with increased importance that they have succeeded in overcoming dangers to which others have fatally succumbed.

So on retracing the scene and extending the view—how many of the preceding age (still fresh in our memories), who at the termination of the war were looked upon as wealthy, have disappeared, and with their families have sunk into oblivion! Whilst, on the contrary, a few, endowed with perseverance and tact, have with good fortune, intelligence, and industry succeeded. “Necessity became with them the mother of Invention;” and, as in nature the offspring quit the fostering care of the parent when arrived at maturity, so Invention no longer acknowledges Necessity, but selects its own path for the future, and, forgetting its parent, proceeds onward in its course to fulfil its destiny for the benefit of the surrounding multitudes.

From the altered circumstances of the times, farmers were *compelled* to resort to the mode of making “two ears of corn grow where only one had grown before;” or, in other words, were necessitated to meet the deficiency of price by increasing the production, which endeavour unforeseen events tended in no small degree to aid them.

The discovery of guano and the triumphs of chemistry, materially assisted to accomplish for them what otherwise Invention never could have attained. The cultivators of the worst descriptions of soil became benefited in a more conspicuous manner than the cultivators of those of the best description; with less charges and outlay, by way of rent and labour, their returns were more than proportionably increased, and it became notorious that the occupiers of inferior farms took a position in relation to those of a better description that they had never before attained. Whilst, the extensive introduction of under-draining still further contributed to bring them nearer the point of productiveness; so that, under the further advantages of season, the inferior clay soils in the last year have generally produced crops superior to those found upon the best soils of the kingdom; and, although it has

been in this case mainly attributable to the beneficial influence of a dry season, we are not to forget that this has been only proportionately with the previous high cultivation employed. The application of machinery to the uses of a farm has given to other purposes the labour formerly devoted to thrashing, and many other processes now superseded wholly or in part by it; and these again acting and reacting, have tended to produce a higher degree of cultivation than had before never been attained; and thus going on year by year with accelerated force, it must at length ramify to all those districts and farms not hitherto reached. The thrashing and converting our crops, which should be accomplished by the least expensive mode, is now effected by machinery; and therefore so far, invention has yielded a vast amount of benefit, and done its duty. We now require its application to the *cultivation* of the *soil*, and thus to place us upon a footing with the manufacturers of iron as well as of our cotton and woollen fabrics. Machinery has, in these cases, so far reduced the cost of production, that it has enabled them to compete with the whole world, and to undersell the manufactures of other nations. Machinery, when placed in competition with manual and horse labour, not only excels it for quantity, but cost. Upon an ordinary farm, the horse labour is as two to three of manual; the two combined, as one to two of the produce. The importance of superseding it in any degree is, therefore, apparent; and ought to be the step next taken, to enable the farmers to meet the competition to which, whenever peace is established, they will again be subjected.

Another point that has almost escaped attention, is the great advantage that has been derived by the introduction of new varieties of grain and roots. If any one will take the trouble to compare those of the last period we have referred to with the preceding one, he will at once become convinced of the fact. The knowledge that has been obtained in the physiology of plants, and the advantages derived by hybridizing, have tended materially to this result. The varieties of wheat of which the Syer and Spalding varieties are types, when brought into a comparison with the Burrell and now almost extinct varieties of a former period, will show an increase in quantity of fully twenty per cent. in acreable production. The Tartarian varieties of oats, in comparison with the original varieties, exhibit a still greater increase. The Chevalier, and improved varieties of barley; the Italian, and improved varieties of grasses; the Skirving, and improved varieties of turnips; the same of mangel-wurzel, and its adaptation to the heavier descriptions of soil, are all advantages of

which it is almost impossible to calculate the benefits.

These are subjects coming under the denomination more of *practical* than of *scientific* development; or rather may we not say it is practice with science, aided as it has been by invention stimu-

lated by necessity? As, however, we intend to return to this subject, we must postpone for the present any direct consideration as to how far agriculture has profited by the exertion and the agency of the Press.

### ON FATTENING CATTLE.

The London, or Central Farmers' Club, in the late discussion on fattening cattle, entirely overlooked the chief point on which the matter rests, viz.—the quality of the straw and turnips in North and South Britain. This division of the kingdom happens in Yorkshire, as in the north of that county very different systems and qualities generally prevail from the southern parts, arising from the soil and climate, and the attendant consequences. The early climate of South Britain hastens the maturation of strawy crops, and the dry aridity exsiccates every moisture, and leaves the culms in the condition of silicious fibre that afford no nutriment, and only fit for being converted into manure. In North Britain, the humid climate permits a later growth of vegetation, which is reaped with more moisture, and thus inherits a nutritious quality. In these parts, work-horses are sustained by wheat-straw during winter; oat-straw is a dainty; and even barley-straw is used, when the crop has been well harvested. The best beef in Britain is there matured from turnips and straws, and without any other article whatever. The climate produces a hard, glossy turnip, very moist and sweet, that is very far superior in quality to the soft, foggy bulbs that grow in South Britain, where are wanting the effects of cold, tempered with moisture, to mature the turnip for fattening. The straws will not maintain any animal life, much less support horses that work, and are even useless to maintain young stock that are being reared. Hence the resort to oilcake and extraneous articles, to supply the deficiency in straws and roots. On the other hand, the hay of South Britain much exceeds that of the northern parts, as the dry climate allows the storing of the crop with much greenness and moisture retained, and which is thereby very nutritious. But hay is not an efficient article for the purpose of fattening: waste attends the use, and with straw that attendance is converted into manure. The value of hay grudges being made into dung, without being used for feeding.

The beef of Scotch Kyoel cattle, which is the best in Britain, is not so good when the animals are fattened in South Britain as when produced

in Scotland, which arises from the very potent influences of climate both on the articles of food and on the animal organization. After all the fine breeding of animals that has been accomplished, these Kyoel cattle pay more per head and per acre than most cattle in Britain, because they are reared at such little cost.

Beasts are most conveniently fattened in yards, provided with a shelter-shed, with one opening, and low in the roof. The dressed turnips are placed in the morning, for a day's supply, in cribs, along the side-walls of the shed, and from which all filth is removed every morning. A widely-latticed rack, in the centre of the yard, contains the straws, which are placed in a fresh supply in a daily store, and are eaten or rejected at pleasure. Two of the largest-sized beasts may be in one yard, and three or four of the medium bulk. Of young cattle, six or eight are lodged in a yard, and are supplied with turnip-tops and small roots. The yards are strewn with litter, thinly and evenly, every two or three days.

The cutting or slicing of turnips, to be eaten by sheep and cattle, never rested on a stable foundation, but is nevertheless a practice that continues longer than some other fancies, by reason of accidental circumstances. An apple is best when bitten by the human mouth; and when cut, as done with turnips, the volatile juices fly off; and they form the most nutritious portion of the articles. The animal delights to exercise the jaws, by which the saliva is produced, that is essential to the production of the agents of decomposition. The expense of cutting roots adds to the outlay of manufacture. After all that has been spoken, written, and practised on the use of turnips, it may be stated that the easiest and most effectual mode consists in drawing from lands of good quality the one-half of the crop, dressed from earth and roots, and spreading the bulbs daily over a surface of ley or stubble, and there consumed by a fattening flock, which will eat all but a few rinds, which pass into manure; and the animals repose where and when their freedom directs. A very long, varied, and extensive experience enables the assertion that no better way exists of fattening sheep; and the ex-

pense is the least that can be incurred. The half of the crop left on the ground is consumed on the land by a store flock, or by a portion of sheep in a condition advanced to become fat from the early grazing. One-third of the crop may be dressed from tops and roots, and carried for stall-feeding; a third used as described; and the other third left to be consumed on the ground.

This is the mode on the best quality of turnip-lands. On the light soils, on which turnips are raised with auxiliary manures, the whole crop is consumed on the ground; a fresh portion is given daily; the roots are eaten where they grow, and the shells of the bulbs are picked up, and the rinds only remain. The sheep are confined nightly in a fold that is moved regularly over the ground, behind the consumption of the turnips. The land is thus equally benefited, and the sheep have daily freedom for exercise.

It is very true that turnips cannot be raised in the dry climate of South Britain to compete with the northern parts, where dews and very frequent rains are so abundant; but potatoes may be largely produced by autumn planting, which secures to

the plant the benefit of winter moisture. Potatoes will rear cattle, along with straws, very beneficially; and, though not equal to turnips for fattening, a large amount of assistance may be got from the roots. Cabbages may be winter-raised in the same manner.

Fattening of cattle without roots is not an eligible piece of farming; and when extraneous articles are bought, and an expensive process of manufacture incurred, the whole cost bears heavily on the profits. Food raised on the farm glides into use, and without any great expense in one date. A cost is incurred; but the outlay is in different times and items, and no large aggregation is raised. More than one purpose is answered: the beast is reared and fattened, and the land is improved for cropping.

The cutting of straws and hays into chaff rests on the same foundation with slicing turnips: straw in chaff is straw still; and with hay, the article passes unreduced by chewing, and the necessary saliva is not produced. Nature acts by simple modes; and in following them, the most certain success is obtained.

J. D.

### THE SPREADING OF FARMYARD MANURE.

A frozen surface of grass—a thermometer showing a night temperature of 18 and even 16 degs. sets the dung-cart busily to work; the pastures are extensively top-dressed. Within one hundred yards of the windows of the room where we are now writing, this operation is going on, in an old park. The turf is refreshing, in this way, over a large breadth of an old domain, whose soil the plough has not disturbed since good Queen Elizabeth walked under its venerable trees, with Howard of Effingham, and the other great sailors of the Armada, in her train. The manure thus spreading tells us plainly enough, even through our noses, that it is not the dung of poor straw-fed animals that forms this rich top-dressing: it is too nitrogenous, too ammoniacal in its fumes for *that*. We look forward to a rich breadth of spring grass, that will refresh our eyesight wherever its influence extends; but as Nelson, when only a post-captain, once said to his admiral, who was rather too wont to travel on in the old way, “Never let us say we have done well if we could have done better.” So we feel that the ordinary spreading of farmyard compost over grass lands is one of those practices that might be improved upon; it is, in fact, one of the few operations of the farm which modern agriculturists, and the science of our times, have left much in the same state as in the days of the Tudors,

when good old Judge Fitzherbert gravely assigned to the English farmer's wives of his time the very delicate office of aiding their husbands to fill the dung wain!

Is there no way, then, of profitably improving this practice? Could not a “turf manure drill” be constructed, that would deposit, if not ordinary compost, at least artificial manures, beneath the surface of the turf; something which should combine the advantages of the sub-turf plough with the manure drill? Or, if this is not yet to be accomplished, is there no mode by which the ammoniacal gases of the dung, when spread over the surface of the turf, shall cease to be swept away by the dry March winds? We rather opine that this *is* to be done to a very profitable extent, and we should be glad if some of our readers, whose teams are now thus employed, would make a few easy *comparative* experiments, and report to us the results. Why not try the effect of common salt mixed with the dung? It is a good fixer of ammonia, and its presence would produce other and beneficial effects upon the manure, the grasses, the soil, and the insects which tenant them all. We should not be afraid of applying the salt liberally. If the farmer has ready access to lime, another portion of the dung might be dressed with this earth; but let us not forget in any case that, if we want knowledge, we

must "gang warily," and not either lime or salt *the whole* of the application of dung, but a portion of the dressing only. That the evolution of even the ammoniacal fumes of Peruvian guano is stayed by a copious admixture of salt, has been lately shown by an able French chemist. M. Barral made his experiments both in his laboratory and in his fields (*Quar. Journal of Agri.* 1855, p. 705). He took two samples of pure guano, mixing one with its own weight of common salt. He exposed equal weights of the pure guano and of the salted guano, in the same stove, to a current of air maintained at 100 degs. They were equally spread, occupied the same extent of surface, were alike pulverized. At the end of three hours the pure guano was found to have lost 5.1 per cent. of its nitrogen; but only 1.9 per cent. was lost from that mixed with salt. The next trial was made in the open air. For fifteen days equal weights of the pure and the salted guano were exposed in plates. At the end of that period the pure guano had lost 11.6 per cent. of its nitrogen; the salted guano only 5 per cent.

These important observations are of a class which well repay the careful study of the grazier, for some light might, perchance, be thrown in this way upon the fitful growth of the red clover, whose success seems in many cases promoted by the preservation in its soil of nitrogenous manures. This plant appears to delight in close soils. It has been remarked generally to succeed better after sheep-fed turnips than after a carted-off crop. And, as a writer in the same able periodical we have just quoted tell us (*ibid.*, 1856, p. 198), manure seems

to have a material influence on the growth of clover. We remember a case where the manure had been carted out during a frost, and laid in heaps, which were not spread out at the time. The frost was succeeded by very wet weather; the dung remained unspread; the best part of the manure was therefore washed into the soil under the heaps. When the field was in hay, there was scarcely a plant of clover to be seen in it, except where the heaps of dung had lain: there it flourished luxuriantly. In Scotland (adds the same author) we find that the nearer in the rotation is the application of the manure to the clover crop, the more likely it is to succeed; and that if the manure is applied to the barley rather than (as is usual) to the turnip crop, the greater is the chance of a crop of clover.

All these observations appear to us to point in a similar direction; viz., that the greater the amount of ammoniacal or other nitrogenous matters present in the soil, the better for the grasses: and although we may not yet be able to apply volatile manures to our grass lands in any better way than by spreading them on the surface, in the sunshine, to be dispersed by the breezes, yet it is always beneficial in any case, when we remember that the course we have long adopted can hardly be made worse. The hero who invented beer no doubt kept it at first in an open vessel. It was only when time pointed out that the air carried off its most prized and volatile portion, that covered vessels were employed: the formation of bung-holes was no doubt a later improvement, and bungs and vent-pegs a still more recent.

#### "PROPOSED SALE OF THE CHINCHA GUANO ISLANDS."

"Be it decreed that the guano of the Chincha Islands — say 11,670,152 tons — be sold at public auction, in nine months, at a price not less than 30 dollars per ton" — is the proposition of the Peruvian Government for the solution of the guano monopoly question. How does it affect British agriculture? For some time past we have been loud in our complaints, every province in this kingdom echoing the exorbitant charges it was paying for this invaluable manure, upwards of 50 dollars having been paid per ton! Now, we have the offer of the whole at little more than half the money! Who amongst us ever dreamt of so propitious a settlement of this international question? How should we respond to it?

But is the story "too good to be true"? Whether true or not—whether there is any probability of the contemplated "Bill" passing the Peruvian Legislature or not, the proposition raised suggests two things worthy of consideration: *First*, if true, ought not the landed interest or Government of this country to close with the offer made, so as to prevent, probably, higher prices than now paid being demanded by

guano speculators? And, *second*, if the measure falls to the ground, ought they to make such an offer to the Peruvian Government as is here contemplated, in the hopes of procuring a suitable supply of guano to meet the wants of the country?

Considered first in respect to Peru, there cannot be a doubt that Senor Roca's measure is a prudent one for the republic, and that the 350,104,560 dollars, if judiciously invested in the paying off of her national debt, the encouragement of immigration, education of the people, and in the irrigation and improvement of the country generally, would be of far more value than the immense accumulations of guano on the Chincha Islands. Experience has already proved, to the satisfaction of the National Convention, that the latter is not such a profitable source from which to derive a revenue as the general prosperity of the commonwealth. So far, therefore, as Peru is concerned, the proposition is probably the most important which has ever been enunciated in her political economy.

To England the question comes home with double in-

terest at the present moment, owing to the high price of agricultural produce. The extra demand for artificial manures proves this, that for Peruvian guano exceeding many times the supply. Now, as an increase of supply would be equivalent to an increase of produce, the beneficial results at issue may be more easily imagined than expressed.

But the mere change of proprietorship would be no guarantee for an increased supply. On the contrary, it might prove the reverse, public or public speculators turning out greater monopolists than what the Peruvian Government have been.

Free trade in guano is obviously, therefore, the practical question at issue; and to obtain such a desideratum we may at once conclude that the British Government ought to become the purchasers. The guano might be equally safe in the hands of the landed interest as to monopoly; but here, we fear, the lack of enterprise and capital is such as to render the proposition practically impossible, so that the result would be the loss of the guano. The first point is, to secure it at the highest price it is worth; the second, to protect the islands after the purchase is made; and the third, to secure the delivery of the guano to the British farmer. Now, under each of these heads, the Government possesses many advantages over private commercial interests. It is able, for example, to give a longer price, and thus secure the guano; and also to control the whole affair afterwards, both as to protection and delivery.

To this, no doubt, exceptions may be taken, in behalf of commercial and international rights. In a country like England, where capital is so plentiful and enterprise so great, it may be asked, for example, Why make a Government job of the Chincha Islands? But the objection falls to the ground, for two reasons—*first*, there would be nothing to hinder Government from handing over to commercial parties the guano at prime cost, on their granting the necessary security to offer it in the British market at a stipulated price; and *second*, even granting that Government sold the whole through the instrumentality of commission agents, transactions with the landed interest and retail dealers would be of such an open recognized character as to prevent the possibility of jobbing.

The other question of international rights is not so easily disposed of; for England will find in the United States of America, France, and the other continental states of Europe no mean competitors in the first market. "The law," we are told, is "to be published in all languages, and circulated, through the Government representatives, in Europe, Asia, and America;" so that no favour or partiality is to be shown her. At the same time, it is evident that she stands most in need of the guano—is the wealthiest and best able to give a fair price for it; so that, if we lose this national acquisition of so much importance to us in our present exigencies, the reason must obviously be attributed to bad management—a conclusion which need not be concealed.

We have said that Government ought to give the highest price the guano is worth to England. Now, as this is somewhat opposed to the opinions hitherto expressed by the country, its soundness may be queried, and therefore it may be as well to review it before passing to the second head of our subject.

(1). Peruvian guano is still one of the cheapest artificial manure in the market, and if the Chincha Islands fall into the hands of our transatlantic cousins, who are not insensible of their value, those who have hitherto been loudest in their complaints against monopoly prices to Government may be the first to reprove them, for a want of duty and respect to the welfare of the agricultural interest, should they lose the guano by offering too small a price.

(2). The proposition of the Peruvian Government is doubtless calculated to reprove the policy of the landed interest and government of this country, hitherto being not a little tinged with *short-sighted selfishness*, and to warn them in business-like terms at present not to lose sight of the best interests of their country for the future.

(3). And lastly, the present exigencies of the country demand of Government to secure the guano at almost any reasonable price. International duty may no doubt call upon her to respond to the interests of other states. Granted; but nevertheless if England neglects her interest in the Chincha Islands, she obviously loses sight of what is equivalent to her staff of life—the daily bread of a large portion of her people, now experiencing the hardships of a short allowance.

With these conclusions we are prepared, briefly to dispose of the second part of our subject. If the Deputies of Peru reject Senor Roca's measure, it will neither diminish England's dependence on guano for our increase of bread-corn, nor lessen the duty devolving on her Government and landed interest to consult, at present, the productive resources of their country for the future. The question of purchase has been raised, and no stone ought to be left unturned to conclude a bargain. The mutual interests of both countries demand this; and although postponed, the day is not far distant when they will reciprocate together; for what England has to spare (a surplus population, machinery, &c.) Peru wants, and what Peru has to spare (guano) England wants; so that under such circumstances the interchange at issue is but a work of time. At present, therefore, England demands of the landed interest of this country to do their duty.

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TO KILL WORMS.—Where worms are numerous, and throw up their casts in such quantities as to disfigure grass-plots, a strong decoction of walnut-leaves, if in the season, watered from a pot over the ground, will cause the vermin to leave their holes, when they may be easily destroyed. In winter-time a good irrigation of strong brine (salt and water) will produce a similar effect, but the herbage will perish on its application, although the same may be used safely and effectually in gravel-walks, &c.

## THE GAME LAWS AND LANDLORDS.

There are certain abuses which, in the still faithful observance of a time-honoured custom, are sure to be made the most of. Prominent amongst these stand game and the game-laws. The offence here is not so much in breaking the law as in enforcing it. Perhaps in no other act for which the Legislature is answerable are the sympathies of the people generally so little in unison with that they have to observe. The game-laws, in fact, are made for one especial class of society. More than this, to that same body is their jurisdiction almost entirely entrusted. The man, then, who sins against such enactments, does so with the full consciousness that his judges will be those chiefly interested in maintaining the full dignity of the law.

The knowledge of this ought to have the effect of making us all more than usually careful. In saying so much, we would address not merely him who may be tempted to transgress, but equally so such as may have to sit in judgment upon him. At best "they have a disagreeable duty to perform." Their prejudices and their interests will all be assumed to go against the offender. They will be looked upon by many not so much as justices as prosecutors; and woe to them should they strain any point or enforce any penalty for which they are not fully warranted. As we have said, this is certain to be made the most of. The Press of this country have not often much in common with the sportsman. Town and Country will be alike ready to fasten on such an error of judgment. From his own immediate neighbourhood to the most distant parts of the kingdom will the oppression and injustice of the country magistrate continue to be dwelt upon and denounced.

Surely, then, it behoves us all to be doubly careful in what we do with the game-laws; and surely the country gentleman should be even more careful than any other, in handling so ticklish a subject. He is commonly regarded only as the influenced exponent of a bad law; while a keen sense of his own honour and character should urge him to afford every reasonable contradiction to so unfavourable an opinion. Let him hazard no conviction but on the clearest evidence; and even when he does convict, let mercy be as ready to temper justice in the death of a pheasant, as for the stealing of a loaf, the pulling a turnip, or any other crime where poverty and necessity *may* have induced to its commission. Let him, on the other hand, be but hasty and harsh, and, like another

Midas, all he touches shall turn to game—he himself being made more palpably game of than his finest pheasants or fattest hares.

Surely, we repeat, he should be careful here. If he would have his neighbours respect him, and the Government uphold him, he should endeavour to read the game-laws temperately and dispassionately. If he will not, seldom in these days can he hope to escape retribution. It is not only the poor wretch before him that the abuse of power will arm against him. Every hand is ready to be raised. He and his laws are not merely oppressing the labourer, but robbing the farmer, and disgracing the community.

All this has been said within this very week. There is hardly a paper in London but has denounced the monstrous decision of the Wingham Bench of Magistrates. We are not going to tell the story over again here. It will be found in another place; and it will be seen from this that the whole charge rested with one of those terrors of the country—a game-keeper. We speak advisedly. We know from our own experience how often characters are whispered away and petty cases trumped up by these men; and it is simply a disgrace to the landed proprietors they should exercise with their employers the influence they do. Can anything be more overstrained than this man's conduct? The firing of a gun was with him offence enough, and without an atom of evidence beyond, the worshipful Bench of Magistrates agreed with, and supported him! Mr. Rice may consider himself in no way implicated in this matter. Had, however, an over-zealous policeman, in his anxiety to convict, forced the so-called evidence which his servant did from a half-witted boy, the man would most probably have lost his appointment. It remains to be seen whether "a gentleman's service" is to tend but to the training and encouragement of mere spies.

As to the conviction indeed, no evidence whatever need have been offered. The game-keeper influence runs through the whole proceedings. The lad's character had evidently been whispered away. What says Mr. D'Aeth—"Your father and brothers have all been at it; and if they have not been taken, they ought to have been." Been at what, Mr. D'Aeth? Doing their duty to their employers, and, in so doing, accidentally killing game they did not care to pick up. That "ought to be" is a convenient phrase. According to Mr. D'Aeth, the whole family of the Hoyles "ought

to be" in prison for offences never proved against them; while Mr. D'Aeth "ought to be," no doubt, the grand luminary of the Wingham Bench of Magistrates, from that excellent discretion and common sense of justice he has now so signally proved himself to possess.

The case, however, has still another reading, and that peculiarly an agricultural one. The farmer's bird-boy has now his duties clearly defined, and it is only right these should be generally known. There are certain birds he is to warn off; while there are others to which he is to pay the utmost possible respect. With rooks, pigeons, and such like rascallions, he will have no mercy; but at the same time he must take care not to inconvenience the game. "I am sorry to trouble you, really," he will say politely to a gentlemanly cock-pheasant, "but I will drive these blackguards off in a minute, and then you will have it all to yourself." This, indeed, can be the only safe course; for, remember, there is sure to be a keeper to mind the boy that minds the birds. We hope even this may be carried yet a step further, as with the Yorkshireman who hesitated to bet with the Londoner. "If you doubt me," said the latter, "my friend the captain here shall hold the money." "Aye, aye," returned the other, "but who's to hold the captain?" We should like to have somebody in turn to mind the keeper—might we suggest his employer?

And what is the effect of all this? Mr. Bright is urged by one writer to return to his proper labours, and aid us to do away with these abominable game-laws. By another, farmers are told to profit by the lesson before them, and never to think of taking land on which there is any reservation of game. A third has some similar advice, quite as well-intentioned, and more or less as impracticable. The game, no doubt, is a landlord's privilege, that will long yet continue with him. How many tenants would now be without occupations, did they stand out for it? Temperately and fairly exercised, we believe it to be a right which the tenantry of this country do not often dispute. They are glad to see their landlords enjoy themselves as they should over their own estates, so long, of course, as this be not to the serious injury of those who have to live by their cultivation. We could instance very many properties where this good feeling has long existed; and others, on the contrary, where the system of game-preserving is to the farmer and the community, little short of direct robbery, waste, and abuse. The great power, we say again, is with the owners of land. They have *yet* the game-laws in their own hands; and it is for them to show that these laws may be retained without that outrage on common sense and justice with which their observance is now so often associated.

## VERMIN, AND GAME LAWS.

SIR,—From the letters I see, from time to time, in your paper, on the subject of Preserving Rabbits upon Estates, it would seem that the landlords of England—some of them, at least—were growing more and more demented about their game. What! give the rabbits as a perquisite, in part of wages, to the gamekeepers, and thus establish for them a direct interest in making every farm a *preserve* for their benefit! This is surely the extreme of reckless injustice and folly, and argues as little regard for the interest of the estate as for that of the tenants. Never would I place myself in the power of a man who, to the practice of preserving game (really such) for his own pleasure and amusement, adds that still more gross injustice of giving a set of men, generally devoid of principle, the privilege of converting every farm on an estate into a rabbit warren, for their own especial benefit. I have known something of the destruction caused by these vermin, both to the crops and fences, even where the tenants had full liberty to destroy them; and I have no hesitation in saying that no farm is worth having, on any pecuniary terms, where the gamekeepers have the rabbits for a perquisite; nor does any landlord who practises it deserve to have a respectable tenant.

It may be said that I have applied a harsh epithet to gamekeepers; but although there may be some who do not deserve it, my own experience convinces me that the majority of them are what I have described them to be. In innumerable instances they are men who have been the most successful poachers themselves, and are chosen, not only on account of their cleverness, but of their intimate knowledge of the peasantry in general, and of the poaching fraternity in particular, in the neighbourhood. Most of them, I believe, too, do a little in that way, under the rose, themselves, and in some cases with the connivance of their employers, who wink at it for a very palpable reason. A circumstance occurs to my recollection which will serve to illustrate this case. The Earl of B. was once exclaiming against the lawyer who had the management of his estates, for some peccadilloes he had just then detected. "Well, my Lord," said the Countess, "it is entirely your own fault. You know him to be a villain, and that he is robbing you every day of your life; why, then, do you not turn him off?"

"Most true, my Lady," replied the Earl; "C. does rob me right and left, but he takes good care the tenants shall not do so; and, with submission to your Lady—

ship's better judgment, *I had rather have one thief about me in the shape of a steward, than three hundred in that of tenants.*"

Just so: and on that principle the landed gentry act who give their keepers the privilege of robbing both themselves and their farmers, and submit to the degradation of employing around them a set of men who, out of their livery, they would most willingly hang or transport, if they could. It is, in fact, the guilty knowledge these men possess of the poachers and their habits, that alone obtains them the favour of their masters.

That many of the keepers, if not most of them, are themselves poachers, I have abundant reason to believe. The following case is so much in point that I cannot refrain from stating it. Some years ago, the late General B. went to a certain noted public-house, the resort of poachers, in the city of N., and asked the landlord if he could procure him thirty brace of live pheasants, to stock a young plantation on his estate at H., away from his old covers.

"If you come here next week," replied the innkeeper, "I shall have seen several parties in that line, and shall be able to tell you."

Accordingly, the General went at the time appointed, when the man told him he might have the required number at two days' notice, and off any estate he chose; "including," said he, "*your own*, if that will suit."

"No, no!" exclaimed the General hastily; "anywhere but out of my covers."

The plain and naked inference to be deduced from the above anecdote—which I know to be true, it having been related to me by one of the General's tenants, who had the account from the innkeeper himself—is that all the gamekeepers on the surrounding estates were poachers, and known to be so by their employers. And although, probably, none of the latter counted upon such a wholesale raid upon their covers, they kept these men, with a full knowledge of their "ruling passion," upon the principle of the old proverb, "Set a thief to catch a thief." Now, to place a body of tenantry at the mercy of such men, giving them a direct interest in keeping up a large head of these vermin upon the farms, is nothing better than downright robbery. It is plain that the more rabbits there are, the larger are the gains of the keepers, who cannot be expected to feel any compunction about the damage they inflict. Indeed, if the landlord himself pays no more regard to the welfare of his tenants than to render them subject to such a gross injustice and injury, it cannot be expected that his keepers will be more considerate.

I have myself known many estates on which the game was preserved with great rigour, the tenants not being allowed to shoot, though they might *destroy* the rabbits by ferreting. Even in these cases, as they had not the liberty of entering the covers for that purpose, the injury sustained by the constant inroads of these vermin, in addition to that inflicted by the game, was a continual source of annoyance and vexation, as well as of loss. It is hopeless for the owners of such estates to expect their tenants to carry out those improvements which the spirit of the age would otherwise suggest. The tenants on them are generally poor and dejected; for no farmer possessing the spirit of an Englishman would take land under such abject conditions. But when to this is added the monstrosity of creating a *second preserve*, by turning every farm into a rabbit-warren for the profit of the game-keepers, the degradation of the tenant becomes complete. It is bad enough to have these artful fellows (for such is the character of all I ever came across) constantly about you, prying into your affairs, and carrying to their

employers every little circumstance they fancy will please them to know, and injure the tenants. More mischief, I firmly believe, has been created between landlord and tenant by their means than by any other. But nothing whatever can justify a landlord in giving them an interest in the destruction of the crops, by allowing them the rabbits as a perquisite—a system sure to intensify the bickerings and quarrels which arise through the influence of these men.

I have at this moment in my eye a farm occupied by a relation of my own. It contains seven hundred acres of excellent land: the tenant is wealthy, and has farmed it well, and successfully; but, through the vile insinuations of an artful keeper, who is jealous of his destroying the rabbits, he has had disputes with his landlord, and the probability is that, as soon as he can procure another farm, he will leave it, rather than submit to the degradation of being subject to the constant surveillance of a spy, who cares for no other interest than his own.

In fact, so enlightened and respectable (in point of intelligence) has the agricultural interest become, that it is high time an alteration should be made in the game-laws; and that those who feed the birds and hares should be allowed the privilege of sharing the pleasures of the chase, as well as the profits of the game. Under the present system the landlord may multiply his game as much as he pleases; and the tenant must stand quietly by, and see his crops destroyed, without redress, or even the privilege of remonstrance. These laws are the remains of the ancient feudalism, and are as much at variance with the spirit and intelligence of the present age as would be military service. I do hope that the aristocracy of England will open their eyes to the injustice and impolicy of allowing these laws to remain on the statute-book; still less that they will continue the mean and unworthy custom of paying their servants' wages out of the just profits belonging to their tenants.

Your correspondent S. A., writing from Leamington, has estimated the damage of one rabbit at 10s. per annum; but if to the loss of the wheat be added the injury to the fences, and that sustained by the constant hunting and ferreting by the keepers, I believe that sum will not half represent the mischief, independent of the continued vexation and annoyance the tenant must suffer.

Hoping that you will take this subject up, and expatiate upon it in your leading articles,

I remain, yours, &c.,

Dec. 27th.

FAIRPLAY.

## LONDON CENTRAL FARMERS' CLUB.

The following subjects have been selected for discussion during the present year, 1856:—

Feb. 4.—Agricultural Statistics, combined with a Practicable and Equitable System of taking the Annual Average Price of Corn. Proposed by Mr. J. A. Williams, of Baydon, Hungerford.

March 3.—The Form of Farm Agreement best calculated to give a stimulus to Agricultural Improvements. Proposed by Mr. G. Jackson, of Tattenhall Hall, near Chester.

April 7.—The Relative Values of Artificial Manures, and their Comparative Adaptation to different Crops. Proposed by Mr. J. C. Nesbit, of 39, Kennington-lane.

May 5.—On the Application of Geology and Hydraulics to the Drainage of Land. Proposed by Mr. R. Baker, of Writtle, Chelmsford.

June 2.—On the Expediency of Converting Grass Land into Tillage. Proposed by Mr. J. Wood, of Ockley, Sussex.

November 3.—The Moral and Social Condition of the Agricultural Labourer, and the best Means for Improving it. Proposed by Mr. W. Spearing, of Chilholton, Stockbridge.

December 8.—On the Rotation of Crops, more especially as to how far the Four-course System is susceptible of Improvement. Proposed by Mr. J. Thomas, of Lidlington Park, Woburn.

The discussions commence at half-past 5 o'clock.

## GOOD HUSBANDRY, AND THE NECESSITY FOR ITS EXTENSION.

From the high price of bread-corn, the consequent competition for farms, and probable continuance of high rents, an unsophisticated stranger from the other side of the world, or even a juvenile political economist at home, would be likely to infer that the food-bearing capability of every acre of English soil is now being tested to the utmost, and that no means of increasing productiveness, which are open to a nation of great wealth and good appetite, can possibly be neglected in any corner of our kingdom. But, alas! we know that lands cultivated to the highest pitch of fertility are often the exception rather than the rule; that the profitable investment of capital in improvements might be immensely extended; and that estates may be quickly reckoned up on which almost a double amount of produce could be raised. Not only Britain, but the world, wants bread: a searching scrutiny will surely be made into the conditions which prevent the best use being made of the soil; and if any legal or social trammels shall be found in the way, woe to any class of the community who, by upholding such obstacles, shall deprive their fellow-creatures of any portion of food. Tenant-farmers have been blamed and exhorted by landowners and agricultural writers, too often after the fashion of masters accusing labourers of improvidence, while screwing down their livelihood to the lowest rate of wages. We observe, however, that the landlords are now having their turn of appeal and reproof, of instruction and warning; and we trust that the noble words uttered by Lord Stanley, followed by other energetic declarations at several agricultural societies' meetings, will lead to a great movement amongst the "sons of the soil."

Notwithstanding the modern extension of good husbandry, we know that tenant-farmers may go to yet greater lengths in the profitable investment of capital in the soil: indeed, we believe that, as a general rule, the occupiers of English farms are exerting themselves beyond their strength, straining to cultivate more acres than they have means to manage. But let landowners consider whether, in the majority of cases, their tenantry are not deterred from expending capital to the full extent sanctioned by the experience of the best managers, by the circumstance that the permanent improvements which it is the landlord's duty to make are not yet fully undertaken.

Last summer, we chanced to walk over some land belonging to a nobleman's estate, and occu-

ried by one of the best business farmers in the district, and which, furnishes a pretty good illustration of our meaning. The land referred to lies in one of our midland counties, upon the oolite formation, and consists of several fields of clay soil, connected with a large farm of good loam and "red land," growing first-rate turnips, wheat, and barley. The clay is not particularly stiff, soapy, or tenacious, but what is called "poor and hungry." And this poverty-stricken and faminous character it seems likely to preserve under the following system of culture: Every third year it is dead-fallowed, without manuring, and never ploughed more than four inches deep; the crops procured by all the ploughings and workings needed to keep the ground from becoming unconquerably foul consisting of three quarters of wheat per acre the first year, and a wretchedly thin yield of oats the next. The rent being only some ten shillings an acre, it is possible that, with good prices, the tenant may make this kind of tillage pay its way. But this is not the point we are contending for. We say that that very land could be made to yield by ordinarily good husbandry double the amount of human food at present got out of it, at the same time affording a fair profit upon the extra capital invested, and an increased rent.

Some years ago, a former tenant pretended to drain the land; and so absurdly shallow were his views of "filtration," "subsoiling," &c., that if the ploughman now dips his share an inch or two deeper than usual, he ploughs up the tiles! The fields want draining; and there is a first-rate fall, and not a stone big enough to hinder the spademen. The land lies in high-backed ridges, to shoot off the rain-fall into the sodden water-furrows, each furrow showing itself at harvest as a stripe of three yards in breadth, without an ear of corn from end to end. The tenant is a man of considerable capital, but has no lease. He may quit next year, and cannot, therefore, expend his money gratuitously in improving another man's property. The landlord here is clearly to blame.

The fences are neither ditch, hedgerow, nor copse, but nuisances of bramble, couch-grass, and overgrowths of trailing and spreading plants, several yards in thickness. Is the tenant-at-will to grub up all these rubbishing land-marks, and substitute neat quicks? Here again the landlord is bound to interfere.

Examine the soil. The subsoil is bad. It is sticky, and has that pale yellow-brown appearance

denoting the presence of the unkindly protoxide of iron. But the thin cultivated staple itself was once of the same quality: tillage has improved the surface, making it brown, and tolerably wholesome for plants; and why not, therefore, extend the process further in? why not ameliorate and enrich further down? in one word, why not deepen the staple? The landowner, as before, prevents this improvement by neglecting or not being able to underdrain the land.

There are some kinds of permanent improvement which are admissible in one district, and hazardous in another; but surely the underdrainage and subsequent deep culture of a strong loam or clay soil is an established point in good husbandry, if any rule at all can be said to have been proved in agriculture. Either Smith of Deanston lived and worked for nothing, and Smith of Weedon has never improved his subsoil; drain-tiles and trench-ploughs are useless playthings, and Fowler's

draining plough a futile invention, or else the ground we are describing must be miserably ill-treated, and the nation thus deprived of grain that might be reaped, and meat that might be fed from it.

And are there not thousands of acres in this kingdom, in little better plight, requiring much the same sort of improvement?

We repeat that, in these times of scarcity and high price of provisions, the people ought to know whether the best use is being made of the land; and if the matter should continue to be neglected by "those whom it concerns"—if landowners do not speedily set about improving their own estates, and occupiers do not study and adopt the best management—depend upon it, the prolonged existence of an inadequate cultivation will cause a deep discontent to pervade the consuming classes. It will be for "the landed interest" to consider how far this may be justified by any neglect on their part.

## AGRICULTURAL PROGRESSION.

### THE FARM LABOURER.

The safe and satisfactory progress which every department of ordinary farm practice is now undergoing amongst the most important improvements of the age, and is one of the greatest and best of blessings enjoyed by this highly-favoured country. Its commencement may date from the first establishment of agricultural societies throughout the kingdom. It was from these sources that it received its greatest encouragement, and from them emanated that mass of information which has in such an extraordinary degree contributed to expand the views and stimulate the exertions of the practical farmers of every grade of society. Take the past season. Never has there been such a general adoption of autumn-culture, and never such determination evinced to clean and improve the soil, as was manifested during the past season. The extensive and almost universal introduction of *steam-power* thrashing machines having set at liberty vast numbers of horses for the other labours of the farm, these have been most advantageously employed in autumn fallowing, or in the various purposes of cleanly culture; and this extended preparation of the soil for its final, its highly-fertilized seed-bed, must result in a healthy and vigorous plant, giving very hopeful promise of a full and profitable crop. But to my subject.

I well recollect the introduction of the common machine for thrashing by *horse-power*; and not many years have elapsed since the whole country was under considerable alarm, in consequence of

the working population becoming inimical to their extension, lest it should prevent the necessity of thrashing with that most old-fashioned of all machines—the *flail*. What a change has come over the agricultural labourer since that time! No flails now: men cannot be found to work at such downright drudgery for any lengthened period—it is considered a degradation. To set a man to thrash with a flail is to say he was unfit for other employment. Farm labourers now enjoy the excitement, hurry, and bustle of steam-thrashing days. The great improvements recently introduced in these machines for economising labour, tend only to increase their wonder and admiration rather than incite their envy and opposition; and it is very gratifying to find that this class of men are almost prepared for innovation upon their customary employment; and why? Because they see that the demand for labour is constantly on the increase—that every improvement in farm business has led to a greater outlay of capital in labour.

I have long mixed with farm labourers, and in my younger days laboured daily with them; and although I cannot commend their high intelligence, yet, taking them as a body, and keeping to their sphere of observation, which must of necessity be limited—often confined to a single farm or parish, or at most the district—I fear not to assert that they exercise as much common sense as their neighbours about matters with which they are conversant, and as great skill and ingenuity in the execution of the various employments to which

they apply themselves. Is it nothing to cut and turn over with a plough a furrow straight, clear, and clean, for half-a-mile in length, without bend, swerve, or shake? Is it nothing to build a series of stacks as upright, straight, and high, with simply the eye to guide, as a builder could erect an edifice by aid of plumb-line and rule? The farm labourer can do this, and many equally clever performances in his own peculiar departments of labour, so as to astonish the beholder by the precision and accuracy of its execution. Take any operation: the sowing, drilling, and reaping of corn; the works of draining and hedging; the shearing of sheep—are often beautifully done, and very many other farm operations.

It is a mistake to class the farm labourer of the present day with his fellow of sixty years since. He is now ready and willing, to the best of his ability, to undertake any kind of labour connected with the introduction of the modern improvements in agriculture. No opposition will in future be encountered by modern innovators upon old established farm practices; prejudice—that bane of the ignorant—is disarmed, the way is fully open, and expectation on tiptoe; and delighted am I to see these innovations creeping in everywhere, and to witness the vast improvements that accrue from their adoption, and the readiness with which they are received by the labouring classes generally, and who now begin to vie with each other in carrying them out.

One of the greatest evidences in favour of agricultural progression is this desire on the part of farm labourers to foster the introduction of every implement likely to decrease laborious employment. They were slow to learn, certainly; but works of great magnitude were ever arising before them, so that it was soon found impossible to live in a country of railroads, with trains continually startling the plough-horses they drove, without expanding their views, opening both eyes and heart too. Soon were to be seen steam-engines puffing away in many a farm-yard. Then, again, the numerous appliances to be worked on the farm, to diminish labour and promote more speedy culture and pulverisation of the soil, have become proof to the dullest “clodpole” that at least great changes were going on; and by degrees he has been led to acknowledge them to be decided improvements. Thus the minds of the farm labourers have become enlarged; and having become teachable, our great aim should be to aid them to encourage this disposition to acquire such practical knowledge as will ere long be more than ever requisite in the conduct of farm practice.

Nor is this desire to acquire a knowledge of improved farm practice confined to the culture of the soil and the various operative departments con-

nected therewith, but it extends to the management of stock, and to the various improvements consequent upon the introduction of new modes of breeding, of rearing, and of fattening the live stock common on every well-regulated farm. This is of very great importance. Who does not recollect the favour professed to be given by graziers of cattle to “out liggers”, grass wintered, and to grass-wintered sheep, &c.? The farm labourers can see clearly enough that warm yards, with plenty of turnips, cake, and STRAW (not hay necessarily) for cattle, and warm folds in the turnip field, with a plentiful feed from his cutter, is infinitely preferable; and it is thus (not to enlarge) that he looks upon every other phase of stock management.

We must, at no distant period, be prepared for still greater innovations in farm practice, such as cultivation by steam, sewage irrigation; for a more extensive stock fattening by artificial food, &c.; for the growth of crops, [by chemical aids or otherwise, on a far more surprising and surpassing scale than hitherto practised. For these we must prepare, and for a vastly extended and improved agriculture. It is for this purpose that the minds of the farm labourers should be educated, should be prepared; and that by the diffusion of agricultural knowledge amongst them, either by reading or oral lectures. And what is easier? Such readable information is cheap enough now: every farmer ought to have his papers and periodicals, his *Mark Lane Express*, his *Farmer's Magazine*, his *Agricultural Journals*, or the like, and circulate them amongst his labourers. This may and ought to be done in every locality, and I conclude this imperfect paper by earnestly recommending these and all similar means to be adopted for their especial benefit by every well-wisher to their class not only as desirable, but imperatively necessary.

#### THE FARMER.

Let us take a retrospective view of the Farmer, and enquire into his state and condition prior to the advent of modern agriculture, or to the days of the late Lord Leicester (Mr. Coke) and Francis Duke of Bedford, those noble patrons and pioneers of a new order of agriculture, and compare him with the farmer of modern date.

These noblemen had to do with farmers of the old school—the old British yeomen—the jolly farmers—in most respects honest, worthy men enough, but glorying in their ignorance, and pertinaciously following in the old track, the steps of their forefathers; obstinately prejudiced, and generally opposing all alterations and innovations upon the old-established order of things.

Visit him on his farm. Notice him in his homely

everyday dress—the long brown and threadbare coat, straight in cut; or his blue slop, tucked tightly around him; his most capacious waistcoat, with its ample pockets, and their promiscuous stores; his large nether garments, tied at knee or far below it; with stockings of coarsest knitting; his neck either bare, or protected by a coarse, flaunting tie; his head surmounted by a round, low-crowned, slouching broad-brim; his feet shod with enormous shoes, and large, bright buckles to match. Or take him in his holiday attire. See his long “true-blue” coat, with straight front and bright metal buttons, reaching to his ankles; his yellow or white, but spotless, buckskins, and heavy, topped boots; his bright yellow waistcoat, ample beyond measure; his splendid shirt-frills, and flowing neck-tie; his handsome large-brimmed beaver, with broad band, and large, shining buckle; with his heavy hunting whip in hand, and mounted on his heavy, strong-framed “bob-tailed” charger. Enter with him into his most hospitable home. You have the best of homely fare; the strongest and purest ale, and plenty of it; the boar’s head and the stuffed chine; the home-made loaf; the choicest of cheese, and the best of butter; the pie, the tart, and the pudding of the best—and all given with the heartiest hospitality and primitive simplicity; and your evening is enlivened and cheered by your pipe and glass, the song, and social converse, followed by some one of the many old English games so common at that period—or the dance, the riddle, and the jest.

In giving this very short sketch of old English life, one is tempted to eulogize the old English character, the old English farmer, and his mode of living in the “good olden time.” Its tendency was good, and evidently intended to promote harmony and good-will, and to pass the time pleasantly, convivially, and heartily, as it was then termed; but we must remember that there was nothing intellectually good in all this. The mind was not cared for: the object was rather to prevent intruding thought, and to “drive dull care away”—to make man an unthinking, *jovial* being, as if he possessed neither heart nor soul for more intellectual attainments. We rejoice to know that in the present day the mind of man has far outstripped his animal nature—that amusements like those named are very unsatisfying now, and have no power to restrain his mental aspirations. “Mind is victorious over matter.”

But to “the good old English farmer.” Follow him in his business—his daily rounds. He was a man of early and regular habits, and frugal in his personal expenditure (much to be commended in the present day). He breakfasted at six, dined at twelve, supped at eight, and to bed at nine o’clock.

His course of business was simple and easy, his great aim being to avoid expense in management, regardless of the results either in the paucity of his crops or the unthriftiness of his stock. On the best of soils, his course of cropping would not exceed oats, wheat, and fallow—often a bare fallow. Turnips were almost unknown, in many districts, and not generally cultivated in others, particularly for stock. On the inferior soils it would not always include wheat: on the lighter soils cultivation was at a very low ebb—rabbits and a few scattered sheep being preferred to the cost of culture. Neither drill husbandry nor the alternate system of cropping had begun to prevail; artificial grasses, particularly clover, had but recently been brought into notice, and had not met with much favour from these farmers, nor had artificial manures come into use. Adventitious aids for the fattening or improvement of stock were unknown, or, if known, not resorted to or cared for; no information was diffused amongst them or sought for by them as a class, and no inquiries were instituted, or motives for improvement excited; they were for the most part considered to be an uneducated, unimproveable, isolated body; no person of condition associated with them, or held the slightest intercourse. “Like the clods they cultivated,” their minds were held to be as dull and impenetrable; and these farmers “of the good olden time” were therefore left to themselves and their own resources till about the time we have named—the days of the two illustrious improvers of their country’s agriculture.

But a brighter era was dawning upon them: agriculture became a study. Tull wrote and propounded a new order of husbandry in the early part of the eighteenth century: his writings and practice began to make way about this period. The Northumberland farmers, headed by Mr. Dawson, adopted his practice to a considerable extent; and though distrust, arising from deep-rooted prejudice, prevailed, yet such was the extraordinary result, and such the excellence of his crops, and the amount of his gains, that converts were numerous, and the Tullian system of drill-husbandry at length became general, although very imperfectly carried out, owing to the imperfection of the drill implements. This, however, appears to have been the grand discovery—the great starting point for the renovation of British agriculture. The agricultural mind was interested—was aroused; Arthur Young sent out his *Annals*; Sir Jno. Sinclair instituted the Board of Agriculture; writings, numerous and good, were fast diffusing over the land, carrying the best information then attainable into every district of the kingdom. Societies for the improvement of agriculture and the advancement of the

farmer were established in many parts; new orders of culture, new systems of management were promulgated, and freely and generally discussed; patriotic noblemen and gentlemen undertook the task of experimenting on these new theories, and invited all classes of farmers to attend, examine, and criticise their practice. Who does not remember the Woburn sheep-shearings? the Holkham sheep-shearings, &c.? These were followed by extraordinary results: from them sprung the

new order of agriculture under which we now live, and which has been fostered and matured by the innumerable societies which now exist throughout the country. With them has also arisen a new order of cultivators, a new class of farmers—the modern farmers—a body of men who have won for themselves great renown, and deserve well of their country; but as my limit is full, I must leave my notice of them as a class for a future paper.

### THE CLOSE OF THE YEAR.

*Excelsior!* The close of a year is always a subject of deep interest to a thoughtful and reflective mind. It is the winding-up of a period of time, circumscribed in its duration by the completion of those successive revolutions which measure its various seasons and divisions. We then stand more directly and palpably upon a point between the past and the future, between that which has melted away into the ages of eternity and that which is still belonging to the present. The past is present with us only in knowledge of its events; the future is all uncertainty as to what awaits us. Surely, then, it is the part of wisdom and prudence, at such a period, to take a review of the past; and by an honest and faithful examination of what has been passing around us, to learn how to guard against error, as well as to mark the progress already effected in what is excellent, and instead of resting satisfied with present attainments, to make them serve as a fulcrum on which more firmly to plant the lever for future efforts.

Our agricultural readers, we trust, will perceive the drift of this exordium. The closing year has been one of extraordinary prosperity, and of unexampled progress, to the body to which they belong. Events too, of the greatest moment as affecting their interests, have occurred, plainly pointing out to them the course they ought to take, in order to turn them to the best advantage, and at the same time to prepare themselves for reverses which are not yet out of the range of possibility. On the present occasion, therefore, we wish to impress upon our readers a consideration of the past in respect to the benefits they have derived from it, and the progress they have effected; and of the future, in regard to the prospect it affords of continued prosperity, with the necessity of not relaxing in their effort to attain still higher degrees of excellence, and to make a more liberal use of the means of future progress.

Several events have occurred in the past season to render the condition of the farmer more pros-

perous. The war has had its effect in cutting off a portion of our usual supplies of cereal produce, whilst it has increased the demand. But we must look further and deeper for the cause of the present high prices of agricultural produce; and we find it in the occurrence of a series of natural events, which produced a deficient harvest in England in the year 1853, in America in 1854, and in continental Europe in 1855. The first was of such an extent as to cause a complete exhaustion of the stock of wheat at the close of the cereal year; the second produced a similar exhaustion in the United States the following year; and the third has now deprived us of what has ever been considered our sheet anchor in extremity—the cereal supplies from northern and western Europe—leaving us dependent for this season chiefly on America for the year's importation. It is to these successive events that we must ascribe the fact that in 1854-5, although we had the heaviest crop of wheat that ever was reaped in this kingdom, the price of that grain was as high as in 1853-4, when the deficiency amounted to nearly two-fifths of the average growth. What the present season may yet prove, with an exhausted stock of old wheat at harvest, and a deficiency in the new of one-eighth or one-tenth, it is not for us to prognosticate; but we think it is at any rate probable that present prices will be fully sustained.

Then, as to the progress made in agriculture during the past year, we have reason to congratulate our friends as much on that score as on the prosperity they enjoy. Never was there so much unanimity and good feeling displayed at the public gatherings, or so much liberality in the diffusion of useful knowledge on all subjects connected with or relating to agriculture. In the whole body of British agriculturists increased efforts have been made to render their system complete, by the adoption of those improvements which, whether by the employment of machinery for economising labour, or the use of artificial manures to increase the pro-

duce, or the extension of draining and other means of rendering the land more valuable and productive, have effected a revolution in the practice of husbandry, by which labour is liberated from its ancient slavish uses, and turned into other channels more efficient and less onerous. In this progressive improvement past grievances have been forgotten, because they have been overcome, and the present seized on as the moment for exertion; whilst the future is looked forward to with less anxiety and more confidence, for the realization of the plans which the past has suggested and the present matured.

With respect to the future, and the prospect it affords of continued prosperity, there are several reasons to induce us to believe that such will be the case. Our readers, at least some of them, will probably revert, in idea, to the war as the grand source of that prosperity. But we would most unwillingly dwell upon that event with anything like exultation, or as a desirable thing even to an agriculturist. War is an exotic with us. For hundreds of years no hostile force has been permitted to tread our soil or to ravage our coasts. But this immunity from its immediate horrors ought not to blind us to everything involved in a state of warfare, except the high prices it brings for our produce. Besides, unless hereafter our present friends become our enemies, the war, in ordinary years, will not deprive us of an adequate supply of cereal produce. The only effect it ought to have upon the agriculturist is to stimulate to greater efforts to supply, by superior and extended cultivation, that deficiency in our foreign resources actually occasioned by it; and thus, by moderating the price of the chief necessary of life, to alleviate the sufferings of our labouring classes.

Of the increasing population, however, we can speak more freely, and with less mixed feelings. It is self-evident that a people increasing after the rate of compound interest will require a supply of food increasing in the same ratio. For the last eight or ten years we have imported at the rate of nearly 5,000,000 quarters of wheat per annum; and it is quite evident that unless a corresponding increase in the growth of native wheat with that of the population takes place, we shall annually require larger supplies from abroad. The events, too, of the last three years, which we have already referred to, and more especially the present one, ought to warn us, that a time may come when we shall be thrown wholly upon our own resources, whether by the continuation and extension of the war in Europe or elsewhere, or the simultaneous failure of the crops in those lands from whence we draw our supplies. It is therefore doubly incumbent on the agriculturist to adopt every improvement calculated

to increase his produce. Much has already been effected in this way; but we are far from having reached either the maximum of production, or the minimum in the economization of seed corn. We leave the details to the consideration of those most interested in them.

Never was there a time more favourable for carrying out improvements than the present. The high price of *all* produce the last three years has placed the farmer in comparative affluence; and the most rational and profitable use he can make of his prosperity is, *to invest a portion of his profits in the land*. Without paying any additional rent, this would be equal to adding to his occupation, independent of the pride and pleasure he would feel in seeing the effect, and the extra profit he would derive from it. The motto, therefore, of the British farmer must be that at the head of this article—“EXCELSIOR!” climb higher and yet higher toward the summit of moral, intellectual, and industrial perfection, until every occupier of land becomes a man of science, every farm the laboratory of a practical chemist, and every field exhibits the neatness, regularity, and productiveness of a well-managed garden!

In this race of progressive improvement, the farm labourer must never be forgotten: not only is there a moral obligation upon his employer to promote his advancement in knowledge, as well as his temporal welfare, but self-interest imperatively commands him to do so. The vast changes in progress, in the substitution of complicated machinery for manual labour, requires a new class of mind to superintend them. There is, however, no occasion to change the men; and it would be unjust, as well as unwise, to do so. Let the present race of labourers—especially the rising generation—be instructed in mechanics and in machinery; let them have every facility for increasing that knowledge; and, above all, let every encouragement be afforded for the improvement of their moral condition; and we pledge ourselves that there are ample materials in every parish in the kingdom for carrying out the new system, without going beyond the present class of farm labourers.

We should feel that we had very inadequately noticed the period of the year if we neglected to remind our readers, of the agricultural class, of the source from which they derive their prosperity, and the Power on whom it depends. The farmer, above all other men, must feel how helpless he is, after all his efforts to secure his own welfare, or insure the safety of his crops. A blast of wind, a tempest, a vegetable pestilence, may in one short day lay his hopes prostrate, and defeat his best-arranged plans. On the other hand, gratitude for the past, and hope for the future, ought to fill every

heart, and constitute a motive for increased effort and enterprise. Whilst with humility we should recognise the hand of a superintending Providence, we should consider who it is that has given us faculties and powers *for use*, and not for inaction or

abuse—that we should both “plough and sow in hope,” and labour as if all depended on ourselves, leaving the event to Him who hath assured us that “while the earth remaineth, seed time and harvest, day and night, summer and winter, shall not cease.”

### THE INCREASED USE OF GREEN CROPS.

At several of the meetings held during the week of the Smithfield Show, we could not but rejoice to find the progress which science has made in the good opinion of the English agriculturists. There appears, indeed, to be a very just and hopeful feeling diffused, that all that science has hitherto done for the English farmer is just nothing, compared to what it will at no very distant day accomplish. The advantageous use of green crops, for instance, which was one of the chief improvements that occurred at the dawn of our modern system of agriculture, has never yet been clearly explained by the chemist, as regards their influence in the success of a rotation of crops. True, it is now pretty well agreed that it is in the different amount of nitrogenous matters of the different crops, and the source of the supply of those matters, that we must seek for an explanation; but then, as in what particular portion of the soil or the atmosphere we must search for the origin of the nitrogen of our food, is by no means so well agreed. Some chemists, indeed, attribute to the decomposing matters of the soil, or to the ammonia which the earth contains, or which exists in the atmosphere, the power of supplying the growing plant with all its nitrogen. But there are other distinguished chemists, who do not believe that plants take all their nitrogen in this circumlocutory manner: they see those plants vegetating in an atmosphere of nitrogen—enveloped in the very gas; which they have only to absorb and assimilate in the same way as they are without any doubt enabled to do with another portion of the atmosphere (the carbonic-acid gas), although that is present in the atmosphere in very much smaller proportions. Of the number of such distinguished chemists is M. Ville. In his searches after truth, he did not content himself with theorising upon this great practical question; he instituted a series of exact experiments upon growing plants, the soil in which they grew, and the atmosphere in which they breathed (*Jour. Roy. Ag. Soc.*, vol. xvi., p. 256).

M. Boussingault some little time since has shown by his experiments that plants do acquire nitrogen in some form or other from the air; but then he did not ascertain whether it was

from the atmospheric nitrogen, or the ammonia always to be detected in the atmosphere, that the nitrogen was obtained. It was to determine this point that M. Ville made his trials; he adopted two methods—in the first he employed an apparatus, by which he was enabled to supply, at regular intervals, a copious but accurately measured quantity of air to plants growing in glass cases; the ammonia contained in a similar quantity of air was at the same time carefully ascertained. The seeds from which the plants were raised were transplanted, as soon as they came up, into calcined sand, to which a certain quantity of the ash of similar seeds was added; they were watered with distilled water. The proportion of nitrogen contained in them having been carefully ascertained by analysis of a similar quantity of the same seed, it only remained for M. Ville to ascertain the quantity of this element present in the crop. For we shall readily perceive that if the ammonia in the air supplied is sufficient to account for the excess of nitrogen in the crop over that in the seed, we might be justified in concluding that this ammonia is the source of the increase. If, on the other hand, the increase in the nitrogen was found to be more than could be ascribed to the ammonia, we should be forced to acknowledge that to some other source of nitrogen, probably that found in the atmosphere, the increase must be attributed. Such was the careful reasoning of the French philosopher.

The plants employed in his trials were cress, lupins, rape, wheat, rye, and Indian corn. The result of his experiments was, that the crops in most cases contained considerably more nitrogen than that present in their seeds, and (as ammonia) in the air supplied to them. He arrived, therefore, at the conclusion that plants assimilate the nitrogen gas of the atmosphere; and in this opinion he was further confirmed by his second series of experiments, which were made to check the first. In these he adopted the precaution of depriving the atmospheric air, before it entered the cases, of all its ammonia, so that any gain in nitrogen of the produce over that in the seeds could not be traced to the agency of ammonia. The result of these experiments confirmed that of the previous, the gain of

nitrogen was undoubted; and thus his first conclusions were confirmed. It is true that these are not assented to by every considerable chemist; but their importance is such, that they must lead to other and more varied researches. It is very probable that the power which plants are hence supposed to possess of assimilating atmospheric nitrogen may vary to the utmost extent; moreover, that some crops do not possess any such power. But in whatever way the future experiments upon

our ordinary field crops (to clear away any such doubts) may terminate, the facts which are likely to be ascertained during the inquiry can hardly fail to be most serviceable. They will pretty certainly materially tend to illustrate and furnish practical suggestions for improved rotations; and it is more than probable that they will serve to explain certain failures in particular crops, which are at present alike unaccountable and injurious to the agriculturist.

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## THE EXTENDED USE OF MACHINERY FOR AGRICULTURAL PURPOSES.

Improvements in agriculture are of slow growth, and it is not until time has established their success that they become extensively adopted.

Our attention has been lately directed to this subject; and although we are disposed to think favourably of agricultural development, we are, nevertheless, bound to state that the farmers, as a class, are slow to advance in a direction new to them, and hitherto unexplored. To convince them, is the work of time; and to bring them to the adoption of a new principle, requires the utmost perseverance of an inventor, as well as the demonstration of its successful result. As an instance of this, let any one carry back his recollection to the introduction of machinery, at the commencement of the present century; and he will be convinced of the correctness of our remarks. Thrashing machines alone have required fifty years to become universal, and after having been assailed by hordes of dissatisfied labourers, who travelled from parish to parish, destroying them wherever they had been introduced, or as incendiaries endeavouring to deter their employers from the using them, until at length, in spite of this resistance, they have become so universally adopted as to have superseded thrashing by flail altogether; so that at the present time, labourers cannot even be induced to resume it upon an emergency.

So also of the progress of thrashing by steam. It is at present barely developed, and even now has to contend against ignorance and obstinacy, in districts where it has not become general. The advance that has recently taken place in the wages of the labourer will, however, tend ere long to render it universal.

At the present moment, two important subjects engross public attention—the application of steam for ploughing, and the adoption of the reaping machine for severing the crops of wheat and grain at harvest. The first meets with no resistance to its introduction by the labourers themselves; but

the latter, we fear, will require some time to overcome their prejudices and dislike. The harvest month is to them the climax of the year, and they foresee that, if their labour can at that period be superseded by machinery, a considerable reduction in harvest wages may follow. This objection, it must be confessed, has some weight; but when applied to the former subject, falls at once to the ground, and the desideratum sought, therefore, rests in the capability of the machine itself. That accomplished, all the rest that may be required will follow. It appears, however, that insuperable difficulties surround any attempt to make steam ploughing subservient to the purpose. The superseding the plough is no mean undertaking; and when we consider the perfection that has been attained in that implement, as well as the excellent manner and regularity in which our experienced hands turn over the soil, we need not wonder at the difficulties that attend its supersedence. It is therefore we state unhesitatingly that, in our opinion, it will require a very long time to bring ploughing by steam to such perfection as even to *approach* the nicety of execution of even our second-rate ploughmen; whilst to accomplish anything equal to that which is effected by our expert hands is so far totally out of the question. Still we are not disposed to set at naught the attempts that have already been made, as we foresee that if they become successful even in a minor degree, an extensive field is open for their competition.

From what transpired at the gathering of agriculturists during the week of the Smithfield Show, we are led to suppose that our leading machinists do not enter into the production of a steam-ploughing machine with any degree of spirit or enterprise. Without one exception, we fancied that all of them viewed it rather as a speculative and visionary attempt than otherwise. But when we witnessed the sanguine and enterprising spirit of

one of our farmers, unaided and unassisted in his attempts to bring it to perfection, it contrasted greatly with the cool manner by which he was received by the leading machinists of the day. Mr. Williams certainly strove hard to convince them of its utility and the successful result that had up to that time attended his endeavours, and which appeared not altogether unlikely to be accomplished. Indeed, so far as his clever model explained its working, we must give him credit for skill displayed in its construction and application, and heartily wish him success in its final accomplishment.

We have endeavoured to trace the cause why our leading manufacturers of agricultural machines put forth their utmost energy for the production of a perfect reaping machine, and, on the other hand, are so apathetic as regards the construction of a machine that by the power of steam may some day supersede the plough. We hope that we may be forgiven, if we hint that in the one case a novel and extensively required machine would enter largely into manufacture; whilst, on the other hand, a steam-ploughing machine will but supersede a more universal implement of large and extensive manufacture, and upon which many of them have obtained great celebrity in their respective districts.

In the one instance, that of the reaping machine, we find most of the leading manufacturers endeavouring to excel each other in its production, and the labourers resisting its introduction; in the other we find the manufacturers leaving the invention to be carried out by the agriculturists, who are not unwilling to adopt the principle of ploughing by steam if it can be made available; but if accomplished, they will have to look to themselves both for the invention and application.

The Royal Agricultural Society we appeal to as the medium by which such great undertakings might be achieved. How could its funds be better applied than by stimulating invention? and for what purpose could a reward be better bestowed than upon the person who should attain the desirable object of ploughing successfully by steam? The agricultural community would hail it as a great boon; and we know that we are not alone in our opinion, that it is within the province of the leading agricultural society of the kingdom to facilitate it. Something more is expected of it even than has already taken place, and we know of no other subject upon which it might render itself so popular as by systematically encouraging the invention under notice.

### CHRISTMAS PRIZE MEAT.

So far as we have been able to examine, fat stock exhibited at the Smithfield Club Show, in Baker-street, this year, have yielded meat fully equal in quality to what was expected from handling them in the Bazaar; but, generally speaking, progress cannot be reported since the previous meeting. At the same time there are numerous individual exceptions deserving of a more lengthened notice than our limited space will permit us to give.

The butcher's stall is doubtless the place for judging satisfactorily, both as to the quantity and quality of meat. Daily experience is adding fresh testimony to the soundness of this conclusion, farmers and butchers feeling more and more disposed to do business in the dead-meat market, in preference to the live stock; and if once a proper market-place was erected on the site of old Smithfield, an improvement so beneficial could not fail to give a fresh impulse to this branch of commerce.

But while the carcase trade is thus slowly superseding the live stock, we are not to be understood as anticipating that Christmas shows of butcher-meat are also to supersede the present; on the contrary, the two ought to go together, or, rather, the former ought to follow the latter, in order to enable breeders and feeders to see the result of their labours, and thus determine their future practice.

There is something about the portly dimensions of the Smithfield Club-Show—cattle, oxen, sheep, and pigs,

that unites the capital with our provinces, in a manner which hardly could be so happily otherwise done. Here, for example, not merely the farmer, salesman, and butcher meet for the first time, it may be, or to renew a former acquaintance; but also our landed nobility and city princes, to handle the stock, criticise them, and otherwise enjoy themselves in a manner more easily imagined than described; and were they to meet again, as we now meet the carcase salesmen and butcher, their Christmas meetings would be tenfold more enlivening, instructive, and interesting, alike to breeders, feeders, sellers, and consumers.

A fair proportion of the stock has this year been slaughtered in the capital. In taking a cursory glance at butcher's stalls and the dead-meat markets, we shall observe the order stated in the catalogue, confining our remarks chiefly to meat from the Bazaar; but at the same time not overlooking purchases from the great Monday market, &c., &c., thus commencing with Devons. At the same time, to avoid repetition, we shall notice the whole of every stall, as we proceed, reserving to a future article the comparative merits of the meat of different breeds apart from party considerations.

Mr. Jeffery, of Foubert's-place, Regent-street, is the largest exhibitor of Devon meat in the metropolis. The quality is superior and uniform as to size and weight, thus presenting to the sight-seeing multitudes of the capital an appearance which we rather leave our

readers to imagine than attempt to describe. Besides Devons there were a good many Scots, with the necessary complement of Down, Scotch, and Welsh mutton. Altogether this is the largest show we have examined, and the finest in quality.

Of this immense stock five Devons and twelve South-downs were from Baker-street, viz., His Royal Highness Prince Albert's and the Earl of Leicester's two prize oxen of the first class, and also his Lordship's four-year-old of the second. From the fourth class the Prince's first prize heifer, and from extra stock his 5 years and 10 months old ox, bred by Lord Portman. The sheep are Lord Walsingham's pen of wethers (No. 177), Sir John Shelley's (No. 183), and the Duke of Richmond's (Nos. 185 and 192).

Generally speaking the Devons carried rather an extra quantity of fat, but the proportion of lean was fair and well grained. In the sheep the fat rather predominated in a greater degree, but the carcasses were very even and finely coloured. On the whole, both lots have turned out fully equal to expectation.

A TRADE MEMORANDUM deserves favourable mention before leaving this stall. A baron of beef from His Royal Highness Prince Albert's prize Devon ox, and two haunches of mutton from His Grace the Duke of Richmond's first prize Downs, may be seen ticketed for the well-known firm of Treadwell, Acker, and Co., St. Nicholas Hotel, New York—the largest in the world, as our readers are no doubt aware. This must be no less gratifying to His Royal Highness and the noble Duke than to Mr. Jeffery and every Englishman; while our transatlantic cousins, one and all of them, will be more than delighted to hear it. For some time past they have been our highest and keenest purchasers at all our sales of improved breeding stock—"Romeo," for example, the brother of the Marquis of Exeter's gold medal ox, having just been declared the best shorthorn in the United States; and now it appears our choice pieces of dead meat are to follow in the wake of our best live stock! The St. Nicholas accommodates about 1,000 persons, some of the rooms costing as much as £30 per night, owing to the lavish expenditure of gold, satin, &c., &c., with which they are furnished. With such facts before the readers of the *Mark Lane Express*, we shall leave them to form their own conceptions of the interest and sensation which the above choice samples of our Christmas meat will create among a fellow-feeling sight-seeing people, with their minds full of English associations, and their pockets stuffed with Californian gold.

His Royal Highness Prince Albert's three-year-old prize Devon ox (Class II., No. 7), bought by Mr. Collingwood, Islington, "dies bad in the kidneys," but well in loose fat. The lean grains pretty well, but the quantity of fat is considerably in excess. Mr. C. has also the Prince's five-year-old Scot (No. 79), which turns out well, the quality being excellent, and of a great thickness along the chine and rump. Indeed, levelness, thickness, and a fine grain, characterize all the best parts. He has also the Duke of Richmond's 20-month Downs, and Mr. Lugar's of the same class; both pens

being good level sheep, the former the best quality of the two.

Mr. Game, Cannon-street, City, exhibits the carcase of Mr. Trevor's Devon—quality fine, being thick, even, and well grained. He has also the Earl of Radnor's Downs—good quality, having a fair proportion of lean.

Of Herefords the two young prize-animals have turned out well. Mr. Niblett's first prize ox, so much admired in the Bazaar for fineness of quality, yields about the richest grained and thickest meat we have seen, and which has met with a ready sale. The purchaser, Mr. Scarlett, Quebec-street, Edgeware-road, has got a fine likeness of the animal taken, and is highly pleased with his transaction altogether. The only fault to be found was the wasting of the fat of the kidneys. The second prize ox, fed by Mr. Longmore, and bought by Mr. Underwood, Eccleston-street, South Pimlico, is rather deficient of lean, but even, of great thickness, and fairly grained.

Mr. Underwood has also Mr. E. F. Whittingstall's fine pen of Hampshire downs, which yield a very superior quality of mutton, with a large proportion of well-mixed lean. This pen was highly commended in the Bazaar, and merits the same here.

Mr. James's four-year-old of this breed (Hereford), bought by Mr. Barclay, of Well-street, also turns out well, all the best parts being level, thick, and finely grained. Mr. B. has also Mr. Lee Bradshaw's first prize gold-medal pen of long-wooled sheep (No. 118); very even as to quality, but greatly too little lean; colour good and graining fine, what there is of it. He has also the Marquis of Exeter's pen of the same class, and also his heavy weights in the next, still more heavily loaded with fat and wanting of lean. Whether more exercise while rearing would develop muscle and check the tendency to fat, is a question we respectfully suggest to the attention of breeders of long-wools.

Mr. Mill's Hereford, bought by Mr. King, Paddington-street, has not turned out so well as the last. Mr. King has also a pen of the Duke of Richmond's downs—very good mutton—a second Lord Walsingham's, a third of the Earl of Chichester. The former are excellent sheep; the latter not so good, but yet pretty fair quality. Besides the Bazaar stock, Mr. K. has a large exhibition of fine Devons and polled Aberdeenshire Scots, and about 60 fine Hampshire downs, the quality of both beef and mutton being superior.

Of shorthorns, Prince Albert's ox, bought by Mr. Bottril, of Rochester-row, Westminster, turns out well. We have seldom seen one of this breed carry more lean, and mix better; while the colour of fat is fine and pinky, and the quarters thick and level. He also slaughtered Mr. Lindsay's pen of Southdown wethers (No. 190), which are rather too fat, but on the whole of fair quality.

Prince Albert's heifer, bought by B. Bull, Chapel-street, Westminster, has wasted considerably. We note the quality pretty well mixed, but over-fat on the outside. Mr. B. has also Mr. Overman's cross-bred long

and short wools—very good mutton. (Gold medal ox not slaughtered yet.)

Of Scots, Mr. Stirling's ox, whose fine head of horns attracted so much attention, has hardly turned out so well as generally expected. The quality is certainly fine, the graining being rich, and colour "blooming;" but the weight of the carcass is deficient, the animal having wasted greatly.

Of Welsh, Mr. Kirkby, Park-street, Grosvenor-square (Purveyor to her Majesty), slaughters Colonel Pennant's prize five-year-old ox. Quality of meat superior, but unfortunately the carcass was not cut up, so that our pen cannot do it justice. He has also Sir John Shelley's pen of Southdowns (No. 171)—a fine sample of Baker-street mutton. Mr. K. also slaughters five fine Highland Scots, of very superior quality, and shews along with them a proportionate quantity of excellent down and Scotch mutton.

Mr. Elphick, Brixton, has Mr. Bennett's Welsh ox, and also heifer. Both yield meat of a superior quality, there being plenty of lean, well-mixed with rich fat. Few samples of better meat are shown in the capital.

Ayrshire: Mr. Elphick, of Hampton Wick, Middlesex, slaughters Sir Williamson Booth's three-year-old heifer of this breed. The quality is superior—the meat being thick, even, and well-mixed. His brother again (East Mousely) exhibits Mr. Overman's Shorthorn cross with this breed, also a splendid body of meat, but does not yield quite so much loose fat.

We now take a short review of the sheep not already noticed.

Passing over the pure Long-wools, we come to the Cross-breeds, Class 25. Mr. Attwell, of Oxford-market, exhibits Lord Walsingham's pen. Very fine mutton, but rather fat. In the same market, Mr. Reynold shows Mr. Stephen's crosses, yielding also good mutton. Mr. Bentley, Henrietta-street, Manchester-square, shows Mr. Howard's pen; quality fine, fully equal to expectation.

Mr. Davis, of the Black Bull Tavern, has Mr. Overman's pen in this class, which turns out pretty well. Mr. Collingwood, of Paddington, has the Earl of Leicester's pen of crosses, Class 26; very fat. Also Mr. Overman's Southdown pen (No. 180); pretty good quality, with blooming colour. Also Mr. Overman's pen of extra stock, which we have noted "comes out clean and blooming, with not so much fat as expected."

Hampshire Downs: Mr. Hawkins, of Oxford-market, sells Mr. Wm. Browne Canning's pen; only one sheep was cut up; the quality is fine, but rather deficient of lean, to what we expected; it is the largest, and very thick on the loin, a chop which we have measuring four-and-a-half inches through! The other two, we aver, have more lean.

Pigs have turned out well, fully equal to expectation, both as to weight and quality. Mr. Coates's gold-medal pen, bought by Mr. Hedges, High-street, Notting-hill, stands high in the scale of merit. Now that they are slaughtered, it were difficult to say which of the three is the best, their quality being so equal. Mr. H. has also Mr. Stewart Marjoribank's pen (No. 235),

also fine quality, but not nearly so rich in the colour as the previous pen.

Mr. Wall, Jermyn-street, has two pens of his Royal Highness Prince Albert's, both fine quality, so far as slaughtered and cut up.

Mr. Garland, of Oxford-market, has 15 pigs from the Bazaar, Baker-street, 6 from the Earl of Radnor, being one pen in each of the first two classes, both yield good pork; 6 from Mr. Druce, of Eynsham, Oxford, being three pens—one in the second class, one third, and the other extra stock; they are of excellent quality; and one pen from Sir J. B. Mill's, the best of the lot.

Mr. Squire, of Tottenham-court-road, has two pens of Prince Albert's; quality fair.

Such is a glance of stock from Baker-street. Butchers were complaining loudly of the frost taking off the bloom and injuring the quality of the meat, when exposed outside; but the vast majority kept the whole meat within doors. The trade may be divided into two classes—those who make a show at Christmas by exposing a week's meat at once, on what is termed the "Great Day," and those who kill and purchase from Newgate as they require it. The latter greatly predominate in numbers; while the former is yearly getting farther and farther into disrepute.

The supply of meat for the capital fully equals the demand, both in the Metropolitan Cattle Market and dead-meat markets. Both in Newgate and Leadenhall, salesmen are complaining that there is a serious want of consumption among the labouring classes, whose demand upon this source is always great when employment is plentiful and wages high; the frost having thrown thousands of bricklayers, carpenters, &c., out of employment; hence the consequences.

With regard to the actual quantity and quality, compared with former years, we believe both are about an average. In the great Monday market for live stock, it was generally supposed that quality was something below it; but we had some difficulty in arriving at this conclusion. On the contrary, we rather felt disposed to attribute any difference of appearance to the new site, believing that had the 7,000 bullocks been crammed into Smithfield they would have looked larger, alike individually and collectively.

During the past week, among the trade we have found butchers generally well pleased—a fact which corroborates the above conclusion. All the principal shops exhibited splendid shows of meat—those with the meat inside as well as those with it outside.

To notice the many shops containing splendid Christmas shows of meat in the metropolis, exclusive of those already mentioned, would fill a volume. Add to the carcasses of the 7,000 bullocks and 25,000 sheep of the live stock market the thousands of tons of dead meat delivered by the railways, and our readers may form some idea of the quantity of butcher-meat required by the British capital at this season. Out of this vast number, we shall take only Slater's of Kensington, and Bannister's of the City of London, both butchers being purveyors to her Majesty.

Mr. Slater has a large display of meat at each of his

shops; but that at Kensington, where he himself resides, is the best. It consists principally of Devon and Scotch beef, Down, Scotch, and Welsh mutton. Besides what is exhibited outside and in his shop, there are about a dozen Devon and Scotch carcasses hanging in the slaughter-house.

Mr. Bannister's new shop is the finest in the capital. It is only but recently built, is very lofty, and sets a laudable example of architectural progress to the trade. That meat keeps longer in it, and is of better quality, than in low crowded places with a confined atmosphere, is plain; but into details of this kind we cannot enter at present. All the meat here is of the finest quality, and exhibited inside some of it the richest in the grain we ever saw. Mutton is equally fine, and consists of Southdown and Scotch. There are also several very fine lambs to be seen at this season, stock not large.

From what we have thus said, we are driven to the

conclusion that the fattening of stock of every kind for Baker-street is yet far from perfection. Taking a general view of the meat exhibited, its chief characteristic is a deficiency of lean, with an excess of fat. The rule, therefore, is to grow less fat and more lean; and the cure for this appears to be a little more exercise when the muscles are growing, and a little less fat-producing food. Of late an opinion has been gaining ground that the Hampshire Downs carry more lean and less fat than the Sussex Downs. The soundness of this conclusion has not been so forcibly illustrated by the carcasses this year as the last, the former carrying more fat; but they have, nevertheless, a decided advantage over the other Downs, so that the Smithfield Club does not do this fine breed of sheep justice as regards premiums. The Hampshire Downs we have examined from the Metropolitan Cattle Market carry far more lean than those from Baker-street.

### "THE MEMORY OF THE PAST," REVIVED BY A SHORT VISIT TO THE CATTLE SHOW IN BAKER-STREET.

DEAR SIR,—After an interval of nearly twenty years, a considerable part of which was spent in the "sister kingdom," I embraced an opportunity afforded me of paying a visit to the far-famed Cattle Show, held in Baker-street last week, and I now sit down, not to pass a regular criticism upon what I saw, but rather to give an account of an old fellow's feelings upon being again brought into juxtaposition with what once constituted his highest earthly enjoyment, and of the pleasurable reminiscences it produced.

As soon as I entered the place I experienced those sensations which a broken-down old hunter may be supposed to feel, when coming suddenly in sight of a pack of hounds in full cry; or a cast-off dragoon horse, on hearing the trumpet sound the charge. By-the-by, I recollect an anecdote of the latter kind, which occurred to the wife of a farmer, with whose family my own was connected by marriage. The good lady attended the stall market at Norwich, and, as was the custom some sixty or seventy years back, usually rode thither on horseback, between a pair of panniers containing ducks, geese, and poultry, pork and veal, butter and eggs, &c., the produce of the farm. She was, on the occasion referred to, riding soberly along on an old charger, when all of a sudden the trumpeter of a corps of yeomanry cavalry, who were exercising in a large field near her route, sounded the charge. Immediately the old veteran pricked his ears, reared his head, cocked his tail, gave a most euphonious responsive neigh, and instantly set off at full speed to join the ranks. The good lady strove to stop him, but in vain; and to her great discomfiture, but to the equally great amusement and gratification of the corps, he never halted till he had placed himself in position in the ranks.

Well, it was with some such feelings I entered the Bazaar in Baker-street; and what a treat was there in store for me, who attended rather as an amateur than a

critic! The first object that attracted my attention was a pair of Galloway Scots, just such as we used to see droves of them at Hempton Green and St. Faith's fairs, and also on Norwich Hill weekly during the season. A long-sided Scot of the name of M'Laren was then the principal agent for the Scotch breeders. He was a bit of a wag, and one day the canny fellow was encountered on the Hill by the Hon. and Rev. A. B., who bore the title of the "fighting parson." The ruling passion, it seems, was strong upon him on this occasion from what followed. "Can you spar?" said he to the Scot.

"Spar, spar!" he replied; "I dinna ken what ye mean."

"Can you box," said his reverence, throwing himself into position.

"Nae, nae, I dinna ken; but if ye ha'e the mind I'll try wi' ye;" and so, suiting the action to the word, he reached the Hon. and Rev. A. B. a rightforward hit, which sent him heels over head, and laid his six-feet-four at full length on the ground.

But this is an awful digression. These Galloways are old acquaintances, and noble fellows they are. There are no beasts fatten more "kindly," or yield better beef. The Devonshires, too, were perfectly familiar to me. Prince Albert's Devons are truly royal and aristocratic; but, as an old farmer remarked to me, "if he can't produce good cattle, who can?" I fully agreed as to the truth of the remark, but I thought it was spoken in a rather discontented spirit, as if the Prince had no right to be a competitor, and in this I could not hold with him. As long as that competition is open, and the judges impartial, which there is every reason to believe is the case, every one who enters the lists has the same opportunity of winning the prizes. It is *not* merely a question of expense, but of judgment and attention; and so far as I am able to form an opinion, the Prince was fully entitled to the prizes he so fairly gained.

The Earl of Leicester's Devons looked to me just as if they were part of the very herd I saw at Holkham, five or six-and-forty years ago. Mr. Coke had introduced them amongst his tenantry; and one of them, Mr. Purday, of Egmere (the farm, I see, is now occupied by Mr. Overman), was a very successful breeder of them. He had so splendid a dairy of Devon cows, that gentlemen came far and near to see them. Mr. Coke never had any agricultural visitors at the Hall but he took them to see this far-famed dairy, which, by-the-by, were but indifferent milkers, being, I suspect, too highly fed. On one occasion a nobleman, who was staying with Mr. Coke, was taken, as a matter of course, to Egmere. After inspecting, admiring, and praising the cattle in the highest terms, he said, "Well, Mr. Purday, nothing can possibly exceed the symmetrical beauty of your stock; but what in the world can induce you to keep those ugly brutes amongst them?" pointing, at the same time, to three Suffolk polled cows; "they quite disgrace and spoil the whole thing."

"That's very true, my Lord," replied the farmer, "my Devons are very beautiful, and I am proud of them; but, after all, we must have a little milk for the family!" It will give a good idea of the estimation in which this stock was held, when I state that Mr. Purday sold a two-year-old bull for £500.

Some of the sheep exhibited at Baker-street were beautiful specimens of their kind, perfect in symmetry, and wonderfully small in the proportion of bone to the size and weight of the carcass. Mr. Overman, of Burnham Sutton, sustains the character of a sheep breeder held by his father, whom I well knew. I recollect a circumstance respecting him, so honourable both to himself and Mr. Coke, his landlord I believe, that I am sure it can give no offence to the family to relate it. When Mr. Overman, still comparatively a young man, was on his deathbed, Mr. Coke paid him a visit. This was no visit of form, curiosity, or empty condolence. A sincere friendship subsisted between them, owing to the hearty zeal and good will with which Mr. Overman seconded and carried out the views of his landlord. On reaching the bedside of the dying man he found him greatly depressed in mind, and endeavoured to console him with the hope of recovery.

"I am not afraid of dying," said Mr. Overman; "but when I think of my poor wife being left with a family of sixteen children, you cannot wonder at my anxiety on their account."

"If that be all, Overman," replied Mr. Coke, "make your mind easy. Your eldest son is now able with assistance to manage the farm for his mother and the family. And with regard to the latter, if they conduct themselves well, I will provide farms for the boys, as fast as they are ready for them; and should your daughters marry farmers, I will see that they too shall be provided for."

I think this was about the year 1810, but I am unable to state the sequel respecting the family. I presume that the Messrs. Overmans, of Weasenhams, Burnham Sutton, and Egmere respectively, are sons, or at least descendants, of the one referred to.

The Southdown and half-bred sheep of the Earl

of Leicester and the Duke of Richmond are perfect in their kind. The closeness of their fleeces, the squareness of the carcass, the fine head, and the slender but firm and short legs of these animals, prove the sedulous care that must have been taken to bring them to such a pitch of perfection. The patronage given by such men to agriculture and grazing is of infinite advantage to the farming interest, if it were only for the purpose of furnishing a supply of breeding stock from their flocks and herds. But it has a far more beneficial effect in superinducing a spirit of enterprise and inquiry, and a desire for the higher acquisitions of the mind, which alone can elevate and ennoble the profession, and raise it to a science. Would that all the landowners of the kingdom would follow the example of such noblemen, and by uniting with their tenantry in those associations which belong to the agricultural class, give them that personal and unassuming encouragement which would elicit talent where it exists, and stimulate enterprise and inquiry, which are otherwise apt to flag and lie dormant.

In the Implement and Machinery Department I was completely lost and confounded. Portable steam engines, reaping machines, hay-making machines, thrashing machines, which not only thrash and clean the corn, but put it up in sacks, all without the labour of man, except in laying the corn on the table of the machine—these, and a hundred other novelties (to me at least), suggested a train of reflections as to the immense benefit that must accrue from the transfer of labour from the more oppressive and exhausting employments, to be applied to other purposes; for the farmer must not employ fewer hands on account of these improvements in machinery, but rather avail himself of their liberation to execute other works that the condition of the land and the increasing wants of our population demand.

But I find I am exceeding the bounds of moderation in respect to the length of my letter, and must conclude. The benefits accruing from these periodical exhibitions are perceptible in every branch of rural economy, and they must continue to exercise a salutary influence in every respect, on the whole body of agriculturists. There is, however, one point on which I would venture to make one observation. It is in reference to the apparent effort to produce *fat*, rather than *perfectly-formed*, cattle. I maintain that the latter ought to be the main object of the competition; but from the number of cross-made stock exhibited—fat enough, it is true, in parts, but most unsightly—it would seem that grazing alone had been the object of the owners, and that breeding had in some instances at least been neglected.

I am quite aware, from my own experience, that a cross-made bullock may fatten as quickly, and pay the grazier as well, as the handsomest Galloway Scot or Devon. But if they do, it is the exception, and not the rule. For decidedly the best method of ensuring good graziers is by attending to the true breeds, continued generation after generation, to attain that symmetrical perfection which accumulates an equal proportion of meat on every part of the carcass. Yours truly,

AN OLD NORFOLK FARMER.

London, 20th Dec.

## LIGHT-LAND FARMING.

The term "light-land" implies, in agricultural language, all soils that are capable of being reduced in the texture to a pulverization that allows the growth of green crops in the plants of tubers, bulbs, and esculents. A large variety of lands occurs under this comprehensive term; varying from the loamy clay, that produces beetroot, to the light loams, chalks, and sands, that change in quality according as the position is alluvial, or rests upon the rocky sediment. Three divisions will sufficiently mark the soils of light-land farming: Clayey loams, which are adapted for potatoes, beetroot, and Swedish turnips; sandy loams, which produce only the common turnips; and the sands, chalks, and gravels, that are restricted to turnips and other feeding crops, with one seed-bearing crop in the rotation. These lands vary much in the productive capability; chiefly in the sandy compositions, as they may be alluvial, marine, or sedimented. The former term is the most prevalent, and abounds in the interior of Britain. The clayey loams comprehend the richest soils in Britain, bearing wheat after the removal, in autumn, of the potatoes, beetroot, and rutabaga, which are the most valuable crops that the climate allows. The lands are superimposed on very deep and extensive beds of alluvial debris, and rest chiefly on the primitive formations, not rising above the old red sandstone but in very few situations. The colour is generally a dark hazel, sometimes black, and occasionally a clay red. The subsoil is mostly a soapy or indurated clay, that retains the necessary moisture to cool the upper soil without an excess to saturate the earth into a noxious quality. Gravel and sand are frequently intermixed in the substratum, when a corresponding variety in the soil is produced. A vast collection of diluvial aggregates often forms the basis of loamy clays, which are thereby much varied in the composition; but the quality is most generally very productive. These loamy clays are fresh-water formations, as few or no instances occur of the marine clays having been transformed into the modification of green-crop land. The adjacent mixtures retain the viscous quality, and still constitute the lands of bare fallow. Some few cases do occur when the alliance is very remote, and the formation had passed through many changes from the original deposit. Even in these instances the viscous quality always shows its presence, and forms a soil that barely allows the culture of roots. These formations accompany the chalk and oolite deposits, and not beyond these upper geological sediments. The highest quality of the soils occurs in over-lying the sandstones without the intervention of a vast depth of alluvial debris, that is often of very discordant qualities and very mixed composition. Unfortunately the class of clayey loams is a small one, and in many cases the lands are used in grass, when the value and utility would be more than doubled in arable cultivation. The grounds mostly lie

in low situations, and are consequently favoured with a genial atmosphere.

Loamy clays being a species of the original aluminous earth, the ploughing of the ground requires a power of draught which is able to penetrate a depth of seven or eight inches in the stubble furrow of the early winter. For this purpose two very stout horses are required, or better done by three animals that are yoked, with two walking in the furrows by chains in tandem, and one horse on the land, with an advantage of the long and short end of the main tree, which equalizes the strength of the drawing powers. A deep furrow at this time affords an abundance of loose soil during the other operations. The ploughing should be done in November and December, and, if possible, not beyond the month of January. The wettest kind of the land is best laid into ridges of fourteen feet, and the drier sorts admit large breadths of ten to twenty yards, which are alternately reversed by the ploughings of the ground. The headlands are cloven, in order to keep the ridge of a medium height, by being alternately gathered and split. In the case of fourteen-foot ridges, five or seven of the spaces may be cleaved and the furrows ploughed up, as the wetness of the land does not require open furrows, and the odd number of ridges brings the end of the work in an open furrow on the top of a ridge. This precaution, and the ploughing up of the open furrows, are purposely intended to bring the land into a level condition for the drilling of the green crop. The narrow angle of soil that is cut by the points of the coulter and share must be laid in the most upright position, which exposes two sides of the furrow-slice to the action of the weather, or the greatest possible quantity of the up-turned soil. The penetration from both sides of the atmospheric action produces the alluvium or comminuted earth, which is the grand object to be procured by every means of cultivation. A furrow too much inverted, or only half up-raised, exposes to the weather only one surface, which is solid and difficult of penetration; the upright narrow section or slice presents two sides to be mellowed, and thereby affords the most alluvium.

These lands will be sufficiently dry to be cross-ploughed in the early part of April, or sooner, in favourable positions of soil and climate. The operation is done by the common plough and two horses, with narrow furrows, in order that the soil may be cut into small pieces for the purposes of reduction. The increasing length of day and of sun of that season will soon render the surface of the ground fit to receive the action of the harrows, which is done across the ploughing, and repeated till the power ceases of breaking the clods of earth by their passing unhurt between the tines of the implement. The roll, in cast-iron of one ton in weight, follows next, and squeezes the clods of earth;

the harrow is again applied, and the roots of weeds are thoroughly disengaged. The stones and filth are carefully picked by hand, and removed from the field; the land is then ploughed lengthwise in large widths of twenty to thirty yards, and the open furrows are filled by reversing some rounds by the plough. The land is harrowed, rolled, and harrowed as before, and the weeds and stones removed—processes which will generally prepare the land to be planted with potatoes and beet-root. But another ploughing may be required for stiffer lands that are foul with weeds, and it is done as above described.

The land having been completely levelled on the surface by the operations of tillage, a straight furrow is drawn in the direction in which the drills will be best laid, by the common plough drawn by horses abreast. The furrow must be deep, and the plough returns in the same place, which throws the earth equally to both sides of the line of traction. Ridglets are formed on each side of this furrow by means of one movement of the plough up and down the land, with the left-hand horse walking in the furrow, and the right-hand one walking on the firm ground, and widely as possible from the other horse. The plough makes a deep rut, and moves the land as widely and deeply as the power of the horses can effect. The tops of the ridglets are 30 in. apart. The day after the drills are made, the farm-yard dung is brought forward in one-horse carts, deposited in regular heaps along the drills, and spread by hand fork very evenly along the hollows of the drills. The quantity must cover the bottom of the plough rut, and will not be under twenty cart-loads of one horse's draught. The cuts of the potato tuber, with an eye in each set, are placed by hand singly over the spread dung, at the distance of nine or ten inches apart, and fixed in the position by a tread of the foot of the person that deposits the seed. The ridglets are split by the plough, and the earth is reversed over the dung, and the drill is formed where the hollow was placed. The horses walk two drills apart, and the main-tree of 5 feet in length allows the separation. The right-hand horse walks in the furrow of the last split drill, and the left-hand animal walks on the top of the second drill that is unmoved—the plough splits the intervening drill, and being deeply wrought, a heavy furrow of earth is thrown over the dung and planted potatoes. The plough returns along the back of these split ridglets, moving in a hollow between the horses, which walk in hollows that are two drills apart. A heavy furrow of earth is thus thrown from the other side over the dung, which is covered deeply with loose earth freshly moved. A light roll levels the narrow top of the newly-made ridglets, and produces an even braiding of the potato shoots. So soon as the young shoots have all appeared above ground, and the weeds have become numerous, the horse-hoe commences its labours by passing once along each interval, by which the weeds are cut, and the sides of drills and bottom of the intervals are moved by the share and knives of the implement. Potatoes require a deep cultivation, and a heavy tool is indispensable to till the intervals. Morton's expanding horse-hoe is the

best single implement, as the duck-footed coulter effectually move the bottom, and the knives are ranged in a rising tier to cut the sides of the drills. A miniature or skeleton plough of iron drawn by one horse is probably the most effectual of all horse-hoes on the stiff soils of clayey loams: the time required is double, as it moves twice in one interval, laying a small furrow into the centre of the interval, which has been taken from the sides of the drills. But the angular point of the common ploughshare penetrates the ground better than any tine or coulter of the common horse-hoes, and the double quantity of time may not be misapplied in obtaining the very important object of deep tillage and an abundance of comminuted soil. One ploughing may be advantageous, and the light scarifier may suffice for the summer operations in checking the growth of weeds. The hand-hoeing follows the first grubbing, and cuts all weeds between the young plants, breaks the ground, and pulverizes the soil. A second hoeing is intermixed with the scarifyings that are done during summer, and destroys any tall weeds that may arise. When the stems of the plant wholly cover the drills, a double mould-board plough drawn by two horses, with a main-tree of five feet in length, moves along the interval between the horses, which walk two drills apart, and throws a heavy furrow of earth to the drills on each side. This operation may be repeated in the course of two weeks after the first earthing, as it will afford to the tubers of the plant an ample quantity of comminuted soil in which to be multiplied. In this state the potato field remains till October, when the stems are pulled, and carried to the piggery as litter, or in a mixed dung-hill; the tubers are raised by plough or fork, and carried to the pits, and covered for use; and the land is ploughed with one furrow, and sown with wheat.

The planting of potatoes is done from the 16th to the end of April, when the land intended to be sown with beet-root will be continued in the preparation. The ground is prepared, drilled, dunged, reversed, and covered, as above described: the drills are 27 or 28 inches wide. The seeds of the plant, steeped and dried with quick-lime, are inserted by hand dibble on the tops of the drills in holes of 2 or 3 seeds, and 6 or 8 inches apart, or are sown by the two drill machines in drop or a continuous stream. Axles with cups are provided for these machines, and are removed and exchanged with the turnip-seed barrels, as the occasion requires. In either way of sowing the seed, a light rolling of the drill finishes the process.

When the young plants of beet-root are risen to the height of two or three inches, the horse-hoe, as for potatoes, grubs and scarifies the intervals of the drills, when the tops of the ridglets are mowed by the hand-hoe, the weeds cut, and the plants left to grow at 8 or 10 inches apart. The scarifyings are repeated as the weeds grow, and the stiffness of the soil requires pulverization, the hand-hoeing is repeated, and any tall weeds that arise during the latter season are pulled by hand. No earthing-up of the roots is done, as the contact of earth induces the growth of fibres from the bulb, which always render the quality to be coarse and

bitter. The crop grows till November, when the roots are pulled by hand, dressed clean from earth and fibres, and the tops cut off by sickle. The tops are eaten by young cattle, and the roots are stored in thatched longitudinal piles, for the use of cows and sheep in the months of spring. The land is ploughed without delay, and sown with wheat.

The sowing of Swedish turnips on clayey loams is done from the middle to the end of May, and for this crop, the land is every way prepared the same as for beet-root. The seed is sown on the top of the ridglets reversed over the dung, by the means of a double drill sowing machine, and covered by a light roll. The scaring of the intervals of the drills during summer, and the hand-hoeing of the crop of plants, are done as before directed; the plants are left to grow at nine inches apart, and the furrowed earth is not laid to the roots, as the contact of soil produces a fibrous growth from the bulb, which renders the quality coarse and bitter. In November, the crop of roots is removed to store-pits for the use of the spring months; the tops are consumed by cattle and sheep, and the land is ploughed and sown with wheat.

The farm-yard dung is carted to a heap in the fields, to be sown with the above crops, or laid in the lane which adjoins the gateway; but it is best in two or more heaps in the field, and so placed as to suit the process of laying-on the manure in the proper season. The heaps are formed during the months of January, February, and March; the carts pass over the sloping ends, and deposit the strawy excrementitious mass in a trampled consolidation, which prevents the fermentative process. A week before the potatoes are planted, the heap is turned over, and shaken into small pieces, which engenders a very active fermentation, during which the dung is deposited in the drills, and the seed placed upon it, and covered with earth by the plough. For beet-root, the heap may be turned over for two weeks previous to being used, which will advance the fermentation a stage further towards rottenness, and the same for Swedish turnips, as that plant and beet-root require a more rotten state of the dung than the potato plant. In all the applications, the plants derive much benefit from the fermentation going on after being deposited in the drill, and evolving a heat that is highly conducive to vegetable growth. The lime newly slaked from the cinders, and in the hottest possible state of pulverization, is best applied on the surface of the ground before the drilling is done, of which the two operations in opening and reversing the ridglets mix and commingle the soil and the lime in a very advantageous manner. The quantity should not be under 200 bushels on an acre, and repeated at every third rotation of the cropping. The temperature of the soil will thus be kept high and uniform.

The rotations of crops to be followed on the lands of clayey loams, vary in the number of years from five to seven. For the very best qualities of soil, the following course of seven years cannot be exceeded, and it has been before recommended in the case of loamy clays which require to be summer-fallowed. Thus, 1, green

crops, potatoes, beet root, rutabaga, and cabbages; 2, wheat or barley; 3, hay; 4, pasture; 5, oats; 6, beans; 7, wheat. Notwithstanding the very great esculent value of cabbages, the plant does not form an eligible crop of general use; the very fibrous root does not penetrate and divide the soil as the tap descent of the turnip and carrot, and the swelling tubers of the potato; and there is no feculent exudation, as in the latter cases, from the fleshy bulb. The management of the plant in cultivation is generally more expensive than that of the turnip and potato.

The rotation of five years is adapted for the second quality of clayey loams, to which beans are not fitted, and wheat is to be omitted. Thus, 1, green crops; 2, wheat or barley; 3, hay; 4, pasture; 5, oats. The grass seeds for both rotations are per acre, 1 bushel of ray grass,  $\frac{1}{2}$  bushel of cock's-foot, 4lbs. of meadow fescue, 10lbs. of red clover, 4lbs. of white clover. The course of five years will be the most generally useful, and most fitted for clayey loams, with the exception of the very best qualities of soil, on which the rotation of seven years may be adopted.

The crops on these soils are large, but the quality of grains is rather deficient. The barley is thick-skinned, and dingy in the colour, compared with the grain that is grown on gravelly soils and sharp loams; and the wheat is not so fine as the quality produced on the lands that are more purely aluminous. The quantity of produce very much overbalances this deficiency, and the bulk of straw adds much to the aggregated value. The green crops are the great basis of productiveness, by which the land is fitted for the future crops, besides yielding in themselves an inestimable value as food for man and beast. The root crops and the wheat are the staple articles. J. D.

*(To be continued.)*

#### SONG OF THE SPADE.

BY J. BEDFORD LENO.

Give me the spade and the man that can use it;  
A fig for your lord and his soft silken hand;  
Let the man who has strength never stoop to abuse it,  
Give it back to the giver—the land, boys, the land.  
There's no bank like the earth to deposit your labour—  
The more you deposit the more you shall have;  
If there's more than you want you can give to your neighbour,  
And your name shall be dear to the true and the brave.

Give me the spade—Old England's glory,  
That fashioned the field from the bleak barren moor;  
Let us speak of its praise with ballad and story,  
While 'tis brightened with labour, not tarnished with gore.  
It was not the sword that won our best battle,  
Created our commerce, and extended our trade,  
Gave food to our wives, our children and cattle;  
But the queen of all weapons—the spade, boys, the spade.

Give me the spade, there's a magic about it  
That turns the black soil into bright shining gold;  
What would our fathers have done, boys, without it,  
When the lands lay all bare, and the north winds blew cold?  
Where the tall forests stood, and the wild beasts were yelling,  
Where our stout-hearted ancestors shrank back afraid,  
The corn-stack is raised, and mankind claim a dwelling,  
Then, hurrah for our true friend—the spade, boys, the spade.

## FISH MANURE.

DEAR SIR,— I know not whether the excellent practical lecture of Professor Way on the properties and uses of fish manure has been followed by any attempts to establish manufactories on our coasts. An inquiry, however, of Mr. Prideaux, one of your correspondents, respecting the possibility of obtaining a supply of fish, accompanied with a complaint that neither the learned Professor nor myself in my letter had given sufficient information on that point, leads me to suppose that such an undertaking is at least contemplated. With regard to your correspondent's complaint, I beg to say that the lecture was necessarily confined, in the main, to the scientific view of the question; and that any remarks upon the *modus operandi*, including the source from whence the raw material is to be obtained, could only be incidentally, if at all, adverted to. My own letter, which appeared on the same day in your paper, was intended to draw the attention of commercial men, and especially of those employed in the manufacture of condensed manures, to the identity, and consequent *equal value*, of the fish manure with guano, and thus induce them to form establishments for its manufacture on the coast, in order to provide against the time when the supply of guano will be exhausted.

Believing, as I do, that the use of condensed manures will indefinitely increase, both from the superior effect produced by them in the produce of the land, and the saving of labour and time in their application, and that the subject has attained an importance that must force itself upon the attention of both commercial and agricultural men with daily extending and increasing interest, I think that it cannot be too frequently brought before the public, and that every word of information calculated to throw light upon it ought to be made the subject of discussion and consideration. I therefore propose to supply in this letter the omission complained of by your correspondent, by saying a word or two upon the most eligible places for obtaining a supply of fish for the manufacture of fish manure.

It was well remarked by Professor Way in his invaluable lecture, that in the prosecution of this enterprise the motive for the fishing must be reversed, and that instead of the capture of edible fish being the primary, and that of other kinds the incidental or rather accidental object, the fishing for the manufactory must become the primary object, and only the more valuable kinds of fish reserved for the market. For this purpose, boats must be fitted out *strictly for the work*, independent of the purchase of useless or uneatable fish caught by the regular boats, and the refuse of curing establishments. It might be supposed that this would injure the fishery by lessening the shoals or driving them off the coasts. I believe, however, that such a fear would be groundless, that the quantity of fish is perfectly inexhaustible, and that *the instinct* which brings the shoals periodically or otherwise to our coasts is too

powerful to be overcome by any draughts upon them, however large or numerous. The progress of the migratory shoals—such as mackerel, herring, pilchards, &c., so far as I am able to judge, is as regular, deliberate, and unconcerned, after centuries of fishing, and, I may add, as numerous, as ever. Nor do I hear that the increasing demands upon the shoals of cod fish on the banks of Newfoundland have either alarmed or lessened the quantity of the fish. The fact is, so enormously prolific are all species of fish, of the edible kinds especially, that the idea of exhaustion is perfectly absurd. The "take" of cod, for instance, at Newfoundland is about 1,400,000 tons per annum, which, if we reckon the fish to weigh, upon the average, 8lbs. each, will give the sum of 392,000,000 of codfish. Now, as the roe of one fish contains a million eggs, it would require only *three hundred and ninety-two* fish to supply the whole take, supposing all the eggs and spawn from them were to live! A large proportion, however, of these are undoubtedly devoured by the fish of prey; but still enough are preserved to afford an inexhaustible supply for all the purposes that man can devise for their destruction.

And now with regard to the places most eligible for such an establishment. Our largest fisheries (in England), I believe, are on the eastern and western coasts, say, the eastern counties and Cornwall. In Ireland the whole line of coast, but especially the western or Atlantic side, swarms with fish which for ages have remained almost unmolested. It is a fact that in Dublin Bay the take of fish by the Cornish fishermen amounts to from £60,000 to £70,000 per annum; *yet not a boat is sent out from Dublin*, and the fish market of that city is chiefly supplied by the Cornish fishermen. The boats are furnished and fitted up, and the capital supplied, by tradesmen at Penzance, St. Ives, &c., who share in the profits of the venture. But an illimitable quantity of fish might be taken in the bay and its neighbourhood; whilst there are plenty of sites, either at Ringsend, Howth, or Clontarf, for an unmolested establishment, which might not be the case nearer to Dublin.

On the west coast, however, the scope is much wider than near Dublin; and the only question is, how far would the inhabitants of those parts tolerate such an establishment? Hitherto they have resisted all attempts of English capitalists to form fisheries upon their fishing grounds, and have illuded and driven away the men employed in them; whether they are now less inimical to the intrusion of "foreigners," as they call us, and are willing to assist by their labour on reasonable terms, I cannot say; but as a beneficial change has already taken place in that country in other respects, it is possible that now, the fishermen of the western coast of Ireland may have seen their error, and are willing to lend their aid in establishing what will certainly be of immense benefit to their country.

Supposing, then, that no opposition would be raised against such establishments, any part of the western coast would furnish an abundant supply of fish at all times and seasons; and the innumerable bays and inlets afford eligible sites at almost every mile or two. But perhaps the most convenient part would be towards the south, from Galway Bay to Baltimore. Independent of the deep-sea fishery, which could be prosecuted with the greatest success by large boats, the whole range of coast is well adapted for the employment of the smaller craft, which in the various estuaries and inlets could pursue their avocations with safety and success. The certainty of an immediate return at a fair price for the produce of their labour would be an unfailing inducement to its prosecution.

With regard to England, any of the port-towns where the herring, mackerel, pilchard, or other fishery is carried on, would be eligible. All the refuse of those establishments would of course be available. Professor Way referred to the sprat fishery on the coasts of Essex, Kent, and Sussex, as affording at present a large supply of manure to the neighbouring farmers. This might be extended indefinitely, and applied to the purpose of the manufacture. Of the dog fish in Dorsetshire, also referred to in his lecture, I had not before heard; but if the quantity taken is considerable, it might answer the purpose. Regard, however, must be paid in some degree to the composition of the different kinds of fish. The learned professor showed that the mackerel contains  $24\frac{1}{2}$  per cent. of oil; this is a most important fact. In the report of the establishment at Concarneau by Messrs. Payen and Pommer, they estimate the proportion of oil extracted at  $2\frac{1}{2}$  per cent. of the weight of fresh fish, which is considered an important item in the produce, as it sells at  $5\frac{1}{2}$ d. per lb. If, therefore, mackerel yields even half the proportion stated in the lecture, it would add materially to the profit of the concern.

With regard to the whale fishery, there is no question that the flesh, if it could be cured and condensed when taken, would be available for the manufacture, *but not at half the price of guano*. The fish manure at Concarneau sells at about £7 10s. per ton,\* and the proprietors of the new establishments could not afford to give £5 per

ton for the refuse flesh of the whale, even if the shippers could afford to give it room at that price, in lieu of oils, which I much doubt. With respect, however, to the bones of the whale, I can speak with more certainty, *that they will not answer the purpose of cattle bones* at any price. I speak now from a personal knowledge, happening to be acquainted with a bone crusher who purchased a large quantity of them, and ruined his trade by mixing them with his other bones, the effect of which was to spoil both. When he found out his error, he attempted to sell the whales' bones by themselves; but when I last saw him he had not succeeded. The fact is, fish bones do not contain the properties of cattle bones, and will do but little, if any, good to the land. Perhaps some of your chemical correspondents will be able to explain the cause of this, and the difference, which I cannot.

Whether a "porpoise fishery" would prove profitable, I cannot say; but certainly there are at times large shoals of them on our coasts. They are, however, a very cunning fish, and are not easily taken in any way. As to sharks, I hope they are not sufficiently numerous with us to form an object of profit to the fisherman. When accidentally caught, however, they will be available. The porpoise, I apprehend, would prove more profitable on account of the oil, if they could be taken in sufficient quantities, either by net or harpoon. The common herring or mackerel net would be of no service in this fishery, which would require a strong and deep net of large dimensions, to drive the porpoises upon the shoals, where they could be destroyed with the spear, harpoon, or club, at leisure.

Upon the whole, I see no reason to fear that a fish manure manufactory, on any part of our coast, would ever have to stand still for want of raw material; whilst depending upon their own fleet of boats, they would most assuredly have the assistance of the regular fishermen, if the remuneration given was liberal. I should be glad to see the experiment tried, being convinced that it would prove amply remunerative to the parties engaged in it; whilst it would confer a lasting benefit upon the agricultural interest.

Yours truly,

N. F.

London, 15th October, 1855.

## STEAM CULTURE.

### ROTARY ACTION.

Now that we have entered the field with the powerful arm of steam, it is high time to bring to the bar of practice the favourite proposition of rotary cultivation. The slow, straight-forward pace of the plough may harmonize with the measured step of hoary age; but childhood and youth—how fond are they of running after whirligigs, just because of their rotary action (?). And in yoking steam, like an untrained colt, let us beware lest experience accuse us in the long run of having spent

\* 20 fr. per 100 kilogrammes.

the best half of an apprenticeship to steam culture in playing ourselves with toys.

The curve which the edge or point of all rotary implements describes is either a cycloid, or that where the base is greater or less than the base of a cycloid; and in order to comprehend its action in the soil, it is necessary to attend to this curve, whatever it may be.

In the following diagrams, fig. 1 is two cycloids, (A) and (B), representing two revolutions of the implement; and lest any of our readers may not be acquainted with the curve, the following explanations will enable them

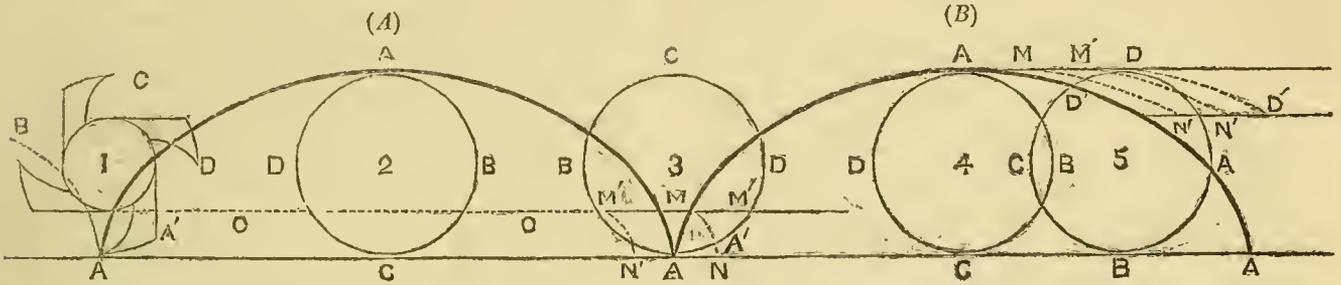
to follow us, and draw the necessary practical conclusions at issue.

The three circles numbered 1, 2, and 3, represent three different positions of the implement, in which the letters A, B, C, and D are the same points of it in each case—as shown at No. 1, representing four ploughs; or the points may be those of any other tiller our readers may imagine.

If a circle roll along a straight line—such as a cart-wheel along the surface of level ground—a point in the circumference of this circle or wheel will during an entire revolution describe a curve, which is called a cy-

cloid. The circle is termed the generating circle, and the point in its circumference the describing point.

In the diagram, either of the circles may be termed the generating circle (say No. 1), and A the describing point in each position—A (fig. 1) being the point at the bottom of the furrow or cultivated soil. In rotating from left to right, it describes the cycloidal curve A A A. When it has made half a revolution it is in the position No. 2, A being then in the vertex. The third position (No. 3) represents the circle when it has made one complete revolution, the describing point having reached the base; A A A is thus the cycloid, A C A its base, and a straight line from A to c (No. 2) its axis.



The circle (No. 3) is that which most interests us, as the implement here enters the soil and again leaves it. When A (or the point of the implement) has reached the base here, it is stationary for an instant of time, when it again arises, describing the cycloid (B). If any of our readers do not see this properly, let them put a mark on the felloe of a cart-wheel, and then follow or trace the curve it describes during two revolutions, when they will find it is that of our diagram.

If we suppose the diameter of the implement four feet, and the depth of cultivation one foot (*i. e.*, a cubic foot of earth at each spit), then the base would be something more than twelve feet in length; so that we must either have twelve ploughs, or make the implement perform three revolutions, in order to invert or cultivate the furrow-slice or spit M' N' M A, the line M M' being the unploughed land, and the dotted line o o the ploughed—or 24 ploughs, with a spit of 12 x 12 x 6.

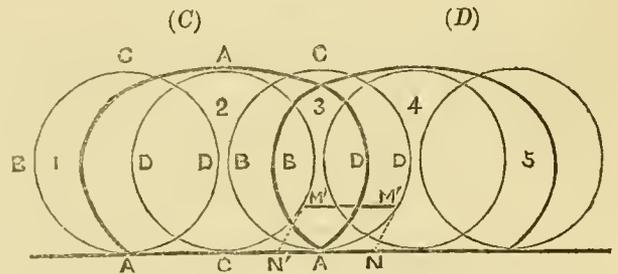
Now, we need hardly waste words in proving to our readers that this is an absolute impossibility, as they must see it at a glance, from the position of No. 3 compared with No. 1. They will also be able to account for the heavy draught of Samuelson's digger, and all implements of this kind working on the cycloidal principle, from the action of the back of the diggers against the unloosened soil; and also for the imperfect manner in which they cultivate the bottom, from the curve which the points of the diggers describe in rising, as represented at A No. 3.

By making the implement revolve the opposite way (say Usher's ploughs), its points or shares entering at the bottom of the furrow instead of as at the surface of the unploughed land, the curve which A would then describe would be an inverted cycloid. The point of the implement would then enter at the vertex, instead of where the ordinate or dotted line o o meets the curve at M.

If we turn the cycloid (B) upside down, and suppose the implement moving from right to left, then No. 4 and No. 5 will represent two positions of it. In the former, the point of the share A is supposed to be at A of the latter when D (No. 5) is about to enter the soil to describe the dotted line D'. It is from this also manifest, then, that we must have either twelve ploughs in the series, or else three revolutions.

How far the proposition of slow motion in this case would meet the demands of practice, experiment must answer; but so far as mere theory is concerned, there is

nothing impossible apparently about it, with very narrow furrow-slices. With twelve ploughs there would be three furrow-slices for one with four ploughs, so that the dotted lines M N would show the first furrow-slice of a wedge-shaped form; M' N' the second, and D D' the third. Two difficulties would doubtless be experienced—the one in constructing the ploughs, from their close proximity to each other; and the second, competition with our *old friend* the straightforward going plough, perhaps the latter the greatest of the two.



The second diagram represents two curves (C) and (D), described by the point A moving at a uniform velocity around its axis three times that required in the cycloid. We may call it a tricloid. The letters and positions of the generating circle and describing point are the same in every respect as in the cycloid, only the difference of velocity gives a difference of curvature, with a corresponding difference in the length of the base. As in the former case, A A A is the tricloid; A C A its base; and a line from A to c No. 2 its axis.

In this case a considerable advantage is gained in the effect produced on cultivation, but at a great sacrifice of power. It is a well-known fact in mechanical science that an increase of velocity cannot be gained without a corresponding increase of power; so that to increase the velocity three times with a given power, is just to diminish the effect produced to one-third.

This, then, we may briefly say in one word, is a sacrifice of steam such as to render steam culture an absolute impossibility.

True it is that Mr. James Boydell has enunciated a new proposition in mechanical science, viz., that power may be gained without losing space, by making the two gearing teeth of the crank-shaft pinion and spur wheel on the carriage wheel of his "Traction Engine," each gear in the vertex of the cycloid which it describes. But although the truth of this proposition is all but

self-evident to those who comprehend practical mechanics, it must nevertheless pass at the bar of practice before it can be admitted as an exception from the general rule. It is a well-known fact, for example, that the top of a cart-wheel moves with double the velocity of its axle; that the describing point A of a generating circle passes the vertex (A No. 2) of the cycloid A with double the velocity of its centre, or progressive motion along the base A C A. The crank-shaft ginion again rolls along an imaginary line parallel to the ground, each tooth describing an inverted cycloid, having its vertex in the vertex of the opposite cycloid described by the gearing tooth of the spur wheel (the pinion), thus forming an endless plank as it revolves. Mr. Boydell takes advantage of this circumstance to save space and velocity, and by applying power to the end of a lever of the second kind (which may technically be termed an endless lever), is able to comply with the conditions which it demands of sustaining a traction force equivalent to twice the power applied. But even granting that the Patentee of the Endless Railway shall establish the truth of his proposition, so that it may be admitted into received science, it will not balance the loss of power sustained by tricloidal action; much less will it balance the loss of power sustained under a pentacloid, hexacloid, heptacloid, octacloid, nonacloid, decacloid, or any other *cloid* with ten-times-ten the velocity of the generating circle.

But apart from this view of the subject, our readers will readily perceive that almost all the obstacles of the cycloid stand in the way of the tricloid, progression being impossible with continuous motion from the action of the implement against the unploughed land M', and the imperfect loosening of it at N' No. 3.

With intermittent progression we have, of course, circular action. Let us glance very briefly at this as the last alternative of rotary culture.

Starting from a state of rest to one of motion is, we fear, a difficulty in the way. Boydell's engine, for example, when stopped in ploughing, has to back a little in order to enable it to advance again. Supposing, then, we take on six inches at every advance, we would then have six inches "back her," and twelve inches "forward," "stop her" and "back her" again, &c., &c.

Now we need not stop to ask the opinion of our practical readers on the issue in this case; for were we to enter the field with it, the conclusion would be obvious. It is much more easy to imagine results, than for us to convey anything like a just idea of them in this case. Six-and-a-half tons—"back her!"—then forward with a velocity of five miles an hour—would impinge against the unploughed soil with a momentum not easily calculated. Then follows the commotion of hot water and steam within, and cold water and oil without, in the faces of the engineer, and all within reach; with twisted axles, broken bolts, cracked saddle-boxes, besides the risk of bursting the boiler. In a word, when we enter the field, intermittent action has its difficulties to remove as well as continuous progression.

From these hasty observations we would rather have our readers to draw their own conclusions, than sum up in a single sentence a sweeping verdict against this kind of culture in any form. Cycloidal action we have seen impossible, tricloidal little better, while the extremes on either side are ten degrees worse. In short, the longer we live, the more our ideas harmonize with the straightforward action of our *old friend* THE PLOUGH, with his faithful allies, "drag-harrows," "cultivators," &c. No doubt objections many are brought against them; but these we shall briefly dispose of in a subsequent article, as worse than imaginary. Meantime, let none of our readers suppose that we look upon the plough and our present system of culture as perfect. On the

contrary, it is not long since we advocated spade or fork-husbandry as preferable to horse-ploughing, &c. But horse culture and steam culture, we hope, will yet be proved two very different things.

## STEAM CULTURE.

SIR,—In your journal there is an article on Fisken's Steam Plough, which professes to discuss the merits of that machine; but the writer of the article misrepresents the principles of the machine, and makes statements which are calculated to mislead those who wish for the truth on such an important subject as steam culture.

The article sets out by stating that "Fisken's project is a compound of several old ones;" and in proof of this averment, mention is made of Chapman, Saxton, McRae, Osborne, and some others, whose schemes we have copied, and combined into our machine. In answer to this, we have to state that these schemes or plans were entirely unknown to us when we projected ours, and consequently we could not copy from that of which we knew nothing.

But the best evidence that our machine is not a compound of these plans is the fact that we do not adopt the patented parts of those machines. The ropes and pulleys or riggers do not act on each other in the way they are represented in the article referred to. There is no part in our machine where the rope crosses, as is said, like the cord of a drill bow. We avoid that sawing of the rope which defeated the success of some of the above plans, as is represented, and we adopt a plan of our own.

As to the arrangement of the ploughs in or on a carriage, we also had to follow our own plan, for we had no other to copy from; and none but those who have attempted the adjusting of ploughs to work together in one frame or carriage, can have any idea of the difficulties in the way of success.

But neither the originality nor excellence of the machine consists in the arranging of ploughs in a carriage, or in the mere employment of ropes and pulleys. The way that our machine is sought to be deprived of its merit is by saying that it is a copy of others. All inventions in mechanics would be stripped of their merits by saying they were only a compound of the three or five mechanical powers or principles, as all machines are but a combination of these simple elements. All inventions, in one sense, must be but combinations or compounds; and all inventors in mechanics, great and small, in that sense are compounders.

The great peculiarity and novelty in our machine consist in transmitting power for field purposes by a small rope moving at great velocity, and in being so arranged that the motive power always maintains one position while the field is being ploughed. The engine, or motive power, is stationed either in a corner of the field or in any field adjacent. None of the plans, which I have seen or heard of, adopt the principle of the small endless rope at great velocity for transmitting power: our method in this respect stands out in full distinctness from all other projects of steam ploughing.

Let me shortly now direct your attention to some of the great advantages gained by this mode of transmitting power, by which the objections raised in the article referred to are avoided.

First. Our method allows us to have all the sheaves, capstans, or anchors, and other fixtures, much lighter than in other plans, which employ ropes and pulleys, and consequently are more easily shifted from field to field.

Secondly. All the heavy strain by which the cultivat-

ing apparatus is moved along the soil comes upon fixed drag ropes, which are taken up by the travelling machine by means of drums or a grooved rigger (for we have employed both ways), and consequently the friction and loss of power occasioned by a heavy drag rope in motion are avoided; and, also, by this arrangement the machine is capable of moving over all kinds of surfaces—hills or steep declivities are no obstacles to its action; and they who know the irregularities that abound in our cultivated fields must admit that a machine which possesses the power of travelling wherever horses can travel, or land requires culture, is endowed with rare merit.

In the article referred to, it is stated that our drag rope requires to be double that of Osborne's or McRae's; the fact is, that ours is lighter, as we do not require to provide for those heavy strains which must attach to their system. The attempt at reasoning to prove that our rope must be double shows that the writer does not understand the machine he professes to describe, and also that he knows not the first elements of mechanics. Strange that such a writer should assume the air of warning his readers against imaginary results, resting on his own misconceptions.

Thirdly. Our scheme possesses the advantage of having the power concentrated, as it were, in the moving carriage, which gives the ploughman complete control over its motions, as, by a simple touch of a handle, he can in an instant stop, reverse, or set the machine in motion, without ever interfering with the action of the small rope; so that stones or sudden obstructions are found to be no difficulty in practice.

Fourthly. The scheme transmits power with great economy. An eminent engineer (James Stirling, Esq., Edinburgh), who was sent by the Highland Agricultural Society of Scotland to report on its merits, found, after a careful measurement of the power, that one plough with its carriage, weighing together 15 cwt., was propelled at the usual speed of a plough, and taking also an average furrow, by the nominal power of two horses, the plough at times working 300 yards distant from the motive power (which was a water wheel). Subsequent experiments by steam power have realized still more favourable results. In a late experiment at Walworth Castle, near Darlington, an engine seven years old, and less than seven horse power, propelled two ploughs and their carriage (weighing 17 cwt.) 1,920 yards in twenty minutes, the ploughs working from six to seven inches deep, and the work also of a superior character: this was within a fraction of six acres per day, with less than seven-horse power. Such are some of the unparalleled results which the apparatus has actually effected.

But lastly, and what may appear to some the most valuable advantage, the scheme affords the ready means of employing other modes of acting on the soil than by the common plough; and from the beginning we contemplated the employment of a more effective method of cultivation than the plough, and are prepared to carry it out as soon as circumstances allow. The design of the scheme, when fully carried out, is, that the cultivating apparatus will leave the soil thoroughly pulverized for the seed as it proceeds, and thus avoid the awkward and antiquated method of comminuting the soil by the mere traction of implements through it. It has been enough for us at present to show how the plough can be profitably drawn by steam. The plough's ancient reign is, however, doomed to fall before the revolutionary notions that accompany the introduction of steam into a new region of action.

In the article reference is made to the fact that when the machine is working two ploughs, and with a leverage of 11 to 1, the small driving rope has then only the tractive power of one-third of a horse-power; and this

is held up as a gross absurdity. Now, a person, before he begins to ridicule, should first see that he is in the right. Had the writer who made this gross reflection taken the trouble to acquaint himself with the principle of virtual velocities, he would at once perceive that one-third of a horse-power, with a velocity of 22 miles per hour, is about the power of four horses moving two miles per hour.

We claim nothing for our machine but what is founded on the principles of mechanical science, or what has been proved by the stern realities of experiment, before which all conjectural objections entirely vanish.

Trusting that the above will find a place in your next publication,

I am, yours truly,

WILLIAM FISKEN.

Stamfordham, by Newcastle-on-Tyne,  
Dec. 13, 1855.

SIR,—I notice, in the *Mark Lane Express*, your correspondent's remarks about Steam Culture, and as my machine is several times brought forward in connection with the subject, I beg you will give a place to the following reply.

May I ask if your correspondent has ever seen my machine at work? The tone of his remarks leads me to infer that he has not; and if so, it would surely have been a little more in harmony with the practical character of your journal if he had avoided so sweeping a condemnation on merely theoretic principles. The day has gone by when science ventures to pronounce *impossibilities* on her own dicta, and it is happily a rare occurrence to have the facts of an experimenter, struggling with difficulties enough in the general apathy of practical men, coolly impugned because the theorizer has never recognized the principles of operation, or taken the trouble of examining the results. Hence your correspondent styles the whole thing as "Usher's proposition," as if the whole were some theory of my own, which he might meet and overturn by a counter theory of his; while I present it to the public, and ask the judgment of the public upon it, not as a proposition, but as an experiment—a fact needing development, it may be, but as far removed from a proposition as the dictum of your correspondent is from that rational theorizing which is most of all afraid of running its head against facts.

I may notice one or two points of detail which, in reference to my machine at least, have so obviously the elements either of prejudice or ignorance, that I can only claim, yet scarcely expect, that candid examination which a proposition really applied will always receive at the hands of the truly scientific.

Your correspondent repudiates the idea of my revolving ploughs being propellers, but this has been proved by many experiments. I can take my machine over newly-ploughed land, and turn it over a second time, both operations of driving the machine and turning over the land being carried on with as much ease to the engines as when ploughing the stubble land for the first time; the ploughing apparatus being driven at double the speed of the machine. Now, as it would require twelve horses to draw a five-ton carriage over a ploughed field, and ten horses to draw five ploughs through the same after that weight had passed over it, I think it follows that the power exerted in the cultivation is transferred to propelling, as a 14-horse engine could not perform both operations at once. Again: he states that the heels of the ploughs are like *railway drags*, and tend to *repel* instead of *propel* the machine; but *this* is entirely obviated by the fact that the heels are kept so much nearer the spindle than the points that they merely touch the ground. This was a point that engaged my

very earliest attention, and which I successfully overcame. I only wish, Mr. Editor, that I had you on the field, on a dry day, with my machine, when all your correspondent's theories about "octacloid and nonacloid," "back her, and stop her," would soon be dissipated, as I never require to stop from one end of the field to the other, unless when coming on a rock; and the sole of the furrow is never more than one inch shallower at one place than another, which is surely of much less consequence than the hardened and smoothed sole made by his "old friend, the plough."

Your correspondent's last paper, On the System of Cultivation by Rotary Machines, is not for me to decide on, as it enters upon points more adapted for the decision of farmers themselves; but I shall give you the opinions of practical agriculturists on the subject, who have witnessed my machine in operation, and with a foot-rule gauged and measured the work performed.

One of our most distinguished farmers' clubs, at one of their meetings, thus record their sentiments on steam ploughing:—

"That, in the opinion of this meeting, it is not essential, in the introduction of any new principle of cultivation, that the old system of working on the method of the plough should be maintained, but that any process, by which the soil is thoroughly committed to a sufficient depth, would be preferable to any system of grubber or plough cultivation."

One farmer writes:—

"After witnessing the trials of Usher's machine, I may with great confidence say that the day is not far distant when the object will be accomplished. The average depth that the plough went on Wednesday was seven inches; and, as far as I can judge, it will turn over five acres per day, for twenty-two shillings."

Another writes:—

"If a practical man had been brought to the field, not knowing how the soil had been stirred, he would have pronounced the complete operation to have been the work of the most perfect grubber or cultivator. As a cultivator and pulverizer of the soil, Mr. Usher's steam plough proved equal, if not superior, to the common plough or any cultivator that I have seen in operation."

Another says:—

"The earth was completely broken up, as if it had been done by spade labour, leaving scarcely a clod for the harrows to break; while the bottom of the furrow, in place of being hard and stiff, was as clean and open as if a rake had passed over it."

Another:—

"Perhaps the severest ordeal to which the steam plough was subjected was when it passed a second time over land newly turned up; but here the trial was amply successful: the machine moved on as steadily and firmly as if it had been cutting the surface for the first time."

An eminent agricultural engineer says:—

"It was with no small amount of pleasure that I first became aware of Mr. Usher's invention of a locomotive machine, in which he had combined the processes of both ploughing and digging, and had moreover adopted for its action that mechanical appliance which has in numberless cases been so eminently successful—rotatory instead of rectilinear motion; and it has indeed become my own farther and firm conviction that steam tillage, to be successful, must be on the locomotive principle, with rotatory motion."

I am, sir, your obedient servant,

JAMES USHER.

Edinburgh, Dec. 18, 1855.

## FISKEN'S PLOUGH.

In addition to what we said last week on this subject, we have only, in reply to Mr. Fisken, to append the following:—

(1.) Practice has never yet been able to overturn sound theoretical principles, for reasons too obvious to require notice, the latter being the laws which govern the former.

(2.) There is nothing novel in the transmission of power "for field purposes by a small rope running at a great velocity;" so that all that can be claimed here is any peculiarity in the mechanical construction for doing so.

(3.) There is nothing novel in the motive power always maintaining one "position" (?) while the field is being ploughed; so that all that can again be claimed is mechanical construction.

(4.) There is nothing novel in the engine being stationary in the corner of the field.

(5.) It will be high time to sing the requiem of the plough when rotary tillers have been adopted in practice.

(6.) Power is, in the first instance, sacrificed to gain velocity, and then velocity to gain power. Now, with all due respect to Scotch engineers, we beg most respectfully to query the economy of steam in such a combination. We have had enough of experience in field-engineering to know that it is an easy matter losing power, but not such an easy one taking it up again, under less antiquated systems than rigger motion, traction, and friction.

(7.) Is not Mr. Fisken aware that his "virtual velocities," as applied to our case, are "essentially stationary"? an absurdity gross enough, we repeat, "for the most unlettered rustic swallowing." We entreat him to read our paragraph again. Let us put the question in another form. *First*, How many levers are there involved in a rigger? only one, as some have ignorantly supposed? and if two is the *rule*, then  $P + W$ , or  $2P + 2W$ ? And *second*, Will his motive power propel his implement in the absence of rigger friction, &c.? Certainly not! With rigger friction, then, what is the additional power required? As this friction is always equal to the tension of the driving and traction ropes, will not one-third more or less of a horse-power be required to overcome it, including the resultant forces involved?

(8.) When inventors fall into such errors as the above, what value can be placed upon their own reports of their experiments? We are the last to call in question the value of evidence of this kind, or to throw any obstacle in the way of progress in the field; but experience has long ago proved that the public cannot with safety rely upon experiments performed by those who, in nine cases out of ten, are too enthusiastically sanguine of success. Caution is necessary on the part of agricultural journals, before giving credence to every thing reported from the field; the more so when reporters appear not always to comprehend the principles on which machines work. But while we thus award to experiment its full merit, we beg to remind our readers at the same time that experimental blunders are much more numerous than theoretical ones; and with these premises we have only to add, that the experiments, as quoted by Mr. Fisken in support of his plough, are wanting in detail to be of reliable value to us.

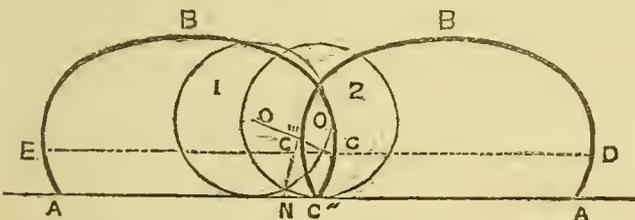
(9.) Neither Chapman's nor Saxton's riggers were thrown aside because of the sawing action of the rope in crossing, as stated by Mr. Fisken, that having been obviated by pulley-guides; but because of the extra

power required for rigger-friction, as stated under last heads.

(10.) When Mr. Fisken acknowledges what he does of rigger mechanics, are we not entitled to thanks for the information we have afforded him? Our object has been to treat the subject impartially, dealing equal-handed justice to all inventors; and if we have failed in this, it is more than what has yet been successfully laid to our charge, while all the complaints brought against us disappear as we approach them like an Egyptian mirage.

USHER'S PLOUGH.

(1.) When Mr. Usher makes the startling announcement that "the day has gone by when science ventures to pronounce impossibilities on her own dicta," what are we to understand by it? That Received Science has fallen asleep? or that she is to have nothing to do with inventors and their steam-culture projects? Has not Mechanical Science laid it down as an established fact in practice that the points of his ploughs are momentarily in a state of rest in the soil, and therefore can produce no effect whatever upon it? and that it is absurd to talk of the heels being "kept so much nearer the spindle than the points, that they merely touch the ground;" as will be seen from the following diagram, where  $ab c''$  is the curve described by any point of his plough, and as  $c'' b a$  that described during the second revolution of the implement. Let  $ed$  be the surface of the soil,  $a c'' a$  the bottom of the cultivated soil, 1 and 2 two positions of the implement,  $o o$  the spindle in each case, and  $c'' n c c''$  the spit of ground to be cultivated; and draw the radius  $o c$  (fig. 1) from the spindle to the surface of the soil  $ed$  in  $c'' c$ .



(2.) Now it will appear manifest at sight to our readers that the radius  $o e''$  (fig. 2) acts upon the soil as the point of the implement  $c$  moves to  $c''$  in rising out of it, and consequently that it checks the progress of the machine like a drag. The heel of the plough, therefore, must, instead of being kept nearer the spindle than the periphery, as stated by Mr. Usher, be in advance of the point or radius  $o c$  (fig. 1)! but were it so, the action would be abrading, not ploughing, as our readers will perceive. The patentee may summon to his assistance all the leading farmers in the kingdom, but they will not get him over the impossibility which Received Science has here thrown in the furrow before his plough. Mr. Fisken has dragged us into "virtual velocities" above, and a very slight insight here ought to convince Mr. Usher that to make the velocity in the one direction equal to the velocity in the other, so as to produce an equilibrium in the point  $c''$ , where the greatest velocity was required, is neither sound doctrine in the columns of an agricultural journal nor effective practice in the field. We are not here saying that 14-horse power of steam and 5 tons of solid metal will not break the surface of ordinary soils; but the practical question at issue involves the economy of time, steam, and iron, in doing so.

(3.) Again, it will be seen that the soil loosened by

the implement is represented by the triangle  $c c'' c'''$ , and that in wet, tenacious, clay soils during winter, the area  $c''' n c''$  would not be loosened at all. In friable soils it might be so, in the same manner as imperfect work with a pick, such being the principle of culture; but in the plastic clays of Surrey at present it would be otherwise.

(4.) The principle of action, it will be seen again, is that of loosening the soil as with a pick, as we have just stated above; so that the fine theory of rotary culture, perfect comminution, and so forth, is a fiction only existing in the minds of some opiniative writers and speculators.

(5.) With regard to *propulsion*, a correspondent has very graphically compared it, in the columns of a contemporary, to the action of the paddle-wheels of steam-boats in the river. Now as the idea of sailing in our fields must be very refreshing during Christmas times, we may safely leave this part of the question in the hands of our readers for solution. Moreover, as paddles are giving way to screws, why not have Bensen and Pettitt's screw "propellor"? since by adopting it we avoid the stumbling-block of "virtual velocities." Our readers will perceive that we are here presenting them with mechanical "nuts to crack" more worthy of patents than paddle systems, and therefore we hope they will make the best of their winter evenings—*Qui nucleum esse vult, frangat nucem oportet.*

MR. NEELD'S COTTAGES FOR THE POOR.

COTTAGE ACCOMMODATION LIKELY TO INCREASE POOR'S RATE.—ILLUSTRATION OF THE EVIL WORKING OF THE LAW OF SETTLEMENT.

I feel somewhat at a loss to know upon what topic I can speak, so as to introduce some variety; and I have therefore been considering what my brother clergymen elsewhere say. And one favourite topic with them of late is the want of cottage accommodation for the poor; and, taking that as their text, they take the opportunity thus afforded them of reading the landowners a lecture as to their duty in this matter. I shall not imitate their example, both because I consider such advice to be much misplaced and to take a very short-sighted view of the subject, and because I believe the land-owners want no advice from me to tell them that "Property has its duties as well as its rights"—(Hear, hear)—and I am sure they are ready to fulfil those rights, any and everywhere towards their poorer neighbours. I may be excused for making one remark while on this subject, with regard to a near connection of yours, sir, which is, that you may define the boundaries of the parish of Grittleton by the admirable cottages which have been erected there by the kindness and generosity of Mr. Neeld (cheers). You may see there cottage accommodation superior to any you could see almost anywhere else. You may see there cottages with one or two rooms down-stairs and bed-rooms up-stairs, a good supply of water, and a piece of garden-ground, all of which is rented for about 1s. a week. The way in which he has provided cottage accommodation for the poor on his estates will make his name to be long remembered; and he will sleep all the better in that palace he is raising for himself at Grittleton, for the way in which he is enabling the poor men to sleep in their cottages around him (cheers). With regard to this question, I believe it to be exceedingly short-sighted and misplaced to find fault with any landlord for not providing cottages; for in proportion as he does so he will increase the rates and decrease his rent. It is unreasonable to expect that of any man. I may be allowed to mention, in illustration, a circumstance that is well known by my neighbour there, Mr. Dark. The guardians of Broughton Gifford were some time ago surprised to receive a notice of the removal of a widow and her four children, of whom they had never before heard anything, to that parish for support. Upon inquiry we found that the grandmother of the woman had been born at Broughton Gifford about 70 years before, and had been taken from the place

soon afterwards by her father. But that fact was against us rather than in our favour, for *birth* in a parish is a *prima facie* settlement until some other and better settlement be set up. So that we were afraid we should be saddled *in perpetuum* with the support of this widow and her four children. But we found out that her grandmother's father had been acknowledged as a parishioner of Lacock some 100 years ago, and inasmuch as this was the case, the great grandchildren followed the settlement of their great grandfather, and consequently we were relieved by the fact of some benevolent landlord having built a cottage in Lacock, in which this man resided and gained a settlement not only for himself, but for his descendants a hundred years after him. That is an illustration of the working of the present law of settlement, even after all the relaxations that have been made in it. But this law of settlement is not only a great hardship to the proprietors, but to the labouring man himself. It has been said that a labouring man has his capital as well as others—and that capital is his ability and willingness to labour. And he ought to be as free to invest that where he chooses as any other man; but he is not free, for he is deterred by the apprehension that if he migrate he shall be torn from his old acquaintances and be transplanted to another place with which he has nothing more than a legal connection. We talk of freedom, but a man is *not* free unless he is at liberty to work where he

pleases. Neither with regard to the employer is this law a fair one, for the employer is a rate-payer, and he knows he must provide relief for those who require it, either in or out of the house; and the consequence is that he has only a choice of difficulties left him—either to employ labourers he does not want, or support them in the poorhouse; and therefore it is that a labouring man, whatever his inferiority as a labourer, yet if he has a large family, and is likely, with them, to become a burden to the parish, is almost sure to get employment, though his work may be unremunerative to his employer. I venture, therefore, to think that, in the interest of the whole agricultural community—in the interest of the landlord, the employer, and the labouring poor—some alteration in the law of settlement is exceedingly desirable. What that change may be it is not for me to say; but I trust the importance of the subject may be some sort of an excuse for my having made these remarks; and I venture to hope that in the next session of Parliament (notwithstanding the war, which almost entirely engrosses everybody's thoughts) we may come to some decision on the settlement question, and at last see the end of that law which for 200 years has been one of the most despotic, searching, and stringent enactments which ever fettered the free action, and injuriously affected the domestic condition and industrial habits of any people whatever.—*The Rev. J. WILKINSON, at Melksham.*

## EXPOSITION UNIVERSELLE DE L'INDUSTRIE.

[FROM THE FRENCH OF MONS. VICTOR BORIE, IN THE "JOURNAL D'AGRICULTURE PRATIQUE."]

### CHAPTER SIXTH.—TRIALS OF REAPING MACHINES AT TRAPPES.

In the trials the Grignon plough attracted the especial attention of the jury. The regularity and the good quality of its work, and the small draught it required, as well as its solid construction and moderate price, naturally point it out (whatever may be the issue of the competition) as one of the most valuable agricultural instruments which has been devoted to the progress of agriculture in any country; France may justly plume itself on a plough which is not worsted in a contest with the time-honoured renown of those of Ball, of Busby, and of Howard. For this plough we are indebted to the labours of M. F. Bella, the head of the Agricultural School at Grignon. The Howard plough partakes of the honours which we pay to the Grignon one. It has one remarkable feature, which we do not meet with in other ploughs, viz., the length of its share, which is 1 m. 39 c., or more than triple our great shares. Its long handles present a leverage which make its guidance remarkably easy, and the effect of its long share is in this wise. The English do not try, as we do, to break the soil in the first tillage by a rather brisk twisted movement; but their principal aim is to place the layer of earth which is detached by the plough on its side, in order that the herbage may be completely turned over and the roots exposed. This the Howard plough does admirably; and they obtain, by a slower process, to wit the aid of scarifiers, cleaners, &c., the complete breaking up of the soil.

The jury had fixed August 2nd as the day for trying the reaping machines, and on the morning of that day the Paris party, consisting of 700 or 800 persons from all parts of France, and in fact all parts of the globe alighted at the Trappes station, in order to be present at these interesting operations. A brigade of mounted gendarmes, a detachment of the 48th infantry regiment of Voltigeurs, and some sappers and miners from Trappes, were also placed at the service of M. de Gasparin, the president of the jury; while tavern-keepers

and victuallers from the neighbourhood were invited to erect tents and to offer their rural, and not too costly hospitality to countless spectators.

The operations commenced at twelve o'clock, and the machines were, as the saying is, "brought up to the scratch." A vast field of autumn oats had been divided the evening before into almost equal squares, separated by a large path, and each of the nine machines was bound on a given signal to accomplish its task. Lots had to be drawn, and the machines were divided into three groups of three each. Each of them was accompanied by an engineer and members of the jury, who took care to verify the time which each took to reap its allotted space.

At a beat of the drum the three first machines were bravely set in motion, under the gaze of more than two thousand spectators, who had run together from the neighbouring villages. Among those assembled from all parts of the globe were MM. Decrombecque, Crespel Delisse, G. Hamoir, Leonce de Lavergne, Lecouteux, Heuze, Pommier, Bella, Allier, Dehaut, Pasquier, Joseph Pigeon, Seguier, Antoine Passy, Garnot Alloury, Laffiley, Bugnet, Crété, Favre Prosper Aubergé, Bénard Gilbert, Pluchet, Fairbairn (one of the most distinguished English professors of mechanical science), and Madame Millet Robinet (the authoress of "The Ladies' Country House"). The whole Grignon college was there. It was, for it, a *fête* in the truest sense of the word, and a useful toil. One could easily recognize the countless pupils by the palms embroidered on the collars of their rustic blouses; and the passionate interest which inspired these young labourers, the hope of agricultural France. The press was also represented by the editors of the *Moniteur*, the *Patrie*, and the *Constitutionnel*.

The three machines first put on their trial were those of M. Cournier, of St. Romain (Isère); of M. Atkin, made by M. Wright, of Illinois (U.S.); and M. Laurent's, of Paris.

The machine of M. Cournier is of very light construction, and differs from all the others by an improvement of the most important kind. The saw which cuts the

corn is replaced by two knives, which sever the stalks at one sweep, and shake them less than the saw. The knives are double, and by means of a screw one can make them cut with the other edge after using the first one. One horse suffices to draw it; and a man, seated at the back, pulls a string, which causes to move a wheel of three teeth, sliding in three grooves. This wheel brings together the stalks, and throws them on one side. Unfortunately this machine did not appear to be constructed with that solidity which is so desirable, and could not accomplish its task with regularity. The lot had assigned to it a piece of barley of 1,628 metres square, almost entirely laid, which it reaped in 47 minutes. As it only required one horse, we must subtract half from this time, which leaves from 23 to 24 minutes. The loss of the screw retarded it at the beginning of its course, so that it did not finish its task for a long time after the others. It was nevertheless very remarkable, that in spite of the depressing condition in which it found itself, this reaper, so to say, left no ears of corn behind it, which cannot be said of all the others. On the other hand we remarked, it is true, that the flights, although they were of canvas, turned too rapidly, and struck the corn too roughly, so as to indent it. This inconvenience, which generally attracted notice, is not one of great importance, as it is easy to obviate it, by reducing, as in the other machines, the number of the flights from six to four, and changing the catching of the wheels which make it move.

This machine did not achieve all the success which it merited; but we think it is destined to fulfil a more important mission than is generally supposed. M. Courner is an intelligent mechanic, who has given high proofs of agricultural industry, and this trial has revealed to him certain defects, which it will be easy for him to avoid in future.

M. Atkin's machine, constructed by M. Wright, is a perfecting of the reaping machine of M'Cormick, of which we will presently speak. The man whose duty it is to gather up the corn in rows for sheaves, is replaced by an automaton contrivance, which imitates admirably the movement of the human arm, and opens and describes a curve outwards, and falls back on itself, after having described an arc of about 45 degrees. This jointed trunk is armed with a toothed rake, which slides over a platform where the cut corn falls, reunites the corn in swathes and presses it against a toothed plate attached to the machine by a spring, which yields whenever the swathe is a little too thick. The swathe so taken is carried a little to the rear of the machine. The rake then retires to commence anew its course over the platform, and the swathe finds itself gently deposited on to the earth. The straw is gently cut by a saw, which traverses two teeth, that is to say, which has working room of about two centimetres, and twice meets each stalk. One driver is sufficient for this machine, which is pushed by two horses behind. It was driven by an American, who managed his horses with an ease which was the subject of general remark. This automaton reaper, as its inventor styles it, reaped in 24 minutes a lot of 1,733 metres square, without stopping; and the specimen which worked on the ground was sold for 860 francs, and 150 francs extra for a set of blades to change with, to M. d'Herlincourt, a deputy of the legislative body.

The reaper of M. Laurent is moved in the same manner as the former, and also requires two horses. It threw the corn on the right side in extended swathes, and emanates from the machine of Bell. M. Laurent conducted his team in person, and three men were placed behind the horses to direct it, by means of a large bar fastened to the extremity of the pole. It left a part of its lot separated from the rest by a small trench of 20

centimetres, which it was impossible for it, as in fact it was for the other machines yoked from behind, to surmount. It was also obliged to waste some precious moments, after having reaped the first part of its allotted share, by making the machine pass over an inequality in the ground, which produced an unpleasant impression against the system of yoking behind.

The second group was composed of the reapers of M. Maziere, of Aigle (Orne); Manny, of Rockford, in the province of Illinois (U.S.); and M. Crosskill's.

The machine of M. Mariere admitted of being drawn by one horse, which was yoked in front, and led by a waggoner. A man followed the machine, armed with a toothless rake, and received the stalks which were thrown sideways in swathes. The saw has the advantage of shifting, as required, to the left or right of the machine, which allows the horses to turn round on the spot. The other machines are obliged to reap constantly, as they turn round in the field, which makes a preliminary labour necessary to trace roads of a great extent in the corn field, in order that the machines may avoid too long a circuit at the top and bottom of the field when they reap at the sides of it. This reaping machine stopped several times in the course of its work.

M. Manny's machine is drawn in front, and requires two horses. It had been already tried some time back at Choisy le Roi, before the Agricultural Society's Committee of Seine et Marne. The driver is seated on an elevated stool; and in case of its meeting with any mischance it can be stopped instantly by a swing movement, which elevates the saw about 35 centimetres above the ground. A man, armed with a rake, follows the machine for the purpose of turning the swathes on one side. It does not appear to require very much draught; but it was remarked that the flights beat the ears rather too briskly, and rather indented them. This inconvenience, we repeat, may be very easily avoided; and afterwards it set to work to reap very ripe oats, nearly a metre in height, so that the flights fell on the ears; whereas, if it had been set to work on ordinary barley, it would have hardly struck them at a point two-thirds of their height. It performed its reaping task, a space of 1,900 metres, in 23 minutes, without stopping.

M. Crosskill's machine, constructed like that of M. Laurent's, was not able to work. It was pushed by two horses yoked behind. After the first few steps they were obliged to unyoke them; and it was withdrawn from the contest by M. Crosskill, who assisted personally at the trials, like all the other exhibitors.

The third group consisted of the machines of M. M'Cormick, of Chicago, Illinois (U.S.); M. Hussey's, constructed by M. William Dray; and M. Muddy's, of Canada.

M'Cormick's machine has already been highly successful in America, and at the London Exposition. It dates from 1842. In 1855 2,500 of these machines were sold; and no less than 5,225 of them have been delivered to the trade. It is patented in France, England, and the United States; and it seems a happy simplification of Bell's. It was drawn by two horses yoked in front, and borrowed from Grignon, where it had already produced some marvellous results. It accomplished its task, namely, 1,987 square metres, in the least time of all, 17 minutes; and was welcomed by an immense crush, lively acclamations, and prolonged huzzas at the end of its course. This speed, which gives about one hectare (2 acres 1 rood 35 poles) in 1 hour 25 minutes, should be not accepted as an absolute fact. We must take into consideration the emulation of the driver, the transient ardour of the horses, and a crowd of other considerations appertaining to the peculiar position in which it was placed. All the world knows that the labour done on a trial-field is not the

labour done in harvest. In fact, taking all these circumstances into account, and calculating two hours for an hectare, we shall arrive at excellent results. Of this we shall find clear proof if we reason from the elements which were at hand at Trappes. There they harvest generally by the piece. A mower receives for one hectare of oats 18 francs (15s.). With this machine we can cut five hectares in ten hours, and see what these five hectares come to with this machine :—

Two horses and drivers . . . . .	8 francs.
A swathe raker . . . . .	5 „
Four women, to bind sheaves . . . .	8 „
—	
	21 francs.

Now 5 hectares cut by a mower cost 95 francs ; and the same number cut by a reaping machine cost 21 francs. We must add what we require for repairs, interest, sinking of capital (one machine only costs 750 francs), and there will always remain an enormous profit for the proprietor of the machine.

Hussey's machine, as modified by William Dray, lacks the flight which is intended to press the corn against the saw. It requires two horses yoked in front ; and took 34 minutes to reap 2,256 metres. The driver is on foot, and a man on a stool turns back the blades to the rear of the machine. As soon as the horses have made tracks, it is necessary to place labourers at stated intervals in order to gather up the swathes and carry them to the rear, so that they may not be trampled under the feet of the horses. M. Barral had taken four pupils from Grignon to follow the machine and assist in this operation. M. William Dray's machine is very small, rather intricate, and constructed for the purpose of passing along the roads.

The last machine of the group was one of M. Muddy's, of Canada, constructed on the model of Bell's ; but it could not work, and was withdrawn. To resume : The machines which stood the test best were those of Messrs. M'Cormick, Manny, Cournier, and Wright's. These four reapers were called upon to undergo tests for the purpose of weighing the quality of their work. The question of speed had been sufficiently settled in preceding trials. M. Cournier had declared that his machine had not been constructed to go through a mowing twice ; and Messrs. M'Cormick, Manny, and Wright were the only competitors. They had mowed some lucerne afterwards in a satisfactory manner ; and on examining their work closely we remarked that they had cut it almost as low as the mowers who had preceded them some time before.

The machines of M'Cormick, Manny, Cournier, and Wright were also conducted at once to a field of wheat, where they worked, and preserved their respective characteristics, rendered more apparent by the very great facilities which this kind of work offered.

To sum up, the cause of these machines to-day has been completely won in the estimation of all those who assisted at these interesting operations. Let us hope that it will spread in our country, and that we shall see it produce in favour of reaping machines a movement which has already manifested itself for some time past in favour of thrashing ones, which are already to be found again in shoals in those parts of the country where progress is not assailed by systematic detractors.

## CHAPTER VII.

### THE TRIALS BEFORE PRINCE NAPOLEON.

We lately announced that Prince Napoleon, the President of the Imperial Commission of the Universal Exposition, had decided that the trials with the agricultural implements and machines which had already been

made by the jury should be solemnly repeated on the 14th of August. This happy idea has been realized. We glory, on behalf of our country, in this great and pregnant initiative. England has inaugurated the Universal Expositions of Industry ; but we, in sooth we, have inaugurated the universal assembly of living makers of arable instruments and agricultural machines. Our neighbours across the British Channel are our seniors in agricultural progress ; but we are on the high road to reach them ; and we trust that if this movement continues and spreads, we shall, ere long, leave them behind in this peaceful and fertile struggle.

The meeting at Trappes will stand forth in the annals of agriculture as one of the grandest and happiest events of our age. What spectacle can be grander than to see agriculturists, landlords, and savans from all the nations of the earth reunited on a given day, in a modest *commune* of France, to test in good and simple faith all the most perfect instruments that the world has ever made ? France, England, Prussia, Italy, Austria, America, Switzerland, Belgium, Sweden, Denmark, and Norway have shaken hands fraternally over the field of battle blessed by God ; and even Africa—so recently gained over to civilization, that generous soil of which agriculture has so many grand and just hopes—was represented by many Arabs in the picturesque habit of their country.

The implements which had won a certain superiority in preceding trials were now to receive on this ground a sort of baptism of public opinion. M. Barral, the editor of our journal, had chosen a suitable spot two kilometres from the Trappes station near the road to the wood of D'Arcy, having a surface of seven hectares (17 acres). A workshop and mechanics were also installed on the ground, thanks to his care, in order to repair as quickly as possible the accidents which might have happened in the hurried journey which had to be made by the machines between Paris and Trappes. Three brigades of *gendarmes*, and half a battalion of the 48th Regiment of infantry, protected the machines and labourers against the invasion of the public ; and this precaution, though taken a little tardily, was not useless. In France, it is difficult to find in these countless assemblies that discretion which keeps each in his place, and yet permits all to see a little. They push, they elbow, and press ; each wishes to be better placed than his neighbour ; and in fact, for ten who bruise their noses against the machines, and trouble the labourers, there are two hundred who see nothing. At half-past ten Prince Napoleon arrived in Mons. Dailly's carriage, accompanied by M. Rouher, Minister of Agriculture and Commerce, and M.M. Gasparin, Dailly, and Barral, who had gone to receive the Prince at the railway station.

At a given signal the teams, to the number of twenty-seven, were put in motion. The twenty ploughs which started at the roll of the drum were those of Ball, Howard, Ransome (England), Grignon G. Hamoir, Bonnet, Parquin, André Jean, Roquebrune and Pluchet (France), Meszaros (Austria), Fredrikswoerk (Denmark), Mors (Canada), The Hohenheim Agricultural Institute (Wurtemberg), Van Maele and Odeurs (Belgium), The Ultuna Agricultural Institute (Sweden), and Ridolfi and Lambruschini, of Tuscany.

The trenching ploughs of Grignon, Bazin, and G. Hamoir were placed on the furrows which had been opened by three of the preceding ploughs. The hoers of Coleman and Lepreux, the scarifier of Gratiem, the tiller of Grignon, and the grubber of Bentall were at the same time entered on a field full of stubble and roots of colza. Nothing was more interesting and picturesque than that assembly of implements, gathered from all parts of the world to work before the *élite* of the agriculturists of all nations. Among the ploughs, we especially noted that of Howard, which had already ob-

tained such grand successes; No. 2 of Grignon, and Ransomes'; G. Hamoir's, Odeur's, Frederikswærk's, Bonnet's, Armelin's, and Ridolfi's.

When the ploughs had completed their labours, some of the teams were attached to the harrows and rollers, while the others were put to the thrashing machines, the dibblers, and the reapers.

The jointed harrow of Howard, and that of Saunders and Williams, were entered on the ground which was broken up. The Norwegian harrow, constructed by Cappelen, of Eitsfoss-Jernværk (Norway); while the rollers of Crosskill, Cambridge, and Stanley (England), were sent to break the clods. We remarked that the teeth of the English harrows choked themselves; but the Norwegian harrows and the Crosskill roller worked in a style which called forth the lively admiration of the Prince and Minister of Agriculture, as well as that of all agriculturists.

The working shed of M. Masson exhibited specimens of all the different kinds of labours which take place in the interior of a farm. In front of it stood, harnessed, the ingenious Crosskill waggon, which had brought the beet-root, potatoes, flax, oats, maize, barley, wheat, &c., to supply the machines. A small locomotive of Calla's, of nine-horse power, set in motion, at one time, a curious flax-dressing machine of Ransome's (England), and an excellent root-cutter of Maurer's (Grand Duchy of Baden). That dresser is destined to dress flax which is not soaked; and it appeared to work very well. The root-cutter of the Grand Duchy of Baden sliced the beet-root and potatoes in almost geometrical prisms, with a facility and rapidity which was the subject of general admiration. This instrument completely eclipsed that of Ransomes', which has, nevertheless, a great English reputation. It cut the roots in two different styles, either for sheep or horned cattle, according as the handle was turned to the right or the left.

Then came the oat crusher of Ransome and Sims, and the machine of Barrett, Exall, and Andrewes, for barley cleaning. The great workshop of Ransome and Sims makes the best crushers, and the one which worked here has been bought for 94 francs by the Prince Napoleon. The machine for barley cleaning was quite a novelty, and is absolutely unknown in France.

The churn of M. Claes, of Lembeck, Belgium, was also set to work with 60 litres of cream, and made in three-quarters of an hour a little more than two kilogrammes of butter. This churn is of a very simple construction, which is its chief merit. To this group they had also joined the drainage and tile-making machines of Calla (France), and Whitehead (England), as well as one of Madame Champion's, for the purpose of sifting and cleaning the clay preparatory to making the tiles; all which machines quite charmed the spectators.

Still the thrashing and reaping machines were the most attractive part of the spectacle. Six of the former were there, to wit, Clayton (England), Paige & Co. (Canada), Pitts (U. S.), and Damey, Duvoir, and Pinet (France), all of which had undergone a previous trial of half an hour, the results of which were displayed as follows:—

	Sheaves.	Quantity.	Weight.
Pinet.....	36 .....	150 litres .....	101 kils.
Duvoir ....	58 .....	250 " .....	166 "
Clayton....	117 .....	410 " .....	281 "
Pitts .....	190 .....	740 " .....	503 "

Six flail workers had also thrashed 20 sheaves, and produced 60 litres, weighing 39 kilogrammes. We ought to remark that the machines of Clayton and Pitts were moved by steam-engines, while the others had only two-horse teams. The thrashing machine of Pitts' thrashed 74 litres in 30 minutes, which gives nearly 1,500 litres

an hour, or 150 hectolitres for a ten hours' day, while six flails could hardly thrash 12. The thrashed barley was not perfectly ripe, and had not had time to dry; it ought to have remained in cocks for a dozen days, in which case the weight of the hectolitre would have been only 69 kilogrammes. We may add that Clayton's and Pitts' machines each required 6 workmen, Pinet's three, and Duvoir, Damey's, and Paige's four each.

At a signal given by M. Barral, by a roll of the drum, the engineers turned on the steam, the drivers whipped their horses, the flails glanced in the air, the machines, fed by mountains of sheaves, vomited forth aloft whirlwinds of dust and smoke. The bellowing of the locomotives, the buzz of the machines, and the activity of the workmen, fairly transported the spectators. The countless sentinels could scarcely restrain the crowd from breaking the barriers, and rushing to throw themselves round the strange monsters which devoured sheaves whole, and transmuted them into bushels of barley. After the machine of Pitts', whose voracious activity drew all attention, that of Duvoir was examined with most interest. Pinet's was not much looked at, and M. Damey's could not stand the preparatory test. The Canadian machine had a working place formed of a moveable plank under the horse's feet. This plank, in its flight, ought to turn the machine. The poor horses, mounted on a species of chair, got loose under the blue sky, and produced the most picturesque effect; but we ought to say that they struggled with vain efforts under the whip of the driver; the machine refused to obey their action, and M. Barral was obliged to put an end to their supplication. Nevertheless there are some frames in France which work on this system; but the horses are trained to the work, and have also their shoes armed with pointed nails.

The shed for sowing was near that of thrashing, and we found there the drill of Claes, of Lembeck, the very remarkable drill reversed of Hornsby, and that of Garrett, intended at one and the same time to sow seed and manure. The horse hoes of Smith and Garrett (England) and E. Hamoir and Bodin (France) proved that the advantage of cultivating in lines consists in allowing of the use of repeated hoeings and double cleanings with these rapid instruments. We especially admired the dibbler of Garrett, which the Prince caused to work three different times. It spread gypsum at the same time as the barley, and the white lines which it left behind it showed the regularity of its working. M. Hamoir's hoe also was a decided success, which we are not surprised at after the long acquaintance with the skill of this young agriculturist.

After the lapse of an hour, the crowd marched to a field of barley, which had been got ready for reaping, and which had been divided into 7 lots of 12 ares each, separated by a large path. The six machines of McCormick, Cournier, Wright, Maury, Dray, and Burgess, and six mowers were to reap this field. The moment the Prince arrived, each machine was stationed and yoked, and the horses made ready to start, and at a given signal the horses and machines plunged into the thick of the crop, leaving behind them countless swathes of levelled barley. The 12 ares were reaped by McCormick's in 12 minutes, by Maury's in 15, by Wright's in 18, and by Cournier's in 19; but we must observe that the latter had only one horse. The six mowers, followed by six women to bind the sheaves, employed 25 minutes over the same work. McCormick's machine preserved all that superiority which it evinced in previous trials, but those of Burgess and Dray could not finish their task. McCormick's worked with perfect regularity, and reaped about 2,000 metres square in 17 minutes. Hardly had these operations been concluded, when the crowd marched towards a field of trefoil which the reapers were

to mow. Maury's machine was converted into a mower in a moment, McCormick's took about 15 minutes, and Wright's 25, while Cournier's is not adapted for this change of work. Each mowing parcel was 14 ares, which Maury's accomplished in 15 minutes, McCormick's in 19, and Wright's in 20, while six mowers doing their very best only required 19. Next came the rakes of Howard (England), Grignon (France), Count Morelli (Sardinia), and the Canadian one, which all did their work admirably, while that of Howard seemed the most easy to manage and simplest in construction. The hay-making machine of Smith brought the trials to a close, and obtained a true triumph. As the crowd saw this machine approach, spreading round it a shower of verdure, they knew not what to call it; but when they saw the hay lightly turned over, and spread itself on the ground, every one was in ecstasies with it.

Such was the last episode in this magnificent *fête*, the remembrance of which will long remain engraven in the hearts and memories of all who had the happy fortune to be present.

### CHAPTER VIII.

We must return for a last look into the Exposition, where we have a few more subjects of interest to remark upon. The farm-school of Paillerois, under the presidency of our colleague, M. Raibaud-Lange, has exhibited some agricultural products of a remarkable kind, which result from the different kinds of cultivation pursued at this farm-school. They consist of almonds, some of them partly bruised, some princess almonds, and some winter ones, which have attained an enormous size; Windsor beans, hosier thistles, pistachio nuts, figs, prunes, and olives. M. Raibaud-Lange also undertakes to cultivate madder, and has sent to the Exposition some grains, powder and roots of it. Wines of Provence, and Grenache, and essential oils of olive, complete this magnificent collection, which does great honour to the school and its director. M. Doniol de Clermont-Ferrand has sent two samples of English barley, which got prizes at the local meeting at Clermont. They are ears of *Craps' corn* barley, and bearded barley, which have the great advantage for certain climates of bearing up against damp temperatures, and not being laid flat.

While they tried the churns at the Exposition, the jury took care to fill them solely with milk, and we have made some observations on this fact. It has been pretended that because churns never operate except upon cream at a farm, therefore it has been impossible to reckon their absolute value when they are filled with milk. We have but one answer to make to these observations. The churns which work rapidly and well with milk will work much better with cream, and this is an *a fortiori* argument to which we fancy there is no reply. In fact, in the north, at Lille, and in many parts of Scotland, they have employed the milk to make butter, and the milk so deprived of its butter becomes more manageable, and serves to make cheeses, particularly pressed ones. One of the best churns in the Exposition was that of M. Siterwards, of Sweden, which made butter, in the judgment of the jury, in much less time than that of M. Claës, of Lembecq.

The root cutters of Maurer come from the Grand Duchy of Baden, and had much success at Naples; but unfortunately it is an instrument specially designed for an industrial establishment, or a great farm. It costs 625 francs, which is perhaps a little dear.

We must now examine a plough, which is not the least remarkable of those in the Exposition. It belongs to a young and intelligent agriculturist in the department of the North, which is consecrated to the perfecting of agri-

cultural tools. This plough of M. Gustave Ramoir is an American importation, the model of which was purchased at the Exhibition of all Nations, at London, in 1851. It is from the workshop of M. Starbuck & Son, of New York, and M. G. Ramoir has made several modifications in it. At first he took off the little wheels from the fore part, and made a simple coulter; and he has also added a moveable scale in cast iron, which permits of guiding the march and the penetration with the greatest facility. This plough was tried at Trappes, and we could appreciate it on the soil, both for the perfection and regularity of its working and its lightness. It has often been tried with the dynamometer, both in France and Belgium. It is not a plough which requires the least draught, but it is in fact one of those which approaches the lowest figure of the scale. Its simplicity is very remarkable, as it is constructed of three pieces of cast-iron, which are easily adjusted to one another, while seven bolts suffice to keep the whole together. One of its most interesting peculiarities is the manner of attaching the coulter by means of the American "stirrup-clamp;" but we ought to say that the importation of this excellent invention is due to M. G. Ramoir, who has generously hastened to communicate it to all persons who desire a model of it.

Steam power is incontestably the most powerful, and at the same time the most economical, that can be employed; but the high price of the engine, and the difficulty of having mechanics to repair it on the spot, will cause the services of horses and oxen to be required for many years yet. It is for the purpose of economising the motive force of animals that they have recourse to driving-machines. As agricultural machines become more and more diffused, so will the employment of these engines. Up to this point the English had obtained a certain advantage over us in this respect. That of Messrs. Henry Barrett & Co. was generally considered, in spite of its somewhat complicated mechanism, one of the best machines of the kind; but the English are now completely surpassed by a machine, exhibited by an humble French mechanic, M. Pinet, of Abilly (Indre et Loire). It unites all the conditions of a good and useful machine—simplicity, and facility of transport; and lastly, rudeness of construction, which makes its repairs perfectly easy, wherever it may be. It is made for two horses, but we have seen one set it in motion without difficulty, and a small thrashing machine of M. Pinet's, which is fastened to it for a specimen. It costs from 600 to 625 francs. M. Laurent's (of Paris) chaff cutters also present many advantages of good construction, and cost from 150 to 350 francs, while his root cutters are sold at all prices from 100 to 180 francs. We also remarked the chaff cutter of M. Van Maele (Belgium), which is constructed on nearly the same principle as M. Laurent's. We also remarked on another, which was exhibited by M. Allerup, of Odense, Province of Fionie, Denmark, which was part of the Danish Exposition in the Annexe, on the edge of the water.

The ploughs are here in great numbers, and that of Messrs. Ball and Busby (England) must be considered as of the same family. These two very much resemble each other in their form, as well as the facilities they offer to labourers, and the lightness of their construction. They are entirely of iron, and are remarkable for the length of their shares; that of Busby's, in fact, is 1 m. 65 cs. in length, and Ball's nearly equals it. They were tried at Trappes, and the furrow which they traced was neat and clean, and about 25 centimetres in depth, by an equal width. The strip of earth was deftly cut, and was turned topsy-turvy, after having undergone a rapid twisted movement, but without any undue shake. When, however, they were subjected to the dynamo-

meter, these ploughs appeared to require more draught than those of Howard and Grignon.

Belgium has taken a happy initiative in the Exposition. It was not contented with sending the remarkable instruments of MM. Claes, Van Maele, etc.; but M. Bortier has exhibited a very interesting novelty, which is the ornamental plan of a model farm, called "The Britannia," out of compliment to the English farmers, which have given the idea for it. It is situated at Chisteltes, near Bruges, Belgium, and has been built with the greatest possible economy. In agriculture there is no difficulty to plunge into expense, if money be not lacking; but what ought primarily to be looked to, is to make the best thing in the best possible way. That is the problem which M. Bortier has proposed to himself, and solved. The bricks and roof tiles were manufactured on the spot; the woods, oak, fir, and aspen, &c., were drawn from the farm, and the lime came from the neighbouring kilns. The freestone for the pig troughs, &c., is the common blue stone of the country, and has only been employed except where it was absolutely indispensable. The wood work of the interior has been daubed with pitch, and that of the exterior with pitch and tar. Everything combines those two conditions of every good farm building—economy and durability. The general plan of this farm is so conceived as to be enlarged at pleasure. The style of cultivation had for its aim the breeding and feeding of sheep, conjointly with that of pigs. It also contains a beet-root distillery. The buildings are separated one from another, and communicate by arched brick passages, for the purpose of lessening the perils of fire. It has neither barns nor hay lofts, but the system of waggons covered and moveable supply their place. The dwelling-houses are only boarded, and the cattle are placed in boxes, and thus they can at their free will be under cover or in the open air. The stables are paved with stone, and the pig styes are sparred according to Huxtable's system. The ventilation is perfectly kept up by means of slits built into the walls, which can be opened or shut at pleasure, and in the roofs by means of skylights with moveable blinds. All the manure is transformed into liquid manure, and carried into the fields by subterraneous pipes, after Kennedy's system. A steam-engine of six-horse power is sufficient for all the services required on the farm, and a railway furnishes communication between all the principal points of the farm, along which the waggons slide. Messrs. Horeau and Alleweireld of Belgium are the architects.

\* \* \* \* \*

The Exposition of Industry is closed. The gates are shut against visitors, and the galleries invaded by workmen bring back to our minds what they were before the opening of the Palace. All the ephemeral and dainty stalls, destined to set off their various stores, are gone. Their brilliant trophies leave us merely to observe the rough carpenter frames which sustained them. Mountains of packages stop the way. All the marvels which we have fondly dwelt on for four months past have disappeared, swallowed up in countless cases, speckled with labels addressed to all the nations on the face of the earth. This spectacle always leaves on our minds an impression of sadness and regret. All those who have come to see this Exposition and have departed, leaving everything in the blaze of its splendour, are happier than we. For them the glories of the Exposition exist for ever intact in the tablets of memory. The loss of a parent, or an absent friend, is after all but an absence indefinitely prolonged; but when one sees a gallant and beautiful existence quenched little by little, and stands by watching the inexorable and mournful decay which precedes the hour of the last adieu, the feeling proves far more agonising and far more profound. The deserted aisles, the widowed glass cases, the mutilated machines, all these relics dismounted and covered with dust, allowing us only to perceive their raised forms, or some shining edges, under the thick paper, the cloth, or hay which enfolds them, make a sad contrast to the preparations, the surprises, the enthusiasms, and the hopes of other days. It was then we stood by, as the Exposition rapidly and progressively developed itself to our gaze. Each day brought some new wonder with it. Here stood a dazzling glass case, whose curtain had been withdrawn; there a machine on the eve of being mounted, and farther on, iron bronze, crystal and gold, picturesque mountains of products, unknown objects, whose meaning one sought for, inventions of which one had heard spoken, and which one found more beautiful than one had dared to dream. Little by little order spread itself everywhere. The whole aspect of the Exposition assumed unexpected proportions. The *coup d'œil* became magnificent. Each day we felt new emotions. Imagine to yourself a charming girl of five who in fifteen days had burst into all the grace and beauty of splendid womanhood! To-day all these charms have disappeared, and nothing more remains of the Universal Exposition than the recollections it has left in the hearts of its visitors, and the modest recital we have given to our readers of the marvels we have seen.

H. H. DIXON.

Kensington.

## SCOTCH AGRICULTURAL STATISTICS.

We extract from the returns published in the *Scotsman* the gross return of the statistics for Scotland. That publication makes the following pertinent remarks on the returns:—

The Scottish agricultural statistics for the year and crop 1855, which we present in full to-day, form a document of great value, and one which ought to be received by the public with some sense of obligation. These returns, showing the nature and amount of this year's produce, of, roundly speaking, almost every acre of Scottish land, are substantially the free-will offerings of the tenant farmers. Considering the natural though erroneous prejudices that exist on such subjects—the tendency to resent such inquiries as an interference by the State in the private business of individuals—the voluntary rendering and collection of such statistica is a most powerful

and gratifying testimony to the intelligence and public spirit of the farmers of Scotland. It is less pleasant to add that their conduct appears in a still more favourable light when compared with that of what would appear to be the mass of the English tenants, who virtually refuse either to render or collect—either to act as their own collectors or to render information to collectors otherwise appointed. By what we can learn from discussions at the meetings of poor-law guardians and from speeches at agricultural dinners, it would appear that the objection in England is not to the trouble, but to the imaginary danger of increased rents and rates. The English landlords, though there are lamentable exceptions, take little share in this recusancy, and a few of them have even preached against it, but in vain. In Scotland, on the other hand, the number of

refusals among the tenantry is so small as only to mark more clearly the approach to unanimity, while the number of recusants among the landowners would seem to be more, and even considerable, in proportion. Next to the tenantry, thanks are due to the Highland Society, or rather to its Secretary, Mr. Hall Maxwell, on whom the collection and arrangement must have thrown an amount and species of labour only to be overcome by great vigour and tact. The multiplicity of details, the variety of persons to be dealt with, the work of classification and deduction, implied in the production of such tables as we present to-day, should be held as not only enhancing their value, but increasing the obligation due to their authors. Some correspondents of our own have complained of delay; but when we note that the estimates of produce, which form both the largest and most essential part of the tables, were returnable only on the first of the current month, after which date many schedules had to be forwarded from remote districts, it will be held, we think, that there has been as little failure in expedition as in energy and skill.

For one of the chief uses of such returns, these tables cannot yet be regarded as fully available. Although this is the second year in which returns have been procured for all Scotland, a comparison on all points is not practicable, owing to changes in the mode of statement shown to be advisable by the experience of last year. This imperfection, however, affects least the most important results of the inquiry—the gross quantity of each kind of grain produced in Scotland; and it must be understood that any change made this year in the mode of making up the estimates operates in the direction of raising the quantities for 1855 above the point they would have reached if stated in precisely the same mode as in 1854. The grand fact shown in this the chief department is, that while, as compared with last year, the number of acres under cereal crops has slightly increased, the production has decreased about 11 per cent. But even that fact is insignificant compared with the confirmatory evidence derived from this year's tables, that those estimates of the agricultural produce for Scotland, and, at least inferentially, those for England also, formerly in common acceptance, were pretty nearly double the fact, as now ascertained. The following figures show the grain produce of Scotland as estimated in "M'Culloch's Commercial Dictionary" and other works of authority, and founded on in many written and oral debates, and the actual quantities as ascertained in each locality for this and last year, stated in quarters:—

	FORMER ESTIMATES.		ASCERTAINED.	
	Qrs.		1854. Qrs.	1855. Qrs.
Wheat .....	1,225,000	..	606,063	.. 632,817
Barley .....	1,800,000	..	954,950	.. 761,613
Oats .....	6,500,000	..	4,231,789	.. 3,758,893
Beans and peas..	150,000	..	135,115	.. 147,956
	9,675,000		5,927,917	5,301,279

To this decrease of 626,638 quarters in the year's produce, has to be added a considerable, but unascertainable, deficiency in the weight of this year's crop as compared with last. Remembering, however, that last year's was a crop above the average even in acreage, and very greatly above it in yield per acre, the decrease above shown cannot be regarded as very great, especially when we take into account that there is no decrease, but a very considerable increase, in wheat, each quarter of which represents, in value, and almost in utility, two quarters of any of the other grains. If the produce of England has been affected only in the same proportion, and if it be admitted that the produce of last year, the three kingdoms over, was considerably above an average, the present high prices are difficult to account for by any decline in the supply. But, in truth, we have as yet been able to grope into the facts only far enough to discover that all our former conjectures were er-

roneous, without as yet reaching to anything like accuracy. When like returns shall have been procured for England, it will not improbably be found that we have been estimating the consumption of the whole country at not greatly less than double the fact, so that we have been much more than we thought dependent on foreign supplies and affected by foreign prices.

Turnips and potatoes show a considerable increase in acreage, and the latter an increase in estimated produce of nearly 200,000 tons, or about 30 per cent. Considering the extent to which potatoes come in as a substitute for flour in times of dearth, the great increase in this crop might have been expected to hold prices at a lower level.

It is impracticable for us, and would perhaps be "too much" for many of our readers, to enter further to-day into the results of these returns; but we may give, what does not appear in the tables, but is deduced from them, the average produce per acre of each kind of crop in Scotland in 1855. The grain crops we state in bushels and pecks per acre—

	Bush.	peck.
Wheat .....	26	2
Barley.....	32	3
Oats .....	32	0 $\frac{3}{4}$
Bere .....	32	1 $\frac{1}{2}$
Beans and peas .....	27	2 $\frac{1}{2}$

The root crops are stated in tons and cwts—

	Ton	cwt.
Turnips .....	14	7 $\frac{2}{3}$
Potatoes.....	4	19 $\frac{3}{4}$

The differences between different counties and districts are in some cases apparently very great—for instance, the produce of wheat per acre is 34 bushels in Sutherland and only 22 in Dumfries; but, on closer scrutiny, these differences are found to be more apparent than real, most of the inordinately large yields being explainable by the fact that they refer to crops, such as wheat in the Highland counties, cultivated only on choice spots and as a matter rather of fancy than of business.

TABLE I.

	1854. Acres.	1855. Acres.
Total under tillage.....	3,431,485....	3,529,902
Wheat.....	168,216....	191,283
Barley.....	207,507....	186,030
Oats .....	932,994....	933,611
Rye.....	3,809....	3,692
Bere .....	18,118....	17,260
Beans.....	37,702....	37,308
Peas .....	6,169....	5,456
Vetches .....	13,442....	15,038
Turnips .....	433,915....	449,372
Potatoes.....	143,032....	146,963
Mangolds .....	1,946....	2,299
Carrots .....	1,218....	1,191
Cabbage.....	1,395....	1,209
Flax .....	6,670....	3,461
Turnip seed .....	1,429....	1,998
Any other crop*.....	—	1,223
Bare fallow.....	26,128....	22,462
Grass and hay in rotation..	1,427,790....	1,509,990

TABLE II.

	1854.	1855.
Total quantity of stock . . .	6,043,384....	6,981,014
NUMBERS OF EACH KIND.		
Horses for agricultural purposes above three years old .....		121,132
Horses for agricultural purposes under three years old .....		32,099
All other horses .....		23,919
Milk cows .....		298,446
Other cattle .....		469,242
Calves .....		207,040
Sheep of all ages for breeding .....		2,707,347
Sheep of all ages for feeding .....		1,138,501
Lambs—produce of 1855 .....		1,848,389
Swine .....		134,349

\* Generally rape.

TABLE III.  
ESTIMATED PRODUCE.

	1854.	1855.
	Bush.	Bush.
Wheat .....	4,848,679....	5,062,540
Barley .....	7,645,328....	6,092,904
Oats .....	34,093,047....	30,079,714
Bere .....	645,418....	556,876
Beans and peas* .....	1,081,263....	1,183,647
	Tons.	Tons.
Turnips .....	6,411,419....	6,461,476
Potatoes.....	529,915....	732,141
Number of occupants in 1855 .....		43,462

Mr. MAXWELL, the indefatigable Secretary of the Highland and Agricultural Society, from whom the statistics are obtained, makes the following amongst other remarks on several points in the return:—

*Highland and Agricultural Society of Scotland,  
Edinburgh, 11th December, 1855.*

#### I. OCCUPANTS.

The return of 1854 did not indicate the number of occupants, but in the report then submitted to my Lords I stated that "in round numbers about 50,000 schedules were issued, and of these about 100 are unaccounted for." I have this year endeavoured to arrive at more exact results regarding this part of the inquiry, and to restrict the list of occupants to those whose status is purely agricultural, by striking off the names of householders, feuars, owners of villas, &c. The number has further been reduced by scheduling together any number of farms lying in the same parish, and leased by the same individual, thus regulating the roll by the number of occupants and not of tenements. Woods form no part of the present inquiry; there is, consequently, a further diminution corresponding to the number of persons whose returns were last year confined to woods. Effect having been given to these modifications, the list contains 4339 occupants rented at and above £20 in the counties of Argyle, Caithness, Inverness, Orkney and Zetland, Ross and Cromarty, and Sutherland, and in the Island of Arran, and 39,123 rented at £10 and upwards in the remaining counties; and I have great pleasure in reporting to my Lords that the returns of acreage and stock may be regarded as complete for the whole number of 43,462, with the exception of one farmer in Argyleshire, and four persons occupying very small portions of land in Aberdeenshire.

I do not mean to affirm that information was always voluntarily tendered, or that there have not been instances where it was refused; an entire absence of opposition is not to be looked for in connection with such a measure, but its extent has been singularly and satisfactorily minute. There were no exact means last year for determining this point, or for ascertaining how many returns had been made by enumerators in consequence of refusals. I have now, however, obtained reports as to this from every district, which enable me to state that in thirteen counties, though there may have been instances of neglect and oversight, there was not one of absolute refusal and opposition; while, in the other nineteen counties, there were about sixty cases of that character. I cannot close this section of the report without repeating what I was last year enabled to state respecting the manner in which the Scotch farmers, as a body, have recognised the importance and utility of statistical information, by readily and faithfully affording the returns required; and it is due to them to observe that the slender minority in opposition does not entirely consist of their class; I regret to say that it comprises the names of landlords whose influence might have been looked for in an opposite direction, but whose example has been fortunately disregarded by their tenants.

#### II. ACREAGE.

The gross returns of acreage published last year cannot be set against those of 1855, inasmuch as, for reasons already made public, six of the columns employed in 1854 were deleted from the schedule of 1855. The corresponding columns for the two years, therefore, are only contrasted; but, in one important point, even these do not afford data for a fair comparison at regards the gross results. The schedule for 1854 contained a

column for "grass under rotation," and another for "permanent pasture;" it is difficult sometimes to draw a line between these, and, consequently, a considerable extent which had been, and again may be, under the plough, was formerly scheduled as "permanent pasture." This year the returns of acreage are limited to tillage, the column for "permanent pasture" having been omitted, and instructions given to schedule as "grass and hay under rotation" all land "which, in the ordinary rotation or course of cropping of the farm, will sooner or later be again broken up." The result has been to swell the column for grass under rotation by the transference to it of much which last year appeared as permanent pasture; the difference thus created amounts to 32,200 $\frac{1}{4}$  acres, and will be found to tell more particularly in the dairy districts. The green crops, particularly turnips, show a large increase, indicating probably a greater breadth in preparation for grain; but the extent under cereals is nearly the same, though the distribution of the different crops varies. Wheat has increased by 23,067 $\frac{1}{4}$  acres. Barley has decreased by 21,426 $\frac{3}{4}$ . There is a trifling difference in favour of oats, and against the other crops; but the gross returns for the two years, as regards the acreage under wheat, barley, oats, rye, bere, beans, and peas, come within 176 acres of each other. In 1854 there were 1,374,515 $\frac{1}{4}$ , and in 1855, 1,374,691 $\frac{1}{4}$  acres.

In accordance with my instructions, the general inquiry into the acreage of stock in the hands of tenants below the £10 and the £20 rental, has not been repeated. Though the number of such occupants is great, the statistics of their holdings are unimportant, and not being subject to sudden fluctuations, it was conceived that the results obtained last year may with safety be readopted.

#### III. STOCK.

The gross returns of stock at first sight exhibit a startling excess over those of last year, but the difference is almost exclusively confined to horses and sheep, and is easily accounted for. In 1854 there was but one column for horses, under which in general only the animals employed on the farm were returned; now there are three columns embracing horses of all ages and descriptions, and there is consequently a larger return. The great difference, however, is in the number of sheep. In 1854 there was no column for lambs, which, by the instructions appended to the schedule, should have been returned with ewes and wethers. Many overlooked this direction, and, seeing no mention of lambs in the schedule, omitted them; but, as there is now a special column, the return has been general, reducing to a certain extent the number of ewes and wethers, but adding to the gross amount of sheep stock. The increase on the total stock this year is 937,630—while that on horses and sheep alone is 928,107.

#### IV. ESTIMATES OF PRODUCE.

The system adopted in 1854 for obtaining estimates of the crops has been continued. In discharge of this important duty, each enumerator is assisted by a committee, composed of experienced farmers from the different parishes of his district, whose attention has been directed to the state of the crops both before and after harvest, and whose reports are restricted to the localities with which they are immediately connected. With the view of having the estimates taken about the same date and under similar circumstances, and of providing time sufficient for testing the character of the crops in the barn, enumerators were this year instructed to call their committees together not earlier than the 15th nor later than the 30th November, and to draw up their reports within that period.

Another regulation was introduced in order to give greater uniformity to the estimates, as well as to embrace the whole produce of the farm. Having ascertained that, in 1854, the light or inferior grain, which is usually consumed on the farm, had in many cases been excluded from the estimates, directions were given to enumerators to include it, by reducing it to its equivalent in good grain, according to marketable value, and by adding it to the average produce per acre. To a certain extent this interferes with a comparison between the averages of the two years. I am unable to determine the exact increase this creates, or to state the number of districts in which it has had effect; but it may be assumed that the light grain was generally omitted last year, and that a certain deduction must, therefore, on a comparison, be allowed from the averages of 1855

\* The produce for 1854 was for beans only, that for 1855 embraces beans and peas.

The list of occupants has been purged and corrected, and now represents the holders of proper agricultural tenements, rented at and above £10 or £20, according to the counties in which they are situated. The returns of acreage, though less comprehensive than those of 1854, indicate the extent of land under a rotation of tillage with greater accuracy than could be claimed for the returns made formerly in the columns for permanent pasture, sheep walks, wood, &c. The deletion of these columns may have been objected to as tending to circumscribe the scope of the inquiry, but so long as the Ordnance Survey of Scotland is incomplete, they cannot be filled, in many districts, with even an approximation to accuracy; and, notwithstanding the care with which their incomplete character was explained, they were, and would continue to be, too often accepted as correct, and used as data for erroneous conclusions. The alterations in the columns for horses and sheep have produced fuller returns of stock. And, finally, a greater degree of uniformity has been given to the estimates of produce.

I have again the pleasure of being called upon to report the able, judicious, and satisfactory manner in which the district enumerators have discharged their important duties, whether as regards the completion of the returns, or the careful preparation of the estimates of produce; and it is right that the attention of my Lords should be particularly directed to the services freely and gratuitously rendered by the members of committee. These gentlemen constitute a selected body of above 1000 of the tenant-farmers of Scotland, and their assistance is not only of the greatest value in obtaining correct estimates of produce, but their co-operation stamps the statistical inquiry with an amount of agricultural approbation, and lends to it a weight of agricultural influence, which have materially conduced to its success.

I have the honour to be, &c.,  
(Signed) JN. HALL MAXWELL.

James Booth, Esq.,  
Principal Secretary of the Board of Trade.

IRISH AGRICULTURAL STATISTICS.

The official returns called for by the Government have been published in tabular forms, and the following abstract will show the quantity of live stock in Ireland in each of the years 1852-3-4-5:—

	Horses.	Cattle.	Sheep.	Pigs.
1852 .. ..	525,088	3,095,067	2,613,943	1,072,658
1853 .. ..	539,785	3,383,309	3,142,656	1,144,945
1854 .. ..	545,929	3,497,901	3,722,219	1,342,549
1855 .. ..	555,536	3,556,616	3,598,471	1,174,224

Increase in numbers from 1852 to 1855	Horses.	Cattle.	Sheep.	Pigs.
	30,448	461,549	984,528	101,568

Total value of the live stock in Ireland in each of the years, 1852, 1853, 1854, and 1855, calculated according to the rates assumed by the Census Commissioners of 1841, viz.:—For horses, £8 each; cattle, £6 10s.; sheep, 22s.; and pigs, 25s each.

	Horses.	Cattle.	Sheep.	Pigs.
	£	£	£	£
1852 .. ..	4,200,704	20,117,935	2,875,337	1,340,823
1853 .. ..	4,318,280	21,991,509	3,456,922	1,431,181
1854 .. ..	4,367,432	22,736,357	4,094,441	1,678,186
1855 .. ..	4,444,288	23,118,004	3,958,318	1,467,780

Increase in value from 1852 to 1855	Horses.	Cattle.	Sheep.	Pigs.
	243,584	3,000,069	1,082,981	126,957

The returns from which the foregoing table was compiled have been collected, as in former years, by the aid of the constabulary and metropolitan police. Tables for 1855 classified by holdings for each barony and county are now in course of preparation. The returns for 1855 have not yet been received from a few small portions of the following constabulary districts—viz., Tralee and Coleraine. As to them, the quantity of live stock for this year has been estimated from the returns of 1854, taking into the calculation the changes in the live stock which are found to have occurred in the other districts of the counties of Kerry and Londonderry.

The next table gives an abstract of the cereal crops for the years 1854 and 1855:—

	1854.	1855.	Increase.	Decrease.
	Acres.	Acres.	Acres.	Acres.
Wheat .. ..	411,284	445,509	34,325	—
Oats.. ..	2,045,298	2,117,955	72,657	—
Barley, Bere, Rye, &c. ..	287,154	267,505	—	79,589
Total .. ..	2,743,726	2,831,029	106,882	19,589

Increase on cereal crops, 87,293 acres.  
Total extent in statute acres of cereal and green crops grown in Ireland in 1852, 1853, 1854, and 1855:—

	Wheat.	Oats.	Barley, Bere, Rye, Beans, and Peas.	Potatoes.
	Acres.	Acres.	Acres.	Acres.
1852 .. ..	353,566	2,283,449	339,591	876,532
1853 .. ..	326,896	2,157,849	348,642	898,733
1854 .. ..	411,284	2,045,298	287,154	989,660
1855 .. ..	445,509	2,117,955	267,565	911,529
	Other Green Turnips. Acres.	Crops. Acres.	Flax. Acres.	Meadow and Clover. Acres.
1852 .. ..	356,790	121,565	137,008	1,270,713
1853 .. ..	329,377	129,133	174,579	1,280,749
1854 .. ..	329,170	89,777	151,403	1,257,864
1855 .. ..	366,497	95,094	97,106	1,311,737

ABSTRACT OF GREEN CROPS.

	1854.	1855.	Increase.	Decrease.
	Acres.	Acres.	Acres.	Acres.
Potatoes .. ..	989,660	981,529	—	8,131
Turnips .. ..	329,170	366,497	37,327	—
Other Green Crops*	98,777	95,024	—	3,683
Total .. ..	1,417,607	1,443,120	37,327	11,814

Increase on Green crops, 25,513 acres.  
\* Mangold wurzel, beetroot, carrots, parsnips, cabbage, vetches, and rape are included under this head.

GENERAL SUMMARY.

	Acres.
Increase on cereal crops .. ..	87,293
Ditto on green crops .. ..	25,513
Ditto on meadow and clover.. ..	53,873
	166,679
Deduct decrease on flax .. ..	54,297

Total increase in the extent of land under crops 112,382

The returns for 1855 have not yet been received from portions of the following constabulary districts, viz.:—Killarney, Tralee, Naas, and Coleraine. As to them, the extent of land under each description of crop for this year has been estimated from the returns of 1854, taking into calculation the changes in the crops which are found to have occurred in the other districts of the counties of Kerry, Kildare, and Londonderry

FACTS FOR FARMERS.—Never keep your cattle short; few farmers can afford it. If you starve them they will starve you.—It will not do to hoe a great field for a little crop, or to mow twenty acres for five loads of hay. Enrich the land and it will pay you for it. Better farm thirty acres well, than fifty acres by halves.—In dry pastures, dig for water on the brow of a hill. Springs are more frequently at the surface on a height, than in a vale.—The foot of the owner is the best manure for his land.—Cut bushes that you wish to destroy in summer, and with a sharp instrument; they will then bleed freely and die.—When an implement is no longer wanted for the season, if you carefully lay it aside, you will have it in good order for the next season.—Cultivate your heart aright, as well as your soil, remembering that “whatsoever a man soweth, that shall he also reap.”—Build a spacious barn when you have learned to raise a crop to fill it: and not before.—Keep notes of remarkable events on the farm: to record your errors will be of benefit.—Good fences make good neighbours.—The better animals can be fed, and the more comfortable they can be kept, the more profitable they are.—Clover sown deep is secured against a drought.—Cows fed well in winter give more milk in summer.—*New England Farmer.*

## ON THE PROGRESS AND RESULTS OF THE UNDER-DRAINAGE OF LAND IN GREAT BRITAIN.

BY J. BAILEY DENTON.

In selecting the subject of drainage as a topic for consideration, at a moment when war and its consequences upon the corn-producing countries of Europe have brought the price of wheat to 11s. 6d. per bushel, and the price of bread to 10d. the loaf, the Council of this Society have been doubtless influenced by a desire to extend the knowledge we possess of an art which has been rightly esteemed the foundation of agricultural improvement, and the most simple and certain means by which the produce of the soil may be increased.

If we consider the deprivations which seem to be multiplying upon us, we shall be led to appreciate more sensibly the importance of the present inquiry, and we shall be struck with the fact—well known, but too little reflected upon—that, in proportion as extremely high prices move the community at large to desire that the capabilities of our native soil should be more fully developed, in order to increase its produce of food, so do many owners of that soil abate their zeal in pursuit of improvements necessarily admitted, though but partially performed, during the more pressing difficulties of extremely low prices.

If this should sound like mere assertion, the evidence afforded by the expenditure in drainage, under the Government loan, will leave no doubt upon the point, for in 1852, when wheat was 40s. 9d. the quarter, the expenditure was £412,269 15s. 6d. It became in 1853, when wheat rose to 53s. 3d. per qr., £334,115 13s. 3d.; and declined still further in 1854, when the price was 72s. 5d. per qr., to £316,220 7s. 4d., or about £100,000 less than in 1852.

This fact, in its reference to the particular subject of drainage, is the more to be lamented because the operation may be considered essentially to rank among the obligations of the owner, and not the occupier of the land; and it is so necessary to found the present discussion upon a right understanding of this important point, that I must be pardoned for dwelling upon it.

It is hardly twelve months ago since I had an opportunity of introducing this subject to the attention of the London Central Farmers' Club, the members of which are for the most part tenant farmers; and it was then suggested to me that, however convincing the evidence might be in proof of the profitable results from systematic drainage, and however interesting in themselves the details of the necessary operations, it was so manifest that drainage, to be satisfactory, must be done effectually and permanently, and must therefore involve such a much larger outlay than a tenant farmer could be expected to make, that my statements should be rather addressed to the owners than to the occupiers of land.

The whole tenor of the discussion on that occasion went to show that considerations of *expediency* were paramount with those whose interest in the soil was limited by the nature of their tenancy, while it was contended that *principle* should rule with those whose interest in the soil was permanent and secure.

This practical view and treatment of the subject could hardly be reprehended, when it is remembered that whereas the average amount of capital employed by occupiers in the cultivation of the inferior wet lands of Great Britain may be estimated not to exceed £6 per acre, the cost of permanently draining these lands would amount to about £5 per acre, so that if the tenants who farm them were to apply their capital at once to this fundamental work, they would be left with only £1 per acre to provide for all the other expenditure on their farms.

If this is so, the proposition becomes reduced to a practical absurdity, for the average amount of capital actually employed in the cultivation of the inferior heavy lands is known to be insufficient to secure even creditable or profitable treatment, irrespective of draining; and to require a tenant to bury a portion of his already-insufficient capital beneath the soil in drainage, under such circumstances, can only lead to the injury of both his landlord and himself.

Up to the passing of the first Act for the advance of public money for the purpose of draining, in 1846, the operation of draining—or bush-gripping, as it was more appropriately called—was looked upon as an act of husbandry to be performed by those tenants who had sufficient capital to undertake it at a cost of from 30s. to 40s. per acre.

Though the drainage lasted but twelve or fourteen years, the outlay was proved to be remunerative, and such draining was recognised by custom in several counties as an improvement entitled to compensation between outgoing and incoming tenants. Now, as long as the intelligence of the country remained insensible of the manifold advantages of deeper draining, and so long as the operation was covered by an outlay of 30s. or 40s. per acre, we can readily understand that little necessity existed for any participation of the landowner; but as soon as it was established that the best effects of draining depended upon permanency of execution, and could only be gained by an outlay approximating £5 per acre, the matter assumed much more serious proportions. It was no longer a simple process of husbandry. The act of the tenant, dictated by self-interest, rightfully became the act of the landlord, ruled by principle. The only thing wanted was the means of borrowing money, and of adjusting the outlay between present and future

owners in cases where the existing owner had but a limited interest in the land.

Mr. Pusey's Act, of 1840, was the first public effort made to meet this want; and although the Act itself, from its complications, remained inoperative, it effectually established the principle of enabling landowners with limited interests to borrow money for draining, and to charge it upon the lands improved. Mr. Pusey's Act, however, was followed, in 1846, by the first Public Money Drainage Act, and subsequently by other Acts, including the Private Money Drainage Act, and the three several acts for incorporating the existing private companies.

The desideratum of money was thus fully supplied, and it is much to be regretted that greater use has not been made of the facilities so afforded, particularly during years like the present, when high prices are making tenants more than ever solicitous to increase their profits by having draining done, and when they will gladly pay the interest by which the cost will be liquidated, as well as a proportion of the extra expense of doing it at a period of scarcity. I am led to these remarks because I am made daily cognizant of the fact that there are many landowners who, being deterred by the present high prices of labour and materials, are contented to receive their rents without default, and leave the work of drainage to be done inefficiently by the tenant, or defer it to a time when they may possibly be obliged to do it without receiving interest; for it is manifest that the time is not very distant when clay lands will be deemed untenable so long as they remain undrained.

The several Acts referred to gave different powers, but all confirmed the rule that under-drainage was the legitimate work of the owner, and that the only contribution to be made by a tenant should be the payment of the annual instalment by which the cost may be repaid in a given number of years. Beyond establishing this equitable arrangement between landlord and tenant, the obligation enforced on the borrower of money, to show that "the improved annual value shall exceed the amount of annual charge by which the cost of drainage shall be repaid," furnished a very wholesome and just criterion by which any landowner may be guided in the outlay of his own money in draining. In fact, the principle involved in this obligation should be made the rule in every case of improvement. It is not sufficient that an owner spending his own money should get simple interest; he must get so much more than interest as will enable him to establish, if he thinks proper, a sinking fund to repay him his capital within the period for which the work will last—or the projected improvement is not worth doing.

But as the fulfilment of this principle involves a compact between two parties—the owner who provides or borrows the capital to execute the work, and the tenant who repays it with interest, it is desirable to adopt every means to reduce the annual instalment as low as is just and equitable, without decreasing the efficacy of the work, in order that the tenant may feel that, *in adverse as well as in prosperous times*, he will be able to pay it. To reduce the instalment, it is necessary to lengthen the

term of repayment of the money expended; but this can only be done consistently with the durability of the works. The object, therefore, to be arrived at by both parties is to secure the best effect with the utmost durability. Already it has been made apparent that the short term of twenty-two years, with all the advantage of the low rate of interest of the Government loan, has necessitated a charge upon the tenants which many, even of the most enlightened, are indisposed to bear as a standing increase of rent; or it has caused dissatisfaction on another and worse ground, viz., that the works themselves have been inefficiently done, from a predetermination to limit their cost to such an amount as will be repaid by a given charge.

I refer to the experience of this fact, because it is manifest that the extension of the art of draining will very materially depend upon the rate of instalment charged upon the tenants, and however profitable individual cases of drainage may be shown to be, the benefit to the nation will be unappreciable, unless we satisfy the tenants generally that during all the vicissitudes of times they can afford to pay the increased rent they ought to be charged. The advantage of a lengthened period will be shown by comparing the increased rent a tenant would have to pay to liquidate the expenditure of £5 per acre in fifty years and twenty-five years. In the former case the increased rent would be from 4s. 6d. to 5s. 3d. per acre,\* and in the latter from 6s. 6d. to 7s. 2d. The difference is nearly 50 per cent. Now, if drainage is substantially done, there is no reason whatever to doubt that it will last at least fifty years; and it follows, therefore, that the time for repayment may extend, if need be, to that period. (See Note at end of paper.)

In saying thus much on behalf of the general advantage of keeping down the annual charge, I have been led to do so more from a desire to assist in determining who are the proper parties to perform the work of under-draining, than from a wish to under-rate the benefit or profit arising from it.

I am in possession of some remarkable instances of the increase of produce, but it would answer no good purpose to give the details now.

I may, however, state in general terms that while many of my correspondents speak of the increase from draining as one-fourth of the produce grown on the same land in an undrained state, *none lay it at less than four bushels per acre*. Some lay great stress on the advantage of doing away with summer fallowing, and in prolonging the wheat-seeding time in autumn, and in gaining an earlier fortnight in the spring and at harvest time, estimating the gain in these respects at a greater amount than the increase in cropping. Some farmers dwell on the reduction of horse-labour; others, again, on the convertibility of drained land, and the capability of

\* Five shillings per acre increased rent will be met by the following increase of produce, upon a four-course system of husbandry, independent of all benefit from the improved condition of the soil for tillage and seeding:—

Turnips, 20 bushels at		3d. per bushel.	
Barley, 1½	”	4s. 0d.	”
Beans, 1½	”	3s. 9d.	”
Wheat, 0¾	”	6s. 8d.	”

folding upon it—showing, most satisfactorily, that it is not necessary to stretch after every item of gain to enable a tenant to pay a fair per-centage on the cost. But among the many facts and opinions I have collected, I know of none that will carry with them greater weight than those afforded by Mr. Hutton, of Gate Burton, in Lincolnshire, whose practical knowledge of agriculture is so well known to all. The following is a letter I have received from him :—

“ Gate Burton, November 21, 1854.

“ My dear Sir,—As our drainage contract is now nearly completed, I think you will be desirous to know my opinion of the way in which the work has been carried out, as well as the results. I am very glad to be able to give you a most satisfactory report of both. The soil, as you know, is generally clay, with a more porous clay subsoil at a depth of about 3 ft. 6 in. We have strictly carried out your principles, viz., a minimum depth of four feet, as few outfalls as possible, all of which are well protected by brickwork and grated iron outlets, with a fall into the open ditch of not less, if possible, than six inches. It is only common justice to Mr. Wright, who has carried on the work under your superintendence, to say that it is scarcely possible that it could be better done, and I am very willing, nay anxious, to submit it to the closest inspection. With regard to the results, the improvement is wonderful. Where four horses have frequently had considerable difficulty in ploughing, sheep are now eating off a good crop of turnips ; and on the old grass land, formerly scarcely of any value to the tenant, the improvement is still greater, as it is now producing excellent crops of wheat, worth almost the fee simple of the land in an unimproved state. “ Yours, very truly,

“ W. HUTTON.”

I may observe that a large proportion of Mr. Hutton's drainage was done in substitution of shallow draining.

To understand clearly the advance made in under-draining, and the extent of work yet to be done, the whole country should be divided geologically into three great characteristic areas, viz., the western and north-western or Alpine district of primary and transition rocks ; the middle district of secondary strata, exclusive of and up to the lower margin of the chalk ; and the eastern and south-eastern district, comprising the chalk of the upper secondary strata, the Wealden and the tertiary and post-tertiary deposits overlying the chalk. There are several outlying portions of the formations thus classified which will be found beyond the line of division, but they are so small as not to interfere with the general arrangement.

A curved line drawn from Exeter to Berwick will make a very close give-and-take division between the western and middle districts ; and the lower margin of the chalk, commencing at Weymouth, in Dorset, and ending at Flamborough Head, in Yorkshire, will form a defined boundary between the middle and eastern districts.

1st. The western and north-western or Alpine district includes the mountainous granite, mica, and slate rocks, with the trap rocks, clays, and debris associated with them, and the conglomerate, clay, and loam of the old red sandstone, which cover a wide breadth of the lower-lying portions of the district.

The district is made up as follows :

TABLE I.

Name of County.	Extent of each County included in District.	Extent of Land cultivated and Land capable of improvement.	Proportion of wet Land.	Amount of Money applied for, under the Public Money Drainage Act.	Amount expended under the Act.
	Acres.	Acres.	Acres.	£.	£.
Cornwall .....	851,200	680,000	255,000	63,702	27,040
Devonshire, part of .... } Somersetshire, part of .. }	1,657,200	1,215,000	400,000		
Wales, part of.....	4,000,000	2,997,000	1,250,000	223,863	83,297
Monmouth } Worcester } parts of .... Hereford .. }	1,315,040	1,215,000	750,000		
Salop .....					
Lancashire .... } Yorkshire .... } parts of Northumberland } Westmoreland .. } Cumberland..... }	1,035,000	565,000	360,000	1,941,168	1,165,683
Scotland, part of.....	18,000,000	628,390	5,000,000		
Outlying portions in the Midland district .....	35,840	20,000	10,000		
Total .....	26,894,280	16,320,390	8,025,000	£2,228,733	£1,276,020

The system of drainage applicable to this district being for the most part occasional or “spring drainage,” the expenditure will be brought rather below the cost of parallel or uniform draining. Where parallel drainage has been deemed necessary in the valleys of the granite district, the cost has been generally high, owing to the large quantity of boulder stones and rock fragments which crowd the debris of which the soil is constituted.

In the clay-slate valleys, too, the cost has been found to be very great, owing to the necessity of breaking through and blasting protruding rocks, frequently bringing the cost as high as £7 or £8 per acre.

The drains in the hill-sides, however, being at comparatively wide intervals, will be executed at from £2 10s. to £4 per acre ; and the average cost of the whole will thereby be much reduced. It may be assumed that the quantity of land permanently drained in

this district, by means of borrowed capital and by private outlay, does not exceed 500,000 acres, and that £35,000,000 will be required to perfect the under-draining of the remaining 7,525,000 acres of wet land.

2nd. The middle district, including all the secondary strata from the basis of the Devonian, Cambrian, and Cumbrian ranges, up to, but exclusive of, the chalk formation, comprises the mountain limestone, the coal measures, the new red sandstones, and magnesian

limestone, the lias, the oolitic strata, and the portion of the green sand, with the gault lying to the west of the main ridge of chalk. In these several formations clays abound, sometimes of very considerable width and thickness, and sometimes only thick enough to act as a parting between beds of porous rock, sand, and gravel. Boulder, or transported clays, frequently cover the foundation rock and out-cropping clays.

The following counties, parts of counties, and parts of Wales and Scotland, make up the middle district:

TABLE II.

Name of County.	Extent of each County included in District.	Extent of Land cultivated and Land capable of improvement.	Proportion of wet Land.	Amount of Money applied for, under the Public Money Drainage Act.	Amount expended under the Act.
	Acres.	Acres.	Acres.	£.	£.
Devon ..	1,200,000	1,170,000	650,000	252,678	125,955
Somerset } parts of .....					
Dorset .. }					
Gloucester	2,434,080	2,340,000	1,350,000	704,831	442,062
Monmouth } parts of ....					
Worcester }					
Salop and Wales .....					
Lancashire .....	5,920,120	5,387,000	3,000,000	106,174	64,101
Yorkshire .....					
Northumberland } parts of					
Westmoreland .. }					
Cumberland .....	1,352,320	1,200,000	700,000	640,000	314,000
Durham .....					
Scotland, parts of .....	1,321,040	1,286,000	800,000	158,133	70,113
Lincolnshire					
Norfolk .... } parts of ..					
Cambridge .. }	488,640	450,000	250,000	158,133	70,113
Huntingdon .. }					
Bedford .....					
Buckingham } parts of ..	1,020,000	965,000	600,000	20,525	16,189
Oxford }					
Berks } parts of .....					
Wilts }	574,080	525,000	350,000	27,208	13,108
Warwick .....					
Northampton .....	95,360	90,000	40,000	100	12,155
Rutland .....					
Leicester .....	535,680	510,000	300,000	39,792	16,952
Nottingham .....					
Derby .....	657,920	590,000	300,000	9,550	3,261
Stafford .....					
Cheshire .....	757,760	720,000	550,000	39,200	28,930
	673,280	630,000	500,000	37,104	23,234
Total .....	Acres 18,882,600	17,613,610	10,415,000	£2,052,680	£1,130,080

This district, consisting of nearly nineteen millions of acres, comprises soils of every degree of tenacity and porosity, from the stiffest clays to the freest sands. About one-half, or eight millions of acres, of the cultivated lands, and lands capable of improvement, are believed to be either clays, or loams requiring drainage on the parallel system, with more or less distance between the drains, and about three and three-quarters millions of acres are of comparatively porous matter, which require occasional drains, or drains at very wide intervals, to free them of the water upheld by the underlying clays. Some of the stiffest clays, however, particularly patches of the red sandstone clay, some deep beds of the lias and Oxford clays, and the gault, require very close drainage to be effective. An interval of six to

eight yards is quite wide enough for these soils. The necessity of thus increasing the number of drains in some places will counterbalance the comparatively small cost of the occasional drainage of the water-logged strata, and will bring the average cost of the whole to £5 per acre. We cannot assume that there are less than ten millions of acres in this district still to be drained. This is supposing that 415,000 acres have been already permanently drained; and, on such assumption, it will require £50,000,000 to perfect the under-draining of the district.

3rd. The eastern district includes the chalk (the uppermost formation of the secondary strata), the green sand which surrounds the Weald clay, the Wealden clay, and Hastings sands, the London and

plastic clays, the Bagshot sand and associated clay, the crag of Norfolk and Suffolk, the rich deposits of Holderness, in Yorkshire, and the more recently recovered fens of Norfolk, Cambridgeshire, Huntingdonshire, and Lincolnshire. Boulder and transported clays are very

frequently found in this district also, covering the out-cropping strata.

The following counties or parts of counties make up the district :

TABLE III.

Name of County.	Extent of each County included in District.	Extent cultivated and capable of improvement.	Proportion of wet Land.	Amount of Money applied for, under the Public Money Drainage Act.	Amount expended under the Act.					
	Acres.	Acres.	Acres.	£.	£.					
Dorset } Wilts } Berks } parts of ..... Hants } Oxford }	2,203,840	2,130,000	600,000	55,473	21,313					
Bucks and Beds, parts of ..						280,000	265,000	250,000		
Cambridge and Hunts, parts of ..						546,560	519,000			
Hertford .....						403,200	375,000	300,000	18,750	17,363
Middlesex .....						180,480	160,000		10,625	3,176
Surrey .....	485,760	450,000	1,300,000	29,155	13,155					
Sussex .....	938,240	900,000		52,768	22,253					
Kent .....	996,480	940,000		23,020	8,293					
Essex .....	981,120	940,000		650,000	21,805	6,782				
Suffolk .....	969,600	920,000	700,000	8,990	5,495					
Norfolk, part of .....	1,285,360	1,215,000		600,000	18,260	6,853				
Lincoln, part of .....	600,000	550,000	50,000		35,000	18,000				
Yorkshire, part of .....	450,000	425,000								
Outlying portions on the Western side .....	254,480	235,000								
<b>Total .....</b> Acres	<b>10,575,120</b>	<b>10,024,000</b>	<b>4,450,000</b>	<b>273,846</b>	<b>122,683</b>					

A very wide portion of this district is chalk, and requires no draining. A considerable portion, too, consists of the fens, of which I have estimated only half as requiring under-draining. Already the prejudice against under-draining these lands is giving way, where the vegetable matter is shallow, and the underlying clay comes closer to the surface. The deep peat, or "black fens," may be considered sufficiently well-drained by open dykes, and have not been included in the foregoing statement. I may remark, however, that, where under-drainage has been tried, it has been found to consolidate the soil and improve the quality and weight of the corn grown. The whole breadth of the fens in the several counties is about 700,000 acres. Of the

denser clays, we have in this district the Wealden and the London clays, the former of which covers 650,000 acres, and the latter 1,500,000 acres, all of which requires parallel and close drainage. Besides these clays, we have a very large space covered with the clays and loams of the Bagshot sand, and with boulder and diluvial clays of every degree of tenacity.

As the metropolis and suburbs are included in this district, I have assumed that 450,000 acres have been permanently drained, leaving 4,000,000 acres requiring draining, the cost of which cannot be estimated at less than £22,000,000.

The following summary gives the totals of the districts :—

TABLE IV.

DISTRICTS.	Total Extent.	Extent cultivated and capable of cultivation.	Proportion of wet land.	Amount of money expended under the Public Money Drainage Act.	Amount of money expended under the Private Money Drainage Act.	Estimated Amount of money expended by Incorporated Companies.	Estimated extent of Land drained permanently by borrowed money and by private means.	Extent still remaining to be drained.	Estimated amount of capital required.
	Acres.	Acres.	Acres.	£	£	£	Acres.	Acres.	£
Western and North-Western District ....	26,894,280	16,320,390	8,025,000	1,276,020	128,723	350,000	500,000	7,525,000	35,000,000
Middle District .....	18,882,600	17,613,610	10,415,000	1,130,080			415,000	10,000,000	50,000,000
Eastern District .....	10,575,120	10,024,000	4,450,000	122,683			450,000	4,000,000	22,000,000
<b>Total .....</b>	<b>56,352,000</b>	<b>43,958,000</b>	<b>22,890,000</b>	<b>2,528,783</b>	<b>128,723</b>	<b>350,000</b>	<b>1,365,000</b>	<b>21,525,000</b>	<b>107,000,000</b>

I have to thank the Inclosure Commissioners for the figures I have quoted relating to the advances under the Public and Private Money Drainage Acts. Having transposed them for my own purpose, I think it best to give

the totals with which they have so obligingly furnished me in another form. They are brought up to the 31st October last;—

TABLE V.

	PUBLIC MONEY			PRIVATE MONEY									
	Applied for			Expended.			Sanctioned.			Expended.			
	£	s.	d.	£	s.	d.							
England .....	1,940,227	11	6	1,059,804	0	0	}	292,056	0	0	111,098	0	0
Wales .....	123,863	0	0	44,297	2	1		72,083	0	0	17,625	9	0
Scotland .....	2,491,167	16	6	1,424,682	17	6		364,139	0	0	128,723	0	0
	4,555,258	8	0	2,528,783	19	7							
To expend .....				1,471,216	0	5							
Total amount of loan .....				4,000,000	0	0							

Thus we see that there will still be required £107,000,000 for the under-drainage of Great Britain, towards which the balance in hand of the Government Loan, £1,471,216, is applicable, leaving the sum of £105,528,784 to be provided from private sources. Of this it may be assumed that four-fifths, or about £80,000,000, will be required on loan, and that the collected capital of incorporated drainage and insurance companies will be the future source of supply; for it is hardly to be supposed that the legislature will again sanction the advance of public money for the particular benefit of one class of the community, after experience has shown that private companies are able and willing to lend money upon the lowest rate of interest ruling in commercial affairs.

The sum of £80,000,000 appears large when placed in juxtaposition with the Government loan of £4,000,000; but, when compared with the sums expended in other national enterprises, such as the £286,068,794 expended within the last twenty-five years by railway companies, it cannot be so regarded, particularly if we remember that 3½ per cent. is above the average interest now gained by railway investments; whereas, in drainage advances, not only would the capitalist be made secure of the current interest of money by a first charge on the freehold itself, but both the owners and occupiers of land would derive a paramount advantage from an enterprise in which they practically run no risk and advance no capital. And, while this result would be gained by individuals, the community would be benefited by an increase in food, by drainage alone, which cannot be estimated in the aggregate at less than 5,830,000 quarters of the several kinds of corn which constitute the country's produce.

The public loan being all bespoken, the means of borrowing money now at command of landowners are:—The Private Monies Drainage Act (12 and 13 Vict., cap. c.), the term for repayment being 22 years; the West of England, or South-West Land Draining Company's Act (11 and 12 Vict., cap. cxlii.), under which a landowner may charge his estate in perpetuity; the General Land Drainage and Improvement Company's Act (12 and 13 Vict., cap. xci.), the term for repayment being 50 years; and the Lands Improvement Company's Act (16 and 17 Vict., cap. cliv.), the term of repayment being 25 years.

Having explained how under-draining became the obligation of the landlord, when it was converted from a temporary to a permanent work, and having shown the source whence borrowed capital is to be obtained, and how little progress we have made in comparison with what still remains to be done, I will pass to those

results which the actual practice of the last ten years afford, and which will influence our future mode of executing works of drainage.

In order to trace the progress now making towards the realization of that adequately deep drainage which Dr. Lyon Playfair has so well described in the article "Theory of Drainage," in the Cyclopædia of Agriculture, we must have reference to the relative merits of the several methods which have been propounded in direct opposition to or as a compromise of the principle of depth.

First on the list is the shallow-draining system, which admits the use of pipes in lieu of bushes, but adheres to drains 18 to 24 inches deep in the furrows, as the quicker means of getting rid of water falling on the surface, than drains laid at a greater depth. I do not propose to dwell very long on this system, for so numerous are the instances throughout Great Britain of the complete success of deep draining, when properly executed, and so generally is deep draining now substituted for shallow draining, that it is difficult to admit of a compromise of depth under any circumstances whatever. But as the advocates of shallow draining have been enabled, by certain defects in the development of the deep drainage system, to maintain a position for a time, it is advisable to trace at once the causes of such defects, that we may not be led away from true principles by accident or the influence of prejudice. We cannot hide from ourselves that the operations under the first Public Money Drainage Act were stimulated by erroneous notions of economy. It was thought that the greater part of our clay lands would be drained at a cost of £3 or £4 per acre, or even less, and to this delusion may be attributed the greater part of the defects which have brought discredit on the system. Experience has shown that the average cost of adequately deep drainage is as near as possible £5 per acre, although at this time the general increase in the price of labour and materials has increased it to about £5 15s.

Drainage, to be perfectly satisfactory in its effect upon the soil, must render it uniformly permeable to the full depth of the drains. The soil midway between them must be in the same condition to receive and infiltrate the rain that falls upon it, as the soil nearest the drains. If this be not accomplished, they are not producing that united effect which should be sought for and obtained, and there is no more certain way of producing an *irregular condition of soil*, than by placing the drains so far distant from each other, that the influence of one drain cannot perfectly meet the influence of another.

Cases have been quoted as failures of deep-draining, in which a desire to keep down the cost has led to an indiscreet widening of the distance; and the unsatisfactory

result to which I have referred, following that indiscretion, has proved that the increased depth of drains will not compensate for increased distance, and that soils which should be drained 24 feet apart cannot be sufficiently well drained at 40 feet apart, let the depth be what it may. But the effect has been no other than this—the principle of depth has remained unshaken. It has simply proved that good draining is not to be done for as little money as bad.

Among the instances of this species of partial failure, I may state that I have been obliged in several instances to introduce intermediate drains when I have been over-careful of expenditure, and have placed those first laid out 30 feet, where they ought to have been 25 feet apart.

Mr. Gow, of Morpeth, writing to me last year said, "I have had one or two failures in deep-draining, where, from a desire to economise, I have placed the minor drains at too great a distance apart; and I find, too, that some of our earlier performances, at a depth of three feet, will require to be re-drained at a greater depth."

It is a common assertion, "that water cannot get down through clays," but in no one instance has it been successfully shown that water will disobey the laws of gravitation, or will fail to descend through *any clay soil, however absorbent and retentive*, to an approximate level with drains of reasonable depth (not less than four feet), *if they be placed sufficiently near each other* to counteract such absorbent and retentive properties, and to meet the effect of atmospheric humidity in maintaining them in force.

Frequently has it fallen to my lot to meet men retaining prejudices in favour of shallow draining, on clays which they have declared to be so stiff and retentive, that it was impossible water could find its way down, and so dense and dry in the subsoil, that no water could be gained from cutting into it. These clays have nevertheless been drained from four to five feet deep, and water has flowed copiously from the outlets; still the advocates of shallow draining, when asked "from whence comes the water?" reject this simple proof of their error.

In the same way they refuse all evidence of the superior effect of deep drains afforded by the facts that they generally commence running *before* shallow drains; that they invariably run as soon and *more copiously* than shallow drains; that they continue to run long *after* the shallow drains have ceased to run; and that they discharge *clear* water, while the shallow drains discharge discoloured water, showing how perfectly the former act as a means of conveying to the subsoil (which the shallow drains hardly penetrate) a proportion of the manure the farmer has taken the pains to put on his land, but of which he is robbed of his shallow drains. If the advocates of shallow draining cannot adduce any instance of the failure of deep draining, it cannot be said that no instance can be found in which shallow draining has failed to keep even the surface of land dry, leaving out of consideration the many benefits incidental to deep drainage, and which are altogether lost sight of, but which are of equal importance with drainage itself.

The following extract of a letter will show that land carefully drained 18 inches deep with tiles, becomes, in a few years, as wet or even wetter than before.

It is from Mr. Macvicar, of Barkwith, in Lincolnshire. He says:—

"I have met with several cases of shallow drainage which at first have been followed with beneficial results, and have become after a time inoperative. Thus, in the parish of Colsterworth, a field of strong retentive clay land was drained in 1842, at a depth of 18 inches; for a time the land was apparently laid dry, but in succeeding years it showed symptoms of returning wetness.

"I saw the field last week; it is sown with wheat, and, although water-furrowed, the land is saturated with water. I

examined the outlets, which were running very slowly, although I believe the drains are open."

I have never yet heard a satisfactory reason for land returning to a state of wetness after being dry. One thing, however, is proved by Mr. Macvicar's case, and that is, that it is not merely by the substitution of the durable pipe for the perishable thorn that the surface of land can be rendered permanently dry, as the shallow drainers say. It will be observed that it is about 14 years since this specimen of *permanent* shallow draining was done. This length of time accords with the period which is generally understood to be the time which elapses before bush-draining would be renewed. Now, I have often heard the remark from farmers who were about to renew this latter description of draining, that they could not account for the land becoming so wet as to require re-draining, when their drains which were put in 12 or 14 years back were open and running, but such was the case; and I believe it will be found that pipe-draining 18 inches deep will be as little durable as bush-draining of the same depth; for whether it be from increased succulency of the surface soil, or from any other cause this discussion may elucidate, it is certain that time will render shallow drainage useless without any rupture of the drains themselves.

Before leaving the shallow-draining system, I will take the liberty of referring to a circumstance which, I trust, will prove to Mr. Bullock Webster, who has long advocated shallow-draining, that he has been misled, and by that he has inadvertently misled others.

In 1850, Mr. Webster published, in the *Journal of the Royal Agricultural Society*, a short paper, headed "Mischief arising from Draining Clay Soils too deeply," and without giving any proof whatever of the mischief to which he referred, he gave currency to what the agent of the Duke of Wellington was doing, and quoted a letter, signed by Mr. Charles Easten, in which he said it was intended never again to put a drain upon the heavy clay at Strathfieldsaye at a greater depth than three feet. I presume he meant to convey that these clays could not be drained effectively at four feet deep or more. It fortunately happened that the Speaker of the House of Commons, whose estate at Heckfield is intermixed with that of the Duke, determined in 1852-3 to drain a portion of his estate. He employed the General Land Drainage Company to do the work for him, and instead of draining at Mr. Easten's depth of three feet, the Company have not laid a single drain less than four feet deep, and the major portion have been laid four feet six inches and more.

So prejudiced were the tenants against deep drainage in the first instance, that they threw obstacles in the way, and the Speaker kindly limited the work to one farm. When this was done the tenants, one and all, begged that the wet lands of their several farms might be drained, and the Speaker thereupon entered into a second contract for several hundred acres, allowing them to select, as far as was practicable, the lands they called "*wet*." On the completion of this second contract, the tenants, with the same unanimity, but with increased earnestness, begged to have the very lands drained they had withheld as dry, and not requiring draining, because they found by comparison with the drained land—the "*mischievously*" deep-drained land—that the excepted dry land was insufferably wet; and to oblige his tenants the Speaker has just entered into a third contract.

I have passed over the clays of Strathfieldsaye, and I can recognise no difference between them and the clays of Heckfield.

I will not dwell upon the tangible evidence the instance affords of the efficacy of deep drainage, nor the contradiction it gives to the reputed "*mischief*" arising from the practice.

It must be manifest, I hope, to Mr. Webster and to those who generally agree with him.

As an advance upon the extremely shallow drainage of 18 inches and 24 inches depth, we find Mr. Denison, Mr. Milward, and several other gentlemen of high repute, draining from 2 feet 6 inches to 3 feet deep, and they still, I believe, express themselves satisfied with the result; but, as drains of the medium depth of 2 feet 6 inches to 3 feet cannot fail to do some good (and, perhaps, a lasting one, so far as the discharge of water goes), the fact that the result has been satisfactory to those who performed the work, does not prove that such medium depth is the best. On the contrary, I hope, by referring to a few facts, to show that drainage as shallow as 30 inches or 36 inches, fails to provide for all the objects in view.

Three important advantages attend deep drainage beyond the primary object of discharging superfluous water. The first is—the increased quantity of soil ameliorated and rendered serviceable to vegetation; the second—its improved temperature; and third—the removal of the pipes beyond the reach of deep cultivation, and beyond the reach of *annual* vegetation, to stop the drains by the growth of roots within them. With regard to the first advantage, it can hardly be necessary to say that the staple of aerated soil into which the roots of plants can travel and seek their food, cannot be too deep. Every inch of additional drainage gives 100 tons of active soil per acre, rendered, by drainage, so free and porous, as to gain fertility from the rain passing through it, and from the solution of the ingredients of the soil, and from the manure which is brought down from the surface by the rain.

I published recently some very curious illustrations of the dislike plants exhibit for stagnant water in the soil. They afforded proof that directly the roots reach the standing water level, they ceased to penetrate further. I have evidence now before me that the roots of the wheat plant, the mangold wurzel, the cabbage, and the white turnip, frequently descend into the soil to the depth of 3 feet. I have myself traced the roots of wheat 9 feet deep. I have discovered the roots of perennial grasses in drains 4 feet deep; and I may refer to Mr. Mercer, of Newton, in Lancashire, who has traced the root of rye grass (which is daily coming more and more into cultivation) running for many feet along a small pipe drain after descending 4 feet through the soil. Mr. Hetley, of Orton, assures me that he discovered the roots of mangolds in a recently-made drain 5 feet deep; and the late Sir John Conroy had many newly-made drains 4 feet deep stopped by the roots of the same plant.

These facts are mentioned to show that the roots of our cultivated crops do descend and appropriate the soil to as great a depth as they are permitted; and we have proof, too, that the greater range of active aerated soil we can give them, the more prolific and weighty is the grain they produce. This has been satisfactorily shown at Yester. By deep cultivation the produce of the wheat crop there has been increased from three quarters and six bushels, to five quarters and four bushels, and the weight per bushel in proportion. Instances could be given of advantages arising from the removal, by deep draining, of the injurious presence of oxide of iron, which is known to pervade many of our clay soils; but I refrain from multiplying cases which may appear at all speculative or incapable of proof.

Upon the second point, the temperature of the soil, we have at present no positive evidence to show that any advantage is gained by increasing the depth beyond three feet; but it cannot, nevertheless, be doubted, that the deeper the drainage which regulates the height of stagnant water in the soil, the more likely it is that exces-

sive evaporation, and its chilling effects in the soil itself, will be prevented. Mr. Parkes has clearly shown, in his admirable paper in the 5th volume of the *Journal of the Royal Agricultural Society of England*, the loss of heat by evaporation of water in undrained land. The experiments carried on at Yester show that in winter a higher temperature of 2½ degs. was gained by draining; while in summer there appeared to be no gain. By the act of deep cultivation, however, in addition to draining, a gain was effected of 2 degs. in summer and 4½ degs. in winter. In this case the drainage was only 33 inches deep, and the comparisons of heat were not made on the same land before and after draining, but on adjoining lands. What would be the effect of an adequately deep drainage has not yet been communicated; though I believe that experiments are in progress which will show that a higher temperature can be produced than any that has attended drainage only 33 inches deep.

But as a proof of the sensibility of a soil drained 4 ft. deep to atmospheric changes, I may mention that my attention has been on more than one occasion called to the circumstance that drains have been observed to run after a discontinuance of that duty without any fall of rain on the surface of the drained land, and upon reference to the barometer it has been found that the quicksilver has fallen whenever this has occurred. Mr. George Beaumont, jun., who first afforded tangible evidence of this extraordinary circumstance, has permitted me to read the following extracts of his letter:—

“I can verify the case of the drains running without rain during a falling barometer beyond all doubt.

“The case I named to you last year of the barometer falling four days consecutively, and with rapidity, was a peculiarly favourable time for noticing it, as it occurred in a dry time, and the drains could be seen distinctly. My man, on being questioned and cautioned by me not to exaggerate, has declared the actual stream of water issuing from one particular drain to be as thick as a ⅜-inch wire. All the drains ran—they did more than drop—and ditches which were previously dry became quite wet, with a perceptible stream of water; this gradually ceased with the change in the density of the atmosphere, as shown by the barometer.

“During last harvest, 1855, the men were cutting wheat, and on getting near to a drain outlet, the ditch from the outlet downwards was observed to be wet, and the drain was dripping. No rain fell in sufficient quantity to enter the ground. The men drank of the water while they were cutting the wheat. A few days after, it was dry again. I have seen and noticed this phenomenon myself.”

A correspondent of the *Agricultural Gazette* has stated that Professor Brocklesby, of Hartford, in America, had observed the same phenomenon in the case of two springs in that country; and explained that the cause was “the diminished atmospheric pressure which exists before a rain.”

With respect to the third point, I wish to avoid speculative views as to the extreme depth to which cultivation may reach; but I believe with the present mode of subsoil ploughing (without the aid of steam-power, which is advancing upon us) a depth of from 17 to 22 inches is gained; it is, therefore, obvious, that pipes laid 18 inches deep would be lifted by the plough, and it is not improbable that when we have the aid of steam-power, pipes laid 24 inches deep will be moved as readily. With these anticipations, it would be a very bad provision for futurity if the owner of entailed property called upon the next generation to contribute to the cost of draining at any depth which 20 years hence may appear as shortsighted as drainage 18 inches deep is now deemed to be. It is true that pipes laid 3 feet deep may not be directly touched by the instrument of subsoil ploughing; but we have evidence of the disposi-

tion of the roots of plants to thread their way through stirred soil 4 and 5 feet deep, and of the stoppage of pipes by the roots of cabbages, mangold wurzel, and turnips, at a depth of 3 feet, *where the soil is firmly consolidated*. With this experience, it must be admitted that the insecurity of 3 feet drainage will be increased by subsoiling, and that therefore the adoption of such a medium depth may operate as a bar to an improvement which may become a natural sequence to draining.

I trust that these few remarks—difficult to condense—in explanation of the collateral and secondary benefits of deep drainage, will serve to show that, in the aggregate, they are of equal importance to the primary object of discharging injurious water, and that any system of drainage which does not provide for them is imperfect as a permanent work.

With these observations I will pass to that system of draining which has recently acquired the title of the *Keythorpe system*. Allowing for a difference in the mode of carrying it into execution, this method is based upon the same principle as Mr. Baker, of Writtle, has enunciated; viz., that if there be a porous soil only 2 feet deep, resting on an impervious subsoil, nothing is gained by carrying the drains into the latter. All practical men—I mean practical men, *qua* drainage—will at once dispute the assumption that there exists any clay subsoil at a depth of 2 feet below the surface which is impervious, and that therefore any system founded on it is nothing more nor less than an indirect mode of shallow draining, aiming only at the discharge of water, without seeking any of those collateral advantages just referred to.

The Keythorpe system, which has been very ably explained by Mr. Joshua Trimmer, the eminent geologist, in the *Journal of the Royal Agricultural Society*, is brought before agriculturists with the flattering recommendations of cheapness and scientific treatment. Lord Berners, the owner of the Keythorpe estate, having certain lands in hand, commenced his draining operations by causing numerous holes to be dug. By observation and experiment, which appears ultimately to have led to a definite practice, his lordship was enabled to arrange his drains so far distant from these holes as just to suffice to draw the water out of them. Mr. Trimmer explains the mode adopted to be a system of draining by pipe channels transverse to certain ridges and furrows, found to exist between soil and subsoil, or, to use the words of Mr. Trimmer, “between the warp drift and the erratic tertiaries of the older strata, on which the warp drift rests,” with a view to intercept the water which finds its way through the porous warp drift into the furrows; these furrows acting, in fact, as *minor drains* to the transverse channels, which act, as *sub-mains*.

The characteristics of the system are:—

Firstly. That the drains are neither equidistant nor of regular depth, their position and depth being determined by the shape of the subterranean undulations and the depth of the furrows.

Secondly. That the drains cross the line of greatest descent (obliquely) in order to intercept the water flowing down the furrows referred to; “which are generally found,” Mr. Trimmer says, “on land with a considerable fall, and run, in most cases, in the direction of the fall.” And

Thirdly. That the efficacy of the drainage depends upon a precise knowledge of the breadth and depth of the ridges and furrows.

Without venturing to deny the statement of so sound a geologist as to the existence of these subterranean ridges and furrows, and without presuming to deny that Lord Berners has rendered his land dry for the time being, I am content to state what appear to me insupe-

rable objections to the general adoption of the Keythorpe system. The first is, that the depth of the drainage must necessarily depend upon the depth of the furrows, whether they be 18 inches or 10 feet deep (if they are found to exist of sufficient regularity to become applicable as drains at all). We have the evidence of what has been done at Keythorpe, showing that they are sometimes found to lie only 18 inches deep, one-tenth of the drains being that depth.

If, therefore, Lord Berners should follow the example of the Marquis of Tweeddale, and determine to subsoil this drained land next year to a depth of 22 inches, he would not only plough up all his 18-inch pipe drains, but, inasmuch as he would decapitate and deform the ridges alternating with the furrows (which are his minor drains), the destruction would not be limited to the 18-inch drainage, but would extend to the major part of the work. The second objection is, that the direction of the pipe drains is across the fall of the land, and therefore opposed to the influence of gravitation. And the third is, that there exists no tangible data generally applicable for setting out the pipe drains.

In many instances I am satisfied that the knowledge Mr. Trimmer has made peculiarly his own would be not only beneficial to landowners, but might frequently assist draining engineers in solving problems in nature, which correct geological knowledge alone can solve. But I do not think it will afford tangible data for the execution of drainage works, particularly those in which expedition forms an item of profit, as is generally the case.

The next system which intervenes as a compromise with the principle of depth, is that of the late Lord Wharnclyffe. It is called the combined system of deep and shallow drainage, and has been described by his Lordship, in the *Journal of the Royal Agricultural Society*, in the following terms:—

“In order to secure the full effect of thorough drainage in clays, it is necessary that there should be not only well-laid conduits for the water which reaches them, but also subsidiary passages opened through the substance of the close subsoil, by means of atmospheric heat, and the contraction which ensues from it. The cracks and fissures which result from this action are reckoned upon as a certain and essential part of the process.

“To give efficiency, therefore, to a system of deep drains beneath a stiff clay, these natural channels are required. To produce them, there must be a continued action of heat and evaporation. If we draw off effectually and constantly the bottom water from beneath the clay and from its substance, as far as it admits of percolation, and by some other means provide a vent for the upper water, which needs no more than this facility to run freely, there seems good reason to suppose that the object may be completely attained, and that we shall remove the moisture from both portions as effectually as its quantity and the substance will permit. Acting upon this view, then, after due consideration, I determined to combine with the fundamental four-feet drains a system of auxiliary ones of much less depth, which should do their work above, and contribute their share to the wholesome discharge, while the under-current from their more subterranean neighbours should be steadily performing their more difficult duty.

“I accomplished this by placing my four feet drains at a distance of from eighteen to twenty yards apart, and then leading others into them, sunk only to about two feet beneath the surface (which appeared, upon consideration, to be sufficiently below any conceivable depth of cultivation), and laying these at a distance from each other of eight yards. These latter are laid at an acute angle with the main drains, and at their mouths are either gradually sloped downwards to the lower level, or have a few loose stones placed in the same intervals between the two, sufficient to ensure the perpendicular descent of the upper stream through that space, which can never exceed, or, indeed, strictly, equal the additional two feet.”

In order to give you the most authentic account of

the results of this system, I will read you the following extracts from a letter I have just received from Mr. William Hunt, of Wortley :—

"I am now able to give you my opinion of the success of the same system of draining upon the Carleton property, belonging to Lord Wharcliffe. The combined system has succeeded most admirably there. The soil generally is a strong loam for about 1 foot in depth, then a stiff clay subsoil; but I found, on making trial pits in several parts of each field, that at the depth of about 3½ feet, and between that and 4 feet, the clay was a little more porous, although below that depth it became quite stiff. I therefore set out the 4 feet drains according to his lordship's usual practice, by 20 yards apart, with the two feet drains slanting into the four feet at 8 yards apart.

"The tenants were at first much averse to the combined system, but they are now highly in favour of it, in preference to the regular system at whatever depths; and they are now preparing to sow turnips next season where such practice was never thought of previously. The rapid manner in which the surface has become dry after the heaviest falls of rain has quite surprised all parties who have witnessed the effects of the combined system of draining at Carleton. *I have no doubt but 4 feet drains, placed at regular distances, would have drained the land I have named, but the cost would have been much higher; and what is of greater importance than the expense?*"

I desire to draw your particular attention to the last paragraph of this letter. My kind correspondent could hardly have made a more candid admission of the influence of expediency.

It would only be repeating the observations already made, were I to explain the several objections with which practical drainers regard this system. I may shortly observe, however, that no one would contradict that the lands were improved by the method of draining adopted, simply because it would be impossible to deny, as I have before implied, that any drain, even two feet deep, could be put into land without doing some good; but it is equally impossible to reconcile with any laws of hydraulics, engineering, or economy, the union of the two depths in one system. The drains of the greater depth must detract from the utility of those at the less; and the two directions, *with* the fall and *across* it, cannot both be right. The numerous junctions, too, are liable to constant disarrangement. It would appear that, by adopting an uniform depth of 3 feet 6 inches (which, although not so good a depth as 4 feet, is a respectable depth) at intervals of 25 feet, a much more permanent drainage could have been secured for £5 an acre (a sum to which Lord Wharcliffe limited himself) than by any method of which a depth of two feet is an element, if the advantages of uniform aëration and deep cultivation are recognised—considerations which Mr. Hunt would appear to have overlooked in the question with which the quotation closes, and which shows clearly that the combined system is simply one of expediency.

I have avoided the subject of spring draining, because all practical men seem to agree on the principle of action, and the length to which this paper has already extended forbids any further enlargement.

Having described the several systems of shallow draining, semi-shallow draining, subsoil furrow or Keythorpe draining, and the combined deep and shallow draining, we now approach that of the adequately deep draining, and a consideration of the means by which that object is to be obtained at the least cost. But let me premise in distinct terms that there are many who are convinced of the advantages of deep draining (I admit myself to be one), who, when dealing with the poorer and denser clays, yield to the views of the late Sir Robert Peel, when he said that he could conceive a case in which, if the amount to be expended was limited, *increased closeness might compensate for diminished depth*. Deep drainers do not admit this compromise,

however, because "the surface water cannot get down;" they do so with the candid acknowledgment that they do not like what they are doing; but inasmuch as the draining of these soils must be as close at one depth as at another, they concede 6 inches in depth, in order to reduce the amount of interest a tenant will be called upon to pay to cover the outlay.

In determining the distance between drains, it is necessary not only to have regard to the nature of the soil, but to the amount of annual rain-fall and the frequency of rain.

A practical knowledge of the different clays of the different formations enables the draining engineer to determine pretty accurately the draining properties of each.

To enable a landowner whose experience is comparatively limited to form a judgment on the subject, I may venture to recommend a means of mechanical analysis which I have found useful, and which I explained last year (See Land Drainage and Drainage Systems, page 23). The proportions of sand and clay are ascertained by washing a given quantity in a flat-bottomed medical phial. The sand subsides below the clay, and is visible through the glass. The existence of lime is ascertained by means of acid. If it effervesces, lime exists; and if the lump dissolves very rapidly, there will be a considerable proportion of lime in the soil. The capabilities of the soil to expand and contract are ascertained by weighing and measuring a given quantity at different times, and under their different conditions of wetness and dryness. In cases of difficulty, recourse should be had to the chemist.

The necessity of a careful examination into the draining properties of clays will be seen by a statement of the comparative cost of draining at different widths. A single yard too near may be a pound per acre thrown away, while a yard too wide may occasion dissatisfaction for ever. Taking labour at 7d. per rod, and pipes and haulage at 22s. 6d. per 1,000, the cost will be as follows :—

	£	s.	d.
At 18 feet apart .....	7	18	4
21     "     .....	6	16	3
24     "     .....	5	19	8
27     "     .....	5	6	9
30     "     .....	4	16	5
40     "     .....	3	12	1

Experience shows that a consideration of the amount of rain-fall is a matter of much moment in determining the width between drains. It does not appear, practically, to govern the size of the pipes to be used; for if the ends of the pipes can be made to join securely, and the fall is good, the smallest-sized pipes will be sufficiently large. But in proportion to the rain-fall, all other considerations being equal, should be the distance of the drains apart, in order that the soil may be sufficiently free at all times to absorb and discharge the maximum amount that can fall on its surface.

We find, from sundry careful records, that 141 inches may be taken as the average annual rain-fall of the wettest place in Cumberland, while 19½ inches may be taken as the average fall in Essex.

It is not enough to ascertain the quantity of rain that falls—we should know the prevalent periods of continuance of rain and moisture; for in accordance with the length of time intervening between rains will be the opportunity for soils to undergo those changes of condition which are essential to complete development of draining, and which conduce to an improved "climate of the soil itself."

We find that the average number of days in the year in which rain falls in the wettest districts of Cumberland is 210; and at Castle Hill, in Devonshire, 191 days;

while at Chiswick, the average number of wet days in the year is 124, with an average fall of 24 inches.

Fortunately, however, the clay soils of the west and north-west of England are comparatively open and porous, and thus counteract the humidity of atmosphere under which they exist; whereas the denser clays, lying to the east of the lias out-crop, have the advantage of a greatly reduced rain-fall, although the number of days on which rain falls is not proportionately less.

With respect to the direction of drains, I believe very little differences of opinion exists. All the most successful drainers concur in the line of steepest descent as essential to effective and economical drainage. Certain exceptions are recognised in the West of England; but I believe it will be found, as practice extends in that quarter, that the exceptions have been allowed in error. There is much difference of opinion as to the adoption of an equi-distant parallel system in lands of the ridge and furrow form. In arable land, the most successful drainers throughout the country disregard the furrows; whereas we find the majority of those in the Midland Counties leaning to the adoption of the furrows as the course of the drains in grass lands. The same difference of opinion prevails as to the use of collars. Some good drainers object to them on account of the cavity left between the collars; but the majority approve of them, and would use them in all soils were it not for the additional cost. In sandy and gravelly soils they are indispensable. With regard to the admission of air to the heads of drains, as advocated by Mr. Simon Hutchinson, very few think it advisable, while some go so far as to say it is decidedly injurious.

Upon the question of outlets there appears to be much difference of practice where there should be none. In the whole process of draining there is nothing so desirable as permanent and substantial work at the point of discharge, so as to reduce to a minimum the ill effects of inattention on the part of tenants, and the neglect of communication between present and succeeding owners. It is considered that the more frequent the outlets the more active the drainage; but as every additional outlet involves additional cost in erecting, and care in preserving them, prudence suggests that the number of acres draining to one outlet should never be more than 20, or less than 6, if the form of the land and size of the fields will permit of these limits. On this arrangement, iron pipes, with swing gratings, set in masonry, may be provided at the cost of 1s. per acre. The outlets should be numbered consecutively.

If these several objects be borne in mind in carrying into operation the main principle of *adequate depth*, there will be but little chance of failure. Having perfected the work, one thing still remains to be done. A plan or record of the lands drained, and the position of the drains, is necessary; and in order that such a record may be preserved for future generations, it is desirable that a national office, connected with the Tithe and Inclosure Commissions, should be set apart for the purpose. It would be invidious to point out instances in which recent works of drainage have already become useless from change of ownership and the indifference of successors. The cost of planning the drains after execution need not exceed 6d. to 9d. per acre where a map of the lands already exists; and after we have spent £5 per acre in draining, does it not appear the very height of folly not to preserve a record of so expensive an object at a cost of 6d. per acre?

I cannot leave my subject without congratulating the country generally on a few points of great moment connected with it. First is the improvement observable in field labourers from their occasional employment in systematic drainage. This improvement is to be particularly noticed in those counties where the wages were lowest and the labourers were esteemed to be inferior. I will instance the counties of Southampton, Wilts, and Dorset. When the General Land Drainage Company first commenced works in those counties, the use of the spade and graft appeared unfamiliar to the farm labourers. We introduced labourers at nearly double wages from North-

umberland and Yorkshire, to teach them their use; and we obtained more profitable labour from the Northumberland man at 18s. per week, than from the Dorset man at 10s. But the tables are now turned; we have at this moment Dorsetshire men employed at Swine, in Yorkshire, who surpass the Yorkshiremen in the quality and expedition of their work. And as it is known that a good drainer is necessarily a good hedger and ditcher, and a handy man at nearly all field work, we may consider that one good result from a general extension of draining will be to increase the capabilities of the farm labourer, and give him a just claim to better wages.

The next subject of congratulation is the increased healthiness of those districts in which any considerable extent of land has been drained.

And the last is the admission, now becoming very general, that the time has arrived when the main and tributary outfalls throughout the country must receive attention. The whole question is growing daily more and more serious; and I earnestly commend it to the consideration of those who, having influence, are willing to exert it in favour of an object of the highest national importance.

\*\* Since Mr. Denton's paper was written, he has made the following addition to it:—

I must here refer to some observations made by Mr. Baker, last night, at the Central Farmers' Club; and I do so because it was evident that his words, uttered with all the effect of his high standing as an agriculturist, seemed to strengthen prejudices which are based on error.

He stated that it was impossible that drainage works could be permanent, and instanced a particular case of pipes being silted up though laid 3½ feet deep. Upon my asking him what they filled up with, he told me sand; and, on my asking if the pipes were laid with collars, he said, "No."

Now, I need only remark that the whole question of permanency depends on the mode of execution. If gravelly and sandy land is drained only 3 feet 6 inches deep, it is hardly necessary to say that the drainage may be as deficient of depth as 18-inch drains are known to be in clays; and to drain any gravelly and sandy soil without collars is simply throwing money away. If such works as these afford Mr. Baker the data upon which he declares it is impossible to render drainage works permanent, I can readily concede the fact.

Again, Mr. Baker referred to some works executed by means of the Government loan; and repeating the fact (in which I can corroborate him) that lands of different character have, in certain instances, been drained alike—he was pleased to attribute this to the influence of scientific drainers. Now, what is the fact of the case? The works that have been so executed under the commission are those which landowners entrust to their own bailiffs, under the nominal instructions of the Government Inspectors, who really have no more to do with the actual execution of the works than men can have who are only called in at the commencement and finish. But on this point I hope there are some here who will speak and disabuse the public mind of the fallacy of holding public officers responsible for work requiring such particularity of management as drainage, who, perhaps, may not see it during the whole time of execution.

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(This was read at the Society of Arts, Wednesday, December 12th, 1855. The Discussion which afterwards took place will be given next month.)  
(To be continued.)

## "PRACTICE WITH SCIENCE."

The forthcoming number of the "Journal of the Royal Agricultural Society" will be the first which has appeared without the superintending care of the late and lamented Mr. Pusey. We know complaints have been made, that it was too much like the consulship of Julius Cæsar, or of the first Napoleon. All we can say, however, is, that we believe the Journal, under the new regime, will maintain the high reputation which it acquired under the old; for we have seldom seen so much writing on agricultural matters which contains so large an amount of wheat mixed with so small a quantity of chaff.

The Journal may be said to have passed already through three phases. It commenced its career with Practice and Science inscribed on its banners. The savans readily and cheerfully flocked to its standard; but their articles were too often science without practice, and smacked too much of the college. Some were even garnished with Greek quotations. What would Sir Roger de Coverley have said to those articles which we could point out, who, when commissioning the "Spectator" to look out a chaplain for him, specially stipulated against being insulted with Greek at his own table? What, again, would the Duke of Wellington have said, who, when giving advice to a young Peer on the subject of Parliamentary speaking, advised him, as the chief requisite, to make himself thoroughly master of the subject on which he was going to speak, and not to quote Latin? This is most excellent advice, though we sometimes fall into the latter error ourselves; but when we do, we always endeavour to make atonement by accompanying our Latin with an English translation. The hot fit of science was succeeded, as usual in other cases, by a cold fit. Then it was that among leading members of the Society we often witnessed sneers at the "scientifics," and expressions of delight at the fun to be derived from pitting them one against another. Then it was that the Council thought it necessary to caution the farmers against being led away by science. Then it was that we were sentenced to read elaborate articles, and listen to still heavier speeches, on the difference between true and false science. Nor was this feeling confined to England; for it was at this time that some severe remarks might be found in the writings of the late and lamented Professor Johnston, as to the low estimation in which chemical science was held even by those who were considered the most enlightened farmers.

This state of things, however, did not last long; guano had a large share in the merit of producing a healthier tone of feeling. Its use in England had been first suggested by Liebig: the first importation in a small box had expanded into a trade employing thousands of tons of shipping. Those who had been foremost in ridiculing the idea of applying this manure to their fields, began to boast how many tons of it they had used, and how soon they had

begun to use it. Bones began to be dissolved in sulphuric acid—another suggestion of Liebig's—first reduced to practice, in England, by the Duke of Richmond. Manufactories of superphosphate arose, law-suits were waged as to the right of making it; and so the farmers became most eager for all kinds of chemical manures, which appeared in rapid succession. Gentlemen, too, who had refused to eat vegetables grown with chemical manure, and gave the preference to good "wholesome horse-muck," as they called it, began to try a variety of chemical experiments in the cultivation of their gardens.

Dissolved bones led the way to the water drill, which was eagerly patronised by one—and that was no less than the late Mr. Pusey himself—who, in his article "On the progress of agriculture," had not long before declared that liquid manure was a pretty plaything; but that solid manure was for real farming. Admit the advantages of the liquid manure-drill, and you reduce the question of the application of town sewage to land in the liquid form to a question of engineering. Chemistry had now become recognised as almost forming a part of agricultural practice.

The Society for the Advancement of Agricultural Chemistry, which had been established because of the cold reception chemistry received from the agricultural world, became merged in the Royal Agricultural Society. A celebrated chemist was appointed; and the researches of Professor Way respecting the action of the soil on manures, raised the once-despised chemistry to the very pinnacle of agricultural popularity.

Meantime other branches of science became popular among agriculturists. The chemical expenditure of the Society was accompanied or preceded, we do not remember which, by a veterinary grant. Professor Simonds brought medical science to bear on veterinary practice, and has been rapidly annihilating the prestige of the old race of farriers, who used to put in their drinks "all the gimcracks as ever they could think of," on the principle "that some of them must do good." A consulting engineer was appointed to assist the Society in adjudicating their premiums, to the throng of implements which, like a park of artillery, crowded the show-yards. Engineering and chemistry, and meteorology and hydraulics were enlisted in the cause of land drainage with manifest advantage; though we are far from contending that they have yet carried it to such perfection, that there is no room for further improvement, or that we are to consider, as some appear to do, that rights are invaded, and that our equanimity is wantonly disturbed when further improvements are suggested, and proved to be capable of application in a practice which its votaries flattered themselves reached perfection.

Let us not forget the valuable papers on botany by Professor Henslow, nor those on entomology by Mr. Curtis. Though we fear the latter are not

read so much as they ought to be, for the study of natural history is a study full of moment to the farmer, minute and unworthy of notice as it may appear. The power of dearth or abundance is often lodged in their hands. The locust, the palmer worm, the midge, and the caterpillar are called in Holy Writ—"My armies, which I send among you." From some of the worst of these scourges we are happily exempt, but we have indigenous enemies among the insect tribes, which have reduced farmers ere now to beggary; and there are foreign insect foes—the Hessian fly, for instance—which have produced as much alarm to the government as the invasion of a hostile army. The best security under Providence against these scourges is a knowledge of their habits, their food, their enemies, and the time of their reproduction. For these reasons entomological knowledge is particularly useful to the farmer; but for all that, we fear—at least, if we may judge by our own—the entomological papers in the *Journal* are those which are the least read. The fact is, that agriculture is connected at so many points with so many different sciences that it is impossible for one man to grasp them all. One good entomologist, however, there should be in every district; and the study of it would form an agreeable amusement to many a country clergyman, while it would enable him often to do good worldly service to his parishioners.

Among the sciences which have been treated in the *Journal* of the Society, geology has not been forgotten. We are of the number of those who think it might not be amiss if it received more encouragement, and if a portion of the funds of the Society were devoted to the encouragement of original research in those branches of the science which are more immediately connected with agriculture. In that respect, however, something has been done. Errors and conventionalisms are beginning to be discarded; and we are no longer told that, given a geological map, you know the value of the soils upon it, and can even let your land by it. In this respect the recent articles in the *Journal* on the farming of particular counties, the writers of which always commence with a geological description to order, manifest much sounder geological views than are to be found in the earlier numbers, for in too many instances the geological part of the essay was but a bad preparation of the Reports of the Board of Agriculture. In this respect, however, there is yet room for improvement, and the true geology of agriculture is a field still almost unbroken. So much for the scientific articles which have appeared in the society's *Journal*. A notice of the many valuable papers on agricultural practice would of itself afford matter for many articles. We purpose on a future occasion to advert to some of them.

### THE POSSIBILITY OF PLOUGHING BY STEAM.

Have our readers ever dwelt with delight on those chapters of our industrial history which relate the sudden advent of great inventions? How in a time of exigency and privation, when the old methods of labour are ceasing to be remunerative; when mouths multiply apace, while bread becomes scarcer than ever—distress crying in the streets, dismay invading the households of the rich—in the midst of threatened ruin, or perchance the riotous uprising of a starving populace, a new means of deliverance appears, and a nation hails with rejoicing a Watt with his steam-engine, or an Arkwright with his cotton machinery? While the multitude in their emergency have been vainly denouncing fancied wrongs, or imperilling the public safety by proposing organic social changes, thoughtful men in their studious solitude have discovered and elaborated some new mechanical ideas which in their instant application cheapen the processes of manufacture, enable the products of toil to compete successfully in the world's market, and provide the means of subsistence for famishing thousands.

A similar chapter, we trust, is about to be prepared for the historian's recording pen by the introduction of steam tillage into our fields. Our national prospect is o'erclouded with anxiety. With a protracted dearth of provisions, we may look for growing discontent on the part of consumers, and the raising of a strong demand for "the most the land will yield"; and as anticipating this call, we find that landowners, and agents, and tenant far-

mers are urging the momentous importance of improving estates, investing capital in the form of better husbandry, and, if need be, altering any laws which debar willing owners from amending their property. Then if war prices tumble, and a low scale should follow, what is to prevent a renewed period of agricultural pressure and poverty? "Necessity is the mother of invention"; and we cannot but believe that, in the face of difficulty, an original and vigorous mind will be found to shape out for us some marvel of mechanical ingenuity, or it may be a chemical philosopher's stone, which shall aid us by renovating our modes of cultivation, or by restoring fertility with hitherto unparalleled cheapness and efficacy. So pressing does the question of steam culture appear, that if the demands of business, the necessity for informing the world of all farming news, of fairs and markets, of a thousand agricultural requirements, permitted such a course, we would gladly devote every available column to discussion and teaching upon the subject.

What amount of probability justifies the expectation of a speedy solution of the present difficulty and delay? May we look for an efficient steam cultivator within this or the coming year? Well, as some inducement to inventors, there stands the *five hundred pounds prize*; and looking to the past, we find that a handsome pecuniary recompense has before now incited to a triumph in mechanical art. In 1765, John Harrison obtained the £20,000 offered by the British Parliament for a chrono-

meter that would determine the longitude at sea within one-half of a degree. But this enormous premium was not claimed at once; fifty-one years elapsed between the time of the offer and that of the final award. And, again, the successful mechanist was a man of humble origin, but great genius, who had devoted a long and laborious life to the construction of clocks and watches for navigation. Somewhat similar conditions are fulfilled in the case of the great desideratum of the present age. Ample inducement to the contrivance of machinery for cultivating by steam or other motive power has long been held out to the consideration of inventors, consisting not merely in the premium offered, but in the public expectation and the agricultural need which, alive through many bygone years, have openly and strongly manifested their presence in our seasons both of scarce food and rural despondency. And many heads and hands have been engaged in the task of producing such machinery; for in searching through the list of myriad patents for engines, looms, and every possible variety of tools and processes in industry, art, and science, we find an astonishing number of inventions connected with this comparatively unthought-of object. At this moment some genius may be busy in developing a plan of tillage that will hereafter revolutionize existing practice, and, like James Watt, may be recording in a diary, or "self-acting biography," how he has had "another touch" with the cultivator, and how he has decided that the flexible pneumatic tube, or the flying hemp rope, is "the thing."

Should our words reach any perplexed or painstaking seeker after a really efficient and economical digger, or a steam-driven ploughshare, able to match the neatly-executed work of a team and clever labourer, while it outstrips them in the quantity of ground turned over, we bid him be of good heart, for he shall not toil and struggle without reward, or spend a life fruitlessly in overmastering a succession of disappointments; provided his idea is the true one, a way is prepared for its success. Like another Palissy, he may not be put to the extremity of burning his household furniture, nay the very roof timber itself, in order to complete his experiments; but if, like the renowned potter, he has learned from nature, has discovered the right principle as a foundation, and is striving only with the difficulties of detail in application, a similar trial

awaits him, and a prosperous issue will crown his hard endeavours.

"Steam ploughing!" you hear engineers continually say—"nothing easier in the world: we can readily perform the operation, but not hitherto at a sufficiently low expense." But herein lies the common mistake: to drag ploughs by steam power is a most difficult task—that is, making work that a farmer would tolerate, and of which a labourer need not be ashamed. Nothing easier than to imitate, in the workshop, the action of cutting and turning a furrow, when your model can slide along perfectly even grooves, and may be turned for another bout by the finger and thumb; but step into the field, and if a novice at the ploughtail, you will no more be able to guide the implement against the resultant forces arising from varying qualities of soil, inequalities of surface, irregularities of the moving power, and a hundred ever-changing influences, great and little, than a landsman well versed in the theory of the rudder can steer a vessel in still water, and keep her head to the beacon. Our schemers all fail in attempting to fix ploughs rigidly in a frame, forgetting that the motion of this frame derived from the rolling of its carriage-wheels over a rugged surface is incompatible with the smooth, even cut with which the shares must swim through the soil. And, indeed, so long has the plough been used and meditated on, and altered and adapted, and transformed from wood into iron, and been born in different climes and localities in as many different shapes as occurred in the transmigrations of Indur, and all in connection with and in reference to the living power that has drawn it—that the man must have a clear understanding, and no lack of courage, who undertakes to furnish a substitute for the implement, or merely to fulfil the office of the team. To expose the shortcomings of an existing institution may require a searching analytical power of mind: to construct a better, demands a genius able by itself to produce a new idea superior to the one which has been developed and unremittingly improved upon by every generation of mankind.

Still we say, "Courage!" If defects are found in our present ploughs, endeavour to improve them; if the principle on which the plough operates shall be proved essentially wrong, let us explore our brains for a better; and if mechanical obstacles alone interfere, battle manfully, assured that our fellow-men are eager to reward our success.

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## THE GRADUAL EXTENSION OF ENGLISH TENANT RIGHT.

It is a source of some satisfaction to commence the new year as strong as ever in the advocacy of a principle with which we have been long and especially identified. That Tenant Right flag the *Mark Lane Express* hoisted as its own colours has turned out no such mistake after all. Cautious gentlemen who thought we might have been going a little too far have long since ceased to upbraid. Supercilious critics, who really could not understand what it was that we wanted, have gradually become more enlightened. Hereditary sticklers

for the rights of property have been brought to see that the matter may have two sides to it, and that no one should claim more than what is justly his own. The term is peculiarly significant. Tenant Right implies nothing more nor less than the tenant's right to his own.

And yet this very title, from a combination of circumstances, we are told, is not altogether a happy one. We are quite willing to allow that the very name may have deterred many from giving to it that consideration the subject deserves. Looking only

to the sister kingdom, some even yet may associate with the claim little beyond unreasonable demand and interminable litigation. Human nature is too prone to think and remember only the worst. Still any evil which the agitation of the Tenant Right question may have caused in Ireland will be long forgotten before we have realized half the good which the English right must and will effect here. It is for this alone that we are answerable—that Tenant Right of which Lincolnshire is the example, and Mr. Pusey was the champion.

For some time past this has been a topic comparatively but little discussed. The less sanguine or more indifferent, indeed, might have fancied it to have died out. Never could there have been a more mistaken notion. Never, perhaps, has a question, less forced, made greater way. The object, in a word, had only to be properly understood to be approved. It was, fortunately, to use a pet term of the day, well *ventilated* at the outset, and it has been increasing in influence ever since. It is true the Legislature refused its sanction to the measure, but even the drawing up and printing of that very Bill did much for the principle involved in it. We are glad to testify to the good sense of the country. Landlords and their agents, who, from prejudice or some indefinite terror, ignored the very name, have long since introduced compensation clauses into their agreements. The resolution arrived at by the London Farmers' Club, at their December meeting, was something of a commentary on the past, as well as a proviso for the future. "A contract having landlord and tenant's interest at the termination *fairly secured*" is simply a tenant-right agreement; and we could have instanced more than one improving man in that room who has already done wonders by the general adoption of such a system. It is a good sign when the agent of an estate can *print* off copies of the terms on which he is willing to let it out. How all this does away with the mysterious technicalities and crabbed characters of the lawyer's office—that multitude of folios which few could read and fewer still could understand! We are fining down the Sybil's volumes to common-sense and simple justice. It will be a great day for landlord and tenant when agreements generally are drawn no longer from musty precedent, but based, as they should be, on the spirit of the age, and the requirements of the art.

Though seldom directly referred to, it is remarkable how the tenant-right principle pervaded the whole of this discussion at the Farmers' Club. The proper management of estates, in fact, would seem in a great degree to depend upon its recognition. In the very opening of his paper we find Mr. Baker impressing it thus: "So long as landlords refuse to give their tenants a security for their invested capital and skill, it can hardly be expected that any permanent and progressive improvement of the estates of this kingdom will follow." And, further on, "No prudent tenant would risk a large amount of capital without some description of written document to secure him against loss by the landlord suddenly ending his occupation."—"Liberal covenants will be certain to secure improving tenants."—"It too frequently happens

that the tenant not only ceases to improve his occupation during the last four or five years of his tenancy, but actually exhausts the improvements he but previously made"—and so on. "South, and south-west," says Mr. Walton, confining himself to the districts he was best acquainted with, "cultivation is in a very bad state; the principal cause of this being want of security." Mr. Jackson spoke even more strongly, giving, as we understood him, a tenant-right agreement the preference to a lease. Mr. Bone, on the other hand, though convinced that "a good tenantry could not be obtained without adequate security for the investment of capital," fearing a legal enactment of tenant-right was impracticable, would arrive at it by means of a lease, or an agreement for its observance between landlord and tenant themselves. In the consideration of a subject not especially addressed, be it remembered, to the hiring and letting of land, we repeat it is remarkable how thoroughly the advocacy of this principle extends over the whole discussion.

It is not, however, the Farmers' Club, or farmers only, who still publicly proclaim the justice and advantage of the English tenant-right. We are glad to say there are landlords who continue to think with the late Mr. Pusey on this subject; that these, too, have authority as agriculturists, and some of them moreover their places in Parliament. Amongst these, few of late years have evinced a more active interest in the cause of agriculture than Mr. Ker Seymer, the member for Dorsetshire. He has shown in a variety of ways that his desire is to see the art really advance and improve; and it was thus he spoke a few days since to a meeting of agriculturists in his own county:—

"I am anxious to explain a vote which I made this year in the House of Commons. You are aware I have always professed myself an advocate for liberal arrangements between landlord and tenant. In spite of that, I felt it my duty to oppose a measure called the Tenant-Right Bill, which was brought in more with reference to Ireland than this country—though if it had been good for Ireland it ought to have been extended to England. I have no hesitation in saying that the principles of this bill were entirely destructive of the rights of property; and I will tell you why. First of all you know that Irish tenants have not been exactly what we should call good tenants, and perhaps the landlords have not been quite what we should term good landlords; and I am not prepared to say that in former days the tenants were not as good as the landlords deserved, for a bad landlord does not deserve a good tenant. Bearing in mind the character of the tenants, let me tell you what was the provision of this bill. It was, if a tenant was removed for any reason from his farm, that he should be entitled to compensation to the amount of four entire years' rent for so-called improvements, about which his landlord had never had an opportunity of saying he wished to have them or not. I have no hesitation in saying that such a principle as that is entirely inconsistent with the rights of property, and would not be tolerated for one moment; therefore I opposed it, and I always shall oppose it."

Here we see that invasion of the rights of property, and tendency to fixity of tenure, which people who do not know what they are talking about will even yet confuse with the English claim. Let such follow Mr. Seymer a little further :—" I did support a bill which was, unfortunately, called a Tenant-Right Bill. I say unfortunately, because when we hear of such things as the Tenant-Right Bill for Ireland, the name gets much prejudiced. The bill to which I now allude was for the purpose of enabling landlords and tenants to make mutual arrangements for giving security for any unexhausted improvements, that security to be extended beyond the life of the owner of the land ; that is, supposing a person held an entailed estate, and wished to make arrangements with regard to permanent improvements, he might afford compensation to the tenant. This bill was intended to enable him to do so, but he cannot as the law now stands. It appears to me that tenants should be entitled to remuneration for unexhausted improvement. That, I think, is a sound principle, and I regret that the bill did not pass. It was introduced by as good a friend to agriculture as ever lived. It was brought forward by Mr. Pusey, and it died with him ;

still I hope it will be brought forward again ; if so, it shall always receive my cordial support. I know the land is very well farmed without it ; but still, if the tenant has capital, and is disposed to lay it out in something beyond ordinarily good cultivation of the land, and that the landlord has a right to expect, every facility should be afforded him to enable him to do so ; and, although I would not say one word to destroy the confidence that happily exists between landlord and tenant, still I must say, speaking for myself, if I were a tenant—knowing that life is uncertain, and that properties change hands—I would not go to a great outlay beyond good cultivation, unless I had security that my family should receive the benefit of that outlay."

We can add nothing to this beyond our hearty concurrence with every word of it. It was a sound principle, introduced by as good a friend to agriculture as ever lived. We hope, with Mr. Seymer, it will be brought forward again. Could it be in better hands than his own ? And if it is brought forward, we trust to test by it, far more closely than ever yet has been, who are the supporters of " sound principles," and " the good friends to agriculture."

### THE YOUNG WHEAT PLANT.

Although resting with the happy circles around our Christmas fire, we can hardly fail to sometimes recur to our fields : to-day hard frozen ; yesterday soaking in rain-water ; to-morrow, perhaps, covered with snow. Amid all these rapid changes we think, too, of the young wheat plants : what is their condition ?—do they vegetate ?—or is all nature torpid ? The agriculturist well knows that, even when deeply covered with a mantle of snow, his young wheats still vegetate—still " work," and extend their roots in search of nutriment. It would perhaps be well if we thought oftener of these phenomena, and noted a little more carefully the movements, not only of the stems of our cultivated plants, but those of their *roots* ; if we now and then considered *why* these extend in a certain direction in preference to others, and what induces certain movements of those roots—extensions always so interesting, and yet commonly so inexplicable. Their search after food—the power which they possess of resisting considerable extremes of heat and cold, are facts as yet only explained in our present state of knowledge by using certain mystic phrases as an explanation of the mysteries of vegetation.

When the farmer says that his young wheat " works" under the surface of the frozen soil, he explains to us quite as much as when the botanist informs us more solemnly that it is in consequence of " a specific vitality," and that it is this which enables the young wheat plant to vegetate in a temperature in which the barley plant perishes. In this case the observant farmer tells us the fact, without attempting to explain it ; the botanist favours us with what he has really persuaded himself is an explanation of the fact, and does not wake up in

time to see that he has merely succeeded in stating in eight syllables what our more practical friend accomplished in one. The wheat grower knows it " works," and that of the cause of this he knows very little ; but our scientific friend is not satisfied with this way of observing, without theorizing : he steps in, and says, " It is specific vitality ;" though he very truly adds, " What specific vitality is, I do not know." But when we see the folly of such modes of reasoning, we shall fall into another error, if we conclude that we have realized the utmost amount of knowledge that can be attained by watching Nature's operations. The phenomenon to which we have been alluding, the extension of roots, is one full of practical interest, and yet we know little more than what every ploughman has long remarked. The extension of the roots of the growing plant in certain directions—the tenacity with which those of the turnip encircle a fragment of decomposing bone—the depth to which the wheat, the lucerne, and some other commonly-cultivated plants extend theirs—and the particular directions in which the roots of most plants extend, for the sake of a copious supply of food—seem to indicate a something more than mechanical to belong to the plant.

That all vegetables absorb their food in a fluid state, is a truth pretty nearly established ; but in what way this is accomplished, we do not always so clearly understand. How the phosphate of lime and other insoluble substances are absorbed, we do not know, nor have any researches been instituted to dispel our ignorance. It has, however, been shown that plants possess the power of making a selection of the substances presented to them in solution, and this power, to us so remarkable,

might most probably be examined with very useful results. The experiments of M. Saussure, made nearly half a century since, are of this class. He dissolved together in water various salts in equal proportions, so that each salt was equal to 1 per cent. of the weight of the water, and then placed in these solutions growing plants, with their roots, and others with their roots cut off. When they were deprived of their roots, the plants absorbed indiscriminately all the salts dissolved in the water; but when their roots were carefully preserved, then the plants separated the water from the salts dissolved in it, in a very remarkable manner, and this not in uniform proportions; for when nitrate of lime and muriate of ammonia were present together, the plant absorbed 16.5 per cent. of the salt of ammonia,

but only 4.5 of that of lime; and when glauber salt, common salt, and acetate of lime were all dissolved together, the plant absorbed 6 per cent. of the glauber salt, 10 per cent. of the common salt, but not any of the acetate of lime; and when gum and sugar were dissolved together, instead of the salts, then the plant absorbed 26 per cent. of the gum, but 34 per cent. of the sugar. The preference which the plants evinced for the muriate of ammonia in these trials is noticeable; and such trials, we think, if repeated and extended, might throw some light on several questions very interesting to our readers; and this opinion is confirmed when we reflect that the enlarged application of manures to the soil in a liquid state will, in all probability, long engage the attention of the agricultural world.

### THE ECONOMICAL FEEDING OF STOCK.

At the meeting of the Grimshoe hundredth Agricultural Root Club the following interesting discussion took place.

Mr. PHILLIPS said, there was no doubt that the question of the economical feeding of stock was one of the most interesting and important which could occupy their attention as farmers; and it was no wonder to him that their attention was now beginning to be roused to that subject, but rather that this question should not have forced itself upon their consideration before. His idea was that there was great waste committed in the feeding of animals by giving them at one time more highly nutritious food than they could properly assimilate to themselves; it hence passed through them in waste; and his remedy was to add largely to that nutritious food other more bulky and less nutritious substances, which while it filled their bellies, which it was essential to do, would not throw into the system more nourishment than it was capable of assimilating. Thus in feeding farm horses whose work was slow, instead of giving them a feed of unmixed oats, he gave them their oats reduced (so to speak) with a large portion of steamed straw chaff; and even for the oats, or at least a large part of them, a portion of roots, either carrots or Swede turnips, minced with his patent mincing machine, might be substituted in mixture, with the steamed straw chaff; so that instead of giving working horses what in this district was the usual allowance, namely, two bushels of oats per week, weighing about 35 lbs. per bushel, he only gave them half that quantity, and sometimes even less. He held it to be important also, in the feeding of horses, to crush their oats. He was satisfied there was a great saving effected by so doing. It was also an excellent method in the feeding of horses, where it could be obtained, to feed them largely with gorse or furze, crushed; they were exceedingly fond of it, and did extremely well upon it; and in the feeding of neat stock he carried on the same system. He never gave them highly nutritious food unmixed with food that was less nutritious; whether therefore he gave them linseed-cake, or even roots, he always mixed them with a large portion of minced straw chaff, steamed, which they ate with avidity. The quantity of highly nutritious food thus went fully as far again, and though the animal did not perhaps graze altogether so fast, yet they had the agreeable conviction that there was no waste committed. The same applied to the feeding of sheep, whether fattening or otherwise; let their roots be reduced to a fine state by mincing, and mixed, in their troughs, with a portion of steamed straw chaff. It was

an excellent plan also, in the feeding of sheep (indeed, he did so with all sorts of stock, and even horses), to let a lump of rock-salt remain in their troughs or mangers. But as to sheep (he meant fattening sheep especially) he thought it highly important to furnish them with shelter, even while they were grazing on the open breaks. For this purpose he had portable houses as lightly made as possible, consistent with a proper degree of strength, ten and a-half feet long and five feet wide, open on one side, and closed at the back and the two ends. These he spread about the fold, and the sheep, after they had filled themselves, retired to them for warmth and shelter. Thus a great portion of the food, which would otherwise have been expended in keeping up the animal heat, became converted into nutriment, and was, consequently, so much food saved. In feeding of pigs, too, he resorted to the same expedients. He never gave them meal unmixed with bran or pollard; and he also most frequently gave them steamed roots in addition; and thus in feeding pigs for the London markets, for which purpose pigs from 40 to 50 lbs. were amply large enough, of which he fed a large quantity, he hardly gave them any corn at all. Parsnips, by the bye, were excellent roots for fattening pigs.

H. B. CALDWELL, Esq. (the Chairman), said he would offer a few observations upon what had fallen from Mr. Phillips, on the subject of feeding stock. And first, as to feeding of horses with gorse. He did not deny that gorse was an excellent food for horses, indeed he was one of the first in this part of the country to bring it into notice; and he believed that one of the first machines that was got up for the crushing of gorse, which went under the name of "White's Patent," was of his suggesting, and might properly be called his machine. But his grand objection to gorse lay in this: That in parts of the country exposed to the ravages of game, and to browsing by sheep, it required to be fenced off, which was an expensive proceeding; and again, in times of deep snow, it was apt to be covered up; and thus, when you were depending upon it for a supply of daily food, you were apt to be disappointed. The same objections in part lay against growing a crop of carrots. Hares were so inordinately fond of them that it was almost impossible to preserve them from their ravages. Besides, in point of fact, he believed a crop of swedes to be equally as good—at the same time that they might be grown with half the trouble and expense, and would keep equally as long. And so with regard to the housing of grazing sheep,

there existed this objection, that, by so doing, they were liable to get their teathe laid unequally upon the land, and thus found their barley crop growing in some places so long and rank as to go down, and in others so thin and poor as to amount to nothing.

Captain CALDWELL said, as far as his observation and experience went as to housing grazing sheep, he concurred with his brother (the President.) He had one piece in particular in his eye, which was a piece of old pasture, in which was an open shed. On this pasture were a number of fat sheep; and go into the piece what time of the day they might, they always found the sheep in the shed; and the dung from them had accumulated to that extent that he was obliged to have it carted out. And he had noticed the same thing, where bunting or other protection had been hung on the hurdles around a fold, that the sheep all huddled together around the sheltered part, and there was scarcely any teathe laid on any other part of the fold.

Mr. PHILLIPS said, in answer to the objections raised by the Chairman and by Captain Caldwell, that he farmed land in a district of country that he should say abounded in hares more than any other, and yet he did not find that they at all damaged the gorse cover; which indeed they were not likely to do while they could get food which they liked so much better. And then as to his objection that carrots could not be grown without fencing them off—why that would be a very small consideration to him, who had a sawing mill, working by steam power, and abundance of ordinary timber, which was of no earthly use but either to burn or to cut into rough palings. He (Mr. Phillips) had several

paled-in pieces of ten acres each, on which he grew carrots and wheat, alternately, varied with other root crops. On these pieces, which were, of course, well farmed, he could grow upwards of a thousand bushels of carrots per acre, and from eight to ten coombs of wheat. What was the expense of fencing, compared with such beneficial results as these? And then as to the objection which had been raised against housing grazing sheep—he begged to say that they did not apply at all to his system, which did not consist of a fixed building, like that alluded to by Captain Caldwell, nor yet a protected fold, like that alluded to by the President, but a number of light portable wooden boxes, or huts, dispersed equally all over the fold, and removed every day. By this system he found no accumulation of teathe at one part of the fold more than another, but it was equally diffused over all parts alike; for they must mind that, although the sheep resorted to the huts to lie down, yet their feeding troughs were spread equally all over the fold.

The CHAIRMAN said, it might be as Mr. Phillips said, that fencing to him was not of that serious import that it might be to others; but still he thought he might find more profitable use for his saw mill, and for his rough timber, than sawing fencing stuff, by employing them in the construction of covered yards for cattle, to the great benefit of his tenants, and he had no doubt his own too; for whenever he had his farms to let again, they would of course bring more rent with these conveniences upon them than without them. The Chairman explained that his tenant, Mr. Brassnet, for whom he had built a covered cattle yard, had said that he considered his farm worth £50 a year more with it than without it.

## THE NEW YEAR.

Farmers, as a body, have commenced the NEW YEAR with prospects more than ordinarily promising. This is equally true whether viewed in an agricultural or political sense, no previous period of history, perhaps, furnishing proof so self-evident of progress.

In giving a condensed notice of the present position and prospects of British agriculture for the current year, we have first to observe that Science and Practice were never in a more healthy and prospering state in the memory of the oldest farmer now in the field. The truth of this is evident from the fact that prejudice and opinative speculations are disappearing before the progress of scientific and experimental inquiry, in a manner unprecedented. In other words, those antiquated habits and customs, which have hitherto so conspicuously characterised our respective provinces from one another, are fast being superseded by modern improvements. Individually, no doubt, much has yet to be done before uniformity of practice is attained in accordance with the demands of soil and climate; but when once principle is fairly espoused, the victory must be considered as half won.

Adverting more to detail, draining, and all those improvements the more immediate province of the landlord, are being slowly carried out, in spite of the political obstacles, all but insurmountable, in the way, as subsequently noticed. Much diversity of opinion no doubt still exists as to opposing systems; but experience is daily cementing divisions of this kind together, giving to public discussions and practices a more scientific and profitable character.

The various operations of the farm, the special department of the farmer, are also being more success-

fully performed than they ever have been, and consequently must produce corresponding results. The increased amount of improved machinery being brought to bear upon the cultivation of the soil, and the harvesting and thrashing of its produce throughout the length and breadth of the land, may be stated in evidence of this; and were tenants' capital unshackled, as afterwards shown, the productive resources of the country would respond still more abundantly to the increasing demands of its consumption.

Steam culture, again, is exciting a livelier interest than it did last year. In 1855, the premium offered by the Royal Agricultural Society on this head was £200, while this year it is £500, thus giving a difference which may be taken as a fair index of the progress of this subject in public estimation. Considerable advance has unquestionably, no doubt, yet to be effected before success can be declared in the field; but the praiseworthy efforts now being made, may be taken as a safe guarantee that no stone will be left unturned to obtain the desideratum at issue.

In the rearing and fattening of live stock, with the manufacture and application of manure, like favourable testimony must be given. A deficient hay crop is no doubt experienced; but this may be accompanied with more than a counter-equivalent, by the additional knowledge acquired of the real value of straw as food for cattle—generally, we aver, under-estimated, especially in our southern provinces.

In a political sense, the position and prospects of the Landed Interest are highly satisfactory; rents not only being well paid, but rising; while the circumstances of tenants correspond. In a few exceptional cases an

undue advantage may be taken of the present level of high prices, in letting and renting farms; parties forgetting that the corn supplies of the country are in a very unsettled state, owing to the war with Russia and our previously too great dependence upon that empire for bread stuffs; but our commercial situation in this respect may soon be established on a surer foundation, an ample supply being obtained from other quarters of the globe, so as to render us entirely independent of the revolutionary state of the shores of the Baltic and Black Seas.

But the more important question (important because national) which the war with Russia has already raised, is the necessity for liberating land, without delay, from the bondage of antiquated statutes—statutes which cripple both landlord and tenant, thus preventing the agricultural resources of the country, already mentioned, from supplying its own wants. Every one experimentally acquainted with the permanent improvement of land and high farming must be perfectly aware that were the proper security for capital thus invested given by the law, an increase of produce could easily be obtained from the British soil far greater than our present imports. Now, with such facts before us, on the one hand—a fair average price being paid for bread; and the immense drain of bullion from our shores on the other, with extravagant prices at home, must not every political journal in the kingdom acknowledge the justness of the imperative claims which farmers as a body have upon Parliament for the immediate attainment of the important question at issue—ample security for capital invested in land?

War, however, is not the only schoolmaster now abroad; the more artificial position of agriculture, from the progress made in chemistry and mechanics, having also proved the necessity for a thorough revisal of the law of land so as to adapt it to the improvements of

modern times. The year 1856 has brought the landlord and tenant to a stage in the march of progress which must compel them to take a new view of things; and that view obviously involves a more independent principle of action, each putting his shoulder faithfully to his own end of the yoke.

Nor can the labouring man any longer remain an exception from this rule of independent though conjunct action, the progress of things now demanding that he also bear his own burden upon his own shoulder. It is an old saying, that "The honest labourer's loaf is sweeter than the beggar's"; and the maxim thus expressed must be faithfully extended throughout the whole industrial fabric of rural society. To distribute gratuitously food, fuel, and clothing to a ragged and half-starved population at Christmas and other times is doubtless charity in the common acceptance of the word; so that to condemn the practice as the contrary, might sound harsh in the ears of those who have not yet divested their minds of feudal usages and that mendicant subserviency which characterized the alms-giving times of our forefathers in the palmy days of popery. But those practically acquainted with the successful management of this class can verify, from fact, that the fewer gratuities you give them so much the better; provided you teach and make them to purchase honestly with their labour—that comparative independence, which they invariably prize so highly. To screw out of the poor man more than your own at one time, and to return it again at another in the shape of a *donum*, is neither sound doctrine nor consistent practice. The fact is, we have now arrived at a period in the history of British agriculture which will compel landlords and tenants to cultivate the independence of their labourers mutually with that of their own, giving them an interest in the soil and its produce, according to the amount and quality of labour they annually expend.

## THE DUKE OF NORTHUMBERLAND AND HIS TENANTRY.

It is amongst the surest signs of an advancing age that class interests are gradually coming less and less into collision. The argument of knocking one man down to enable another to rise is happily obsolete. It is now by no means necessary that the worker in cotton should be the deadly enemy of the grower of corn. The true spirit of commercial life is becoming better appreciated, as we find the most promising plan for all doing well, is for all to deal on fair terms with each other. We may thus unite to amend any wrong, or the better establish any improvement that may be desirable. On the other hand, so long as our own progress was to be fought step by step against somebody else, we could make but little way. The real advance of a nation can only come of a strong pull altogether.

If this good feeling be necessary for the prosperity of a whole population, how much more so must it be for the welfare of the several sections in any one class of them! We map out our people, in the first instance, into so many distinct states—the manufacturing interest, the agricultural interest, the commercial interest, and so on; while these, again, we subdivide according to the means by which such different estates may be maintained. Still, the perfection of any one must mainly depend

upon the unity with which it is worked by its own members. It is, in fact, but again that clock-like movement, in the which, let one wheel only go wrong, and the whole will soon be out of order.

In any such identity of interest nowhere does this suggest it so forcibly as in the art of agriculture. It is the very key-stone of the whole building. Landlord, tenant, and labourer are inseparably bound up with each other. If one does well, they all, at least to some degree, must share in his good fortune. In hard times, on the contrary, each will be a sufferer. The argument is not merely too old and well known to be here elaborated, but has grown into something of a registered answer to every inquiry or objection. If the man of business, or the man of law, urge on us that the hiring and letting of land is hardly conducted in that business-like manner it should be, they will be often assured that landlord and tenant understand one another too well to require anything more. If a farmer is laying out more capital than his terms justify, he and his landlord understand one another too well to fear anything amiss. Landowners make it the great pride of their speeches; occupiers the great prop of their fortunes. Let other people say what they like, *they* understand each other too well to be so

fettered; and the more they trust to this good understanding, the better will they go on.

Be it so! Prudence might, perhaps, advise something more; but let it go. Landlord and tenant will be the last to injure or fetter each other, as to wound that fine feeling they are so mutually jealous of. We may best illustrate this by an example. In the northern part of the kingdom dwells a nobleman of great estate and high character. It may be sufficient to say that those who live under him are worthy of him. Had we been asked to name a landlord and his people, who, from the terms on which they lived, and the manner in which they discharged their different duties, were a credit to each other, we might well have instanced the Duke of Northumberland and his tenantry. His Grace has long shown a strong interest in the proper cultivation of his property—has given all the support in his power to the agricultural associations of the neighbourhood; while he has gone something beyond this in the due encouragement of those with whom he is more immediately connected. It was only this last summer, indeed, that the Duke offered a premium of thirty pounds for the best-cultivated farm of the district. The judges, after their round of inspection, unhesitatingly awarded this to Mr. William Wetherell, of Kirkbridge. It must have been satisfactory to all to know that the donor of this prize himself heartily concurred in the decision arrived at. He did so in the following grateful terms, which we can fancy the recipient of them cherishing far more carefully than even the memento on which he might have spent his thirty pounds:—“It gives me much pleasure,” writes the Duke, “to send you the amount which the judges have awarded to you for the best-managed farm near Stanwick, and this pleasure is much increased *by a knowledge that there never was a prize more justly awarded, nor a farm in a higher state of cultivation, than yours at Kirkbridge.*”

A well-merited compliment, well paid. Happy landlord in such a tenant; and, again, happy tenant in such a landlord! How well they appreciate each other! Don't talk, after this, of your business contracts and bindings down, when men can work on with such an understanding as this between them: “I can show you some of the best farmed land in the world,” the Duke of Northumberland might say, with a proper pride, to his friends: “my tenant does it admirably.” “And what do you mean to do with him now,” might remark these friends in turn, in a conventional, common-sense way; “leave him alone to do as he has done, no doubt?” “Not I,” answers the Duke. “Not I,” thunders the Agent. The common-sense friends feel they must have been saying something very absurd, and say no more; while the Duke and his adviser set their wits to work to alter what has led to so prosperous a condition. “A man cannot do better than best; can he?” meekly enquires somebody or other. “But *he can*, sir”—and how he can do so we must let our readers gather from an advertisement sent us a fortnight since by a body of the leading Yorkshire and North Country farmers. The object of this is another testimonial to

Mr. Wetherell—the reason, his being about to leave “the-best managed farm near Stanwick.”

Few of our readers will require to be told why, as few, but have gone through that correspondence with pain and regret. Picture the return to a man, who has been told by his landlord that no one could farm better, in the arbitrary enforcement of new conditions that could but impede and de-grade him! Let us consider, too, the spirit in which the tenant met these ill-considered proposals. Seldom, we say advisedly, has a better letter ever been written than that by Mr. William Wetherell to his landlord, the Duke of Northumberland. We give it again in an adjoining column, no longer as an advertisement, so that none may lose the opportunity of seeing it. There is no affectation of the martyr, barely a reference to that distinction his landlord has himself allowed, but a singularly temperate, logical, and feeling appeal against the feudal conditions attempted to be forced upon him. Nothing can be possibly better than Mr. Wetherell's conduct in this matter: the Yorkshire farmers may tell us what might possibly be worse.

We confess we have referred to this subject with reluctance, feeling as we do how unprofitable it must be now to place landlord and tenant in antagonism with each other. We are not amongst those who name the one only as “tyrannical landlords,” and the other as “tenant serfs.” We would, however, warn the landed gentry of this kingdom that a case like this is certain to be made the most of, while it will be very long before it is forgotten. We have outlived the age when an act like this could be passed over with indifference. No explanation has yet been offered for it either by the Duke or his advisers. Should, however, any be yet thought desirable, we can only say we shall be too happy to give as prominent a place to it in our columns as we have to that which has led to these reflections.

And, then, the moral effect alas! of a premium from the landlord for the best-cultivated farm. Imagine the unhappy tenant thus distinguished, sitting, like another Damocles, with all his honours thick upon him, and waiting only for the sword to fall. “Yes,” he cogitates, “I am the best farmer on the estate, that's settled. I wonder what they will do with me? Raise my rent, turn me out, or send me into bondage?”

When, next year, the judges report the tenant who has best done his duty by the estates of his Grace the Duke of Northumberland, and when his Grace in a particularly civil letter confirms this from his own experience, what, in the excess of his joy, will the happy man do with himself? Go to Australia, or seriously think of some other pursuit?

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MR. WETHERELL'S CASE.—It is just possible that in these days of high prices, when rents in some parts of the country are being doubled, his Grace may experience less difficulty than is supposed in finding farmers who will comply with the terms which are driving his present tenantry into rebellion; but with such strong proofs before him of their unreasonableness, he will probably, on reconsideration, be induced to give way. High-farming, up to a certain point, is shown to be a

very profitable system, worthy of all encouragement; but compulsory high-farming, under a heavy series of cumulative fines, does not recommend itself to common sense, and will, we trust, not be insisted upon by the Duke of Northumberland.—*Carlisle Journal*.

### MR. WETHERELL'S CASE.

LETTER FROM MR. WETHERELL TO HIS GRACE THE DUKE OF NORTHUMBERLAND.

*Kirkbridge, Oct. 19th, 1855.*

MY LORD DUKE,—In sending this communication to your Grace, I feel that I must ask for much indulgence. I am aware how unpleasant it is for a landlord to give his personal consideration to matters left generally to the Agent; but your Grace has hitherto shown me so much condescension that I now earnestly hope for a kind consideration of my letter. I am also the more emboldened in making this appeal to your Grace from the sincere conviction that during the whole time I have had the honour of being tenant to your Grace, I have expended all the skill and capital I could command in the cultivation and improvement of my farm, which I could no longer continue to do under the agreement which Mr. Moore has submitted to me, and for refusing to sign which I am now discharged from my farm. This agreement is so loaded with penalties, and in my case so impracticable, that I am sure if your Grace fairly considers my objections to it you will not blame me for not having signed it. I will now state to your Grace the objectionable clauses, and why I consider them so.

By the 3rd clause I am to lay on twenty tons of manure on each acre of turnip land, and by clause 8, twelve tons on each acre of meadow. I have calculated that this would require me to produce from my farm 1,160 tons of good rotten manure yearly. I can assure your Grace that my farm could not produce one-half this quantity, even adding to it the oil-cake, guano, bones, linseed, horses' corn, straw, lime, &c., which have cost me, on an average, £300 yearly; hence I should forfeit a penalty of £350 each year, simply for not performing an impossibility. I entreat your Grace to allow the 6th clause, which requires all the manure produced to be expended on the farm, to stand in lieu of the 3rd and 8th, which are really impracticable in my case. With reference to the 5th clause, which forbids me growing any turnip seed, I trust when your Grace considers my large outlay in manures, and the importance of having good seed from roots which have hitherto produced such successful crops, that your Grace will accord me this privilege, which I can assure your Grace is one of great moment to me. What is obtained from the seedsman is never to be relied on, and I have pride in saying that I think I can produce a quality from my own roots which no one can excel.

Your Grace will see that the 6th clause gives all manure after the 1st October in the last year to the incoming tenant. By this clause I should be deprived of manure for my away-going crops, as it must be bred from the produce of the harvest, which at that time is but just completed. I beg of your Grace to allow the custom of the country to prevail in this matter, which fixes the 1st February, and not the 1st October. I think also in the 10th clause the incoming tenant should pay for the labour as well as the seed. This, I humbly submit to your Grace, is not only sanctioned by custom, but is based upon the fairest principle of justice, inasmuch as the incoming tenant reaps all the advantage. The 11th clause requires the tenant to uphold and keep in repair all buildings, and so leave them at the end of his term, but does not expect damages arising from fire or tempest or inevitable accident.

So that a tenant, in any such event, would have to rebuild what might be destroyed, even to the extent of the entire farmstead. I beg your Grace to allow this almost invariable exception to be included in that clause, on the ground of its being simply an act of justice to the tenant to do so.

The 23rd and 24th clauses provide for a valuation of the away-going crops immediately preceding harvest, giving power to the landlord's agent to settle the amount of the valuation, if two arbitrators do not agree, and requiring the amount to be paid into the hands of the Agent, who has power to deduct from the amount whatever he thinks fit for breaches of the agreement. The powers here given to the Agent, I very respectfully submit to your Grace, place the tenant entirely at his mercy, and might result in very great injustice to him. I beg to urge on your Grace that the usual arbitration clause should be adopted, which leaves the arbitrators to choose their own umpire, and allows the tenant outgoing to receive his own money.

I have now given your Grace, as shortly as I could, my objections to the agreement, and entreat your kind consideration of them. I am extremely reluctant to give your Grace this trouble, and have the most anxious desire not to cause your Grace the slightest annoyance; but as Mr. Moore explained that he could allow no modification of the clauses, I am compelled to make my humble suit to your Grace in person. I await with great anxiety your Grace's decision, and do most earnestly hope that my connection with the Stanwick Estate may not cease, and that I and my son may long continue under your Grace to set the example we have always honestly striven to do, of farming up to the highest state of improvement which our skill and capital can attain to.

With every apology for thus addressing you, and with the greatest gratitude and respect for your Grace's uniform urbanity and kindness,

I have the honour to remain, my Lord Duke,

Your Grace's most obedient humble servant,

WILLIAM WETHERELL.

LETTER FROM MR. WETHERELL TO MR. THAIRLWALL.

*Kirkbridge, Darlington, Nov. 27, 1855.*

DEAR SIR,—I beg to acknowledge the receipt of your letter of yesterday's date, requesting to know the result of my interview with his Grace the Duke of Northumberland, respecting the agreement offered for my signature by his Grace's Agent, Mr. Moore.

Although I was most courteously received by his Grace, he nevertheless positively refused to entertain one single objection I made to the agreement, and when I offered to sign it if he would allow the words "or an equivalent" to be added to the condition binding me to lay twenty tons per acre of rotten dung on the land to be sown with turnips, and twelve tons on the land to be mown with hay, he refused to allow any alteration, and said he would make no exception in my case. I then offered to sign it if he would give me his word that I should take no harm from it, to which I got a similar answer. This interview was all the reply I got to my letter to his Grace.

I am, dear Sir, your most obedient servant,

F. THAIRLWALL, Esq.

WILLIAM WETHERELL.

LETTER FROM HIS GRACE THE DUKE OF NORTHUMBERLAND TO MR. WETHERELL.

*Alnwick Castle, 15th August, 1855.*

SIR,—It gives me much pleasure to send you the amount which the judges have awarded to you for the best managed farm near Stanwick, and this pleasure is much increased by a knowledge that there never was a prize more justly awarded, nor a farm in a higher state of cultivation than yours at Kirkbridge.

Yours, &c,

Mr. WETHERELL.

NORTHUMBERLAND.

## GREAT AGRICULTURAL SHOW IN UPPER CANADA.

NORTHUMBERLAND, NEWCASTLE DISTRICT, CANADA WEST.

The Provincial Agricultural Show changes its locality annually, after the plan of the English Agricultural Society, and has been increasing in efficiency year by year since its establishment some ten seasons ago. The present exhibition was held during the second week of October, at Cobourg, a thriving town of 2,000 or 3,000 inhabitants, about midway along the northern shore of Lake Ontario. This place has a good piered harbour, at which the lake steamers regularly call, and is connected with the interior by a railway, extending thirty miles, to Peterboro'. Good gravel roads, too, proceed from it, intersecting the surrounding country in all directions. The ground chosen for the site of the show was situate on the summit of a gentle swell, to the west of the town, and included

a space of about fourteen acres, enclosed for the occasion by a high board fence, the entrance gates, with committee rooms, offices, &c., forming the southern front. Facing you on entering, at some little distance, was the Floral Hall, a large building in the form of a cross, each arm of which extended to 75 feet in length and 40 feet in breadth, 16 feet high, and surmounted in the centre by a square tower and flag-staff, on which floated the British ensign. The four compartments of this structure were devoted severally to fruit, flowers, and vegetables, ladies' fancy work, and the arts, mechanics, manufactures, and furniture, music, and marble work. In rear of this structure were pitched three very large marquees, one for grain roots, dairy produce, &c., one for carriages, and the other

for the reception of the Governor-General. Six large refreshment booths were ranged round the exterior of the central space. The open ground towards the front or south end was occupied by implements, while the rear or north space was formed into a large circular drive, surrounding the horse ring. Enclosing all these compartments, and at a suitable distance from the pens, was an oval drive for visitors, planted on either side with evergreen trees, and sweeping round the whole ground. The pens surrounded the whole line of external fencing, beginning at the south-west corner with pigs, which, with the sheep, occupied the entire west side, about 80 pens. The north side was occupied by about 60 covered and enclosed pens, appropriated to horses and cattle which were wished to remain on the ground at night; about 60 more pens on the east side contained the remainder of the cattle, after which a long range of poultry coops completed the circuit. These pens were 12 feet square, and each was fully tenanted by 8 to 10 sheep, or 4 to 6 head of cattle. The amount of timber consumed in the buildings and enclosure was 200,000 superficial feet, and the arrangements cost from £600 to £700. The sum offered in premiums was about £2,000. About 20,000 were admitted at the gates; 10,000 of whom paid sixpence each, the remainder being members, subscribing 5s. each. Monday and Tuesday were devoted to arranging the arrivals; on Wednesday the judges were at work, and only members were admitted; Thursday and Friday were public days, the latter marked by the reception of the Governor-General and suite.

The early part of the week was threatening and rainy, but Wednesday morning, as if to favour the occasion, shone forth bright and clear. On entering the town, we encountered a continued stream of vehicles proceeding to and from the ground—hacks, cabs, carriages, buggies—we were particularly struck with the small number of lumber or farm waggons, indicating the great advance of our farming community, who now ride in comfortable carriages or buggies, generally driving a pair of horses; twenty years ago lumber waggons were the rule, buggies the exception. The crowded stream of pedestrians on either hand wore everywhere the garb of refinement and competency. We don't remember in the whole scene to have encountered one indigent-looking person or beggar; and, happier still, very little intoxication, although all kinds of refreshments were on the ground. We were not able to obtain the number of entries under the various agricultural heads, but should suppose there were about 200 of sheep, and a like number of cattle, and perhaps 80 or 100 in the various horse classes. The Durhams stood certainly in the position of the favoured class of cattle, their numbers exceeding any other, though in quality we confess ourselves to have been rather disappointed. The first prize bull, owned by Mr. J. Walton, of Smith Township, though perhaps showing equal to anything on the ground, was certainly behind what we have seen in his place on other occasions. In the class of cows too we felt disappointed; the first prize going certainly to a very pretty and well got up animal, owned by Mr. Stone, of Guelph, yet carrying the old hard Yorkshire hair and some other marks of coarseness. We had instances of the thick soft velvety hair, so characteristic of the mellow hide of our newer families of Durhams, as in the stock of Messrs. Wade and others, but we are sorry to say they were poorly got up, not in fact in a condition to show to advantage. We examined every animal carefully, to the number of 60 or 70 pure bred, and must say our favourite breed were rather in the shade. Several of these animals were recently imported from England—a bull out of the prize-taker Bellville, and three or four cows, by Messrs. Wade; seven heifers, by Mr. Miller, of Markham Township, from Dumfriesshire, the latter large animals of their age, but certainly coarse both in form and colour. The entries of Devons amounted to some 40 or 50, and among them some very handsome animals. Mr. Lock, of Yarmouth, Elgin County, seemed here to carry the day in all departments, and his herd were certainly most sweet-looking animals, distancing all competitors, in the soft rich wavy coat, and the sprightly active-looking sweep of the back, so different from the stiff line of the Durham; in thickness of shoulder too, and full barrel of the front ribs, they certainly excelled. They were originally imported from the stock of Mr. Quartley, of Molton, Devonshire. We are pleased to see the progress made in this class during the last few years, as in the absence of any really paying demand for butcher meat, the Devons, from their valuable properties as working cattle, promise to be a most valuable

stock for Canada, where so much rough work is required, to which oxen are certainly better adapted than horses. In Ayrshires there was an unusually large turn out; but many of the animals entered in this class could claim little connexion with that district but the name: something of the Crummie appearance was sufficient to refer them to the land of Burns, and their owners were perhaps influenced more by the poetic or fatherland feeling than anything else in cherishing the name. One or two of the bulls were, however, genuine importations, and some of the cows, removed in the third or fourth degree; few of them assuredly would have been drafted into the Myer Mills byres. The prizes seemed pretty equally apportioned between Mrs. Ewart, of Dundas, and Mr. Boyce, of Amherst Island. But in our old friends the Galloways there certainly could be no mistake, with a coal-black coat, thick enough to protect them against a Canadian winter, the polled head, and deep hardy-looking carcass; we never remember to have seen a better shoulder on the race: one of the calves was literally beef to the heels. There was only one lot shown. They were imported by Mr. Roddick, of Hamilton Township, from the stock of Mr. Beattie, of Newbie, Dumfries (one of the cows being sister to the bull which took Mr. Head's prize at Carlisle). Some half-bred calves were shown, in which the sire's characteristics predominate, and they promise to be a valuable acquisition, especially to the population of our winter barnyards. A few Herefords, imported from the United States, assuredly did little honour to their family. The show of grade cattle, almost entirely Durham crosses, was neither large nor very satisfactory, except in the herd of Mr. Dow, of Whitby, who showed one or two very fine cows. Unfortunately the cattle of various ages and aizes were very much mixed, and in many cases very injudiciously crowded, by each exhibitor wishing to keep his stock of all kinds as much as possible together. We must not, however, forget some fine fat steers; only about half a dozen were shown, but they were certainly more than could be desired for eating. A Canadian cow, the property of Mr. Bright, of Toronto, certainly did credit to her race; her form seemed a perfect parallelogram, with a very fine bone and offal, carrying probably from 1,000 to 1,100 lbs. of beef. We are sorry to see the society cast overboard the native breed of cattle, as they are often good dairy animals, and well adapted to our rigorous winter; a judicious selection, if fostered, might result in a valuable class of animals for the country.

We fear we are occupying too much space, and must hurry through the sheep. Here again is no native class. Leicester, Teeswater, and Cotswold predominate, and it would certainly be difficult to define the boundary of each of these families among our long-woolled sheep; they have been annually assuming more of the huge frame and long rough wool of the Cotswold, the characteristics of which we by no means consider as adapted to become the general stock of our inhospitable regions. We were glad this year to see the bell borne away by an importation of a different character. The prize ram was shown by Mr. Walker, of London; a handsome animal, by no means large, and partaking of the more refined Teeswater type—a level beautiful back, and finely rounded contour, a broad shoulder, and thick muttony arm, but having the shank carried out much lighter than we have been of late wont to see among our prize rams; a sweet light head, without the coarse Roman physiognomy, which the mania for a huge gigantic animal has too often brought along with it. Mr. Walker also took the second and third prizes for shearling ewes, of the same type, imported from Mr. Lee, of Gardham, near Beverley, England. In long-woolled sheep the Messrs. Miller, of Markham, stood next to Mr. Walker. Those sheep which had longer wool than common, or larger frames, were shown as Cotswold, in which class there was less competition. The show of these sheep was certainly of the highest merit. We question if the same number of fine long-woolled sheep could be collected anywhere out of England. After the first lot or two there was a level excellence, not mediocrity; for our farmers have spared no expense in this department, £80 or £100 being no unusual price for a ram. We saw top lambs of next year spoken for, on chance, at £25 to £30. The dusky faces and shanks of Southdowns were very numerous, hardly worthy of the name however, excepting one lot shown by Mr. Gordon, of Paris, C. W., imported from the Babraham flock. We never before saw the true beauty of this valuable breed, but these were certainly splendid creatures. A large number of Merinos, too, showed their long spiral horns, and got abused by the spectators as

horrid ugly brutes, and certainly they were such: our idea is that they would soon starve to death, under ordinary keep and a Canadian winter. There was a pen too of our old chums, the Cheviots, from the green hills and mist of the Borders, for which, as for the Galloways, we were indebted to the enterprise of Mr. Roddick. We could have selected better at Hawick or Boswells Green, but were glad to see their hardy frames among us, albeit whiter fleeced than was characteristic of a loup into Beamish or Till. We have little doubt that this will turn out a valuable stock under the hard usage of our zeroic winters. We should have less objection to the grosser families could they be induced to follow the example of uncle Brin, and suck their paw during winter. Between 400 and 500 sheep were shown in all.

In horses the turn-out was strong, both for draught and harness; we here do the Nimrod afoot. The main fault seems to be the want of plan in adhering to any definite type. Good horses enough have been imported, but no distinct families have been kept up, and crossed according to the fashion of each day; they form an *olla podrida*, a heterogeneous compound, seldom advancing beyond mediocrity in any one feature. A pretty Clyde, owned by Mr. Natrass, of Cavan, took the first draught prize, and some promising young animals were shown of various descriptions, a more active agricultural horse being required here than at home.

We ventured little among the swinish multitude, as un-savoury here as elsewhere, and under the advancing refinement of our farm servants, seldom rejoicing in the show-day festivities of soap and water. We had Lord Ducie's pigs, and black and white Berkshires, and the old Yorkshire, and we presume young Canadian, a great variety. But the interest of this department is sinking, as our farmers find they cannot compete in the barrel of pork with the mild winters and corn fields of more southern regions.

In poultry, quacking duck and crowing roisters, bubbly jocks, Shaughae, Bramah-pootra, Dorking, white buff, Hindoo coloured, adorned some 100 or 200 cages: some of the coarse long-legged gentry would have made good steeds for Billy Bottom on his equestrian journey. We almost overlooked a couple of Maltese cats, quietly enjoying their captivity.

But the wilderness of implements is yet spread out before us. Thrashing machines, travelling saws, reaping and mowing apparatus, drain pipe presses, harrows, ploughs, drills, chaff cutters, gates, apple parers, little dog churns, and all the Yankee knick-nackeries, scarifiers, acratchers, thistle cutters, and every manner of machine to torture the face of the earth, and many to torture their users. Every exhibitor told you his own reaping machine worked the best of any in the world, and no other was worth having. The McCormick character seemed this season to predominate. Our Yankee friends showed us many things which really puzzled our sober-headed farmers to discover their object.

"All flesh is grass," &c., strikes up a very reverend-looking gentleman at your elbow, and, unfolding a portable desk, he accompanies a brisk trade by a long serio-comic dissertation on the invaluable qualities of his medicines. I observed one of these gentry hold forth for six hours without ceasing, to the astonishment of a knot of admiring parsons, healing by the touch of his wand, as he went along, a continuous stream of warts, wens, bunions, toothache, and all manner of diseases. He told the people at starting that he was determined to pocket 100 dollars, and I doubt not he succeeded.

But when I wander into Floral Hall, among the dahlias and cabbages, apricots and apples innumerable, I am bewildered. Suffice it to say, our apples and pears are unsurpassed, grapes and peaches partaking more of the *rara avis*: cauliflowers and onions show that they are completely at home among us; as well as the immense variety of funny-looking articles, of the squash and calabash tribe. How shall I describe the Ladies' Chamber?—quilts and comfortables, collars, true love knots, and babies' pinafores, lovely bunches of waxen flowers, little curly lap-dogs, Jephthas and daughters (a favourite subject) without number, makes us wonder where female hands have found, in this labour-craving region, so much time to spend on the *inutile* of life. But oh! that they should have blasted with their abortions of the fine arts this charming region! Hideous landscapes, the drawing completely out of keeping, and Chinese perspectives hung in such a light as fortunately to reflect back the image of the observer like a looking-glass, and hooded portraits which certainly tell of distance from the possi-

bility of purchasing colours. Some few sketches of merit would doubtless have been found had they been hung otherwise than as covers to the bare-boarded walls, and could we have propitiated the indulgence of a magisterial looking old gentleman who kept in a loud tone urging us to move on. Without more taste be in future called into this department, it were certainly better omitted. Baths, furniture, pianos, with sentimental blackvested performers, mingled with vases, inscribed grave-stones, and all sorts of funny things too tender to be seen out of doors, grace the remainder of this house. One of the marquees is full of the most splendid carriages, coaches too fine for anybody to ride in, and too shiny to trust in competition with the sun, alternate with buggies of most attenuated form, the painted glass panels of which would shiver at a corduroy road and recoil even from the rough embraces of M'Adam. It were certainly better that this department was of a more utilitarian character.

Here, as a contrast to the last, is the agricultural marquee for farm produce—the butter and honey, wheat and potatoes, the solid necessities and sweets, smelling of country air so much coveted by the citizen. This is an important part of the show, and its able manager, Mr. Riddle, furnishes us with the following account. In proceeding briefly to take a survey of the agricultural tent, we were impressed with the thought that a very few years ago the whole of the land producing these grains and roots was one dense forest, traversed only by the Red man in his hunting excursions, though now teeming with all the appliances of civilized life. Wheat having always been looked on by our farmers as their principal dependence, we were surprised to find so few lots shown for the prize of £25, offered by the Canada Company for the best 25 bushels; 5 lots only were shown—all good, but not superior, if equal, to the samples of former years. Mr. Neese, Ameliasburg, Prince Edward's County, here stood first. We think if our farmers would pay more attention to keeping their wheat pure, it would be to their profit, all the samples of that grain shown being mixed up more or less of different varieties. In the class of wheat shown for the 2 bushel prize there was more competition, there being 27 entries, all of white or mixed wheats, not one sample of red appeared. Mr. Anderson, of Flamborough West, here carried the day. Spring wheat next demanded our attention; it was brought forward in good quantity and of excellent quality, Mr. W. Riddell, of Hamilton Town, taking the first prize. Spring wheat is of great importance to all lowland farmers, as until such soils be thoroughly drained they are unsafe for fall wheat. Of rye there were only two lots shown, as this grain is rarely grown on land which will yield wheat. Of oats and barley there was a fair number of lots, though we saw nothing superior to the turn-out of former years, our farmers not giving that attention afforded these grains in British agriculture. Side by side with the Canadian oats were shown four bags of imported, far superior to those of native production. Of peas there was a capital turn-out, though prizes were only offered for two kinds. Those shown were all of the white or green varieties. The large marrowfat appeared to be the favourite, judging by the amount brought forward. There were four or five lots of cloverseed in the tent, all of them good in quality, but too small in quantity for this important seed, which ought to be raised more extensively by our farmers than has yet been done. In this wheat-growing land, cloverseed is of great importance. Of Timothy-grass there were several very good samples shown, but we saw no other seed. Indian corn made a good display, all in the ear; some of the lots seemed scarcely ripe, this season having been rather late and cold for that grain. There were a great number of roots—this is a department of the show which is annually increasing in importance, as our farmers are beginning to find that they cannot carry their stock through our long winters without them. We think that this department was far in advance of any previous year. The mangel wurzel in particular was here in every size and variety, from a single root of 35 lbs., by Baron Longieul of Kingston, to the commonest size. The yellow globe appears to be the favourite variety. Next to the mangel wurzel the carrot appeared in greatest numbers, single specimens of the white carrot weighing ten and twelve pounds; the red carrot being smaller and harder, and we think more nutritious. There were several varieties of turnips shown; but none of them in large numbers, except the Swedish, which is the only one adapted to our climate: some very large specimens appeared. There were several lots of parsnips and some handsome parcels

of potatoes, but the numbers were small. Of pumpkins, and squashes too, there was a large display, some of them weighing we heard, over 150 lbs. We were sorry to see such a small turnout of dairy produce. Surely this department deserves more attention at the hands of our farmers. Of cheese there was very little; in butter the show was better, there being thirty lots shown, all we believe good. There were several bags of hops, the product of Lower Canada. Many other articles, too, appeared in this tent, as turnip seed, carrot seed, flax seed, &c. There was some very nice-looking honey, and likewise essences and oils extracted from native herbs.

The whole exhibition passed off in a most satisfactory manner, for which we were greatly indebted to the unwearied exertions of Mr. John Wade, the leading local manager. Our

horticulturists too, especially Mr. Jeckal and Mr. Fleming, must have due praise for the floral decorations. Our praise of the management must be unqualified when we consider that our locomotive exhibitions are dependent on local management; the want of an organized staff attached to the society causing each year's experience in carrying out details to be in great measure thrown away. This disadvantage is, however, in some degree compensated by the greater variety resulting. Would not a deputation from your English society to our next year's meeting tend to foster our spirit of improvement, and keep up our loyalty and home feeling? Colonists are too apt, under the present system, to forget that they are Englishmen.

Dec. 5.

ROBERT HUME.

## ANNUAL REPORT OF THE WOOL TRADE.

SIR,—A review of the trade of the past twelve months could hardly be expected to present many favourable features for comment. Engaged in a serious but highly popular, because necessary, war, and while the country was willing cheerfully to submit to any sacrifice so long as it was conducted with energy, the utter want of management which had become apparent during the early months of the year through the disunion in the Government (causing so great suffering and disaster to our troops), produced a universal feeling of discontent almost amounting to despair, and a sting was given to the national feeling to which, for the time, every other consideration gave place. Added to this, the failure of the harvest in France, and throughout a great portion of Northern Europe, and the high prices both here and abroad for all kinds of provisions, and, in a great measure the natural consequence, an increasing value of money, with even periods of great pressure during the latter months such a combination of adverse circumstances could not fail to exercise an unfavourable influence on the general trade of this country. It is, nevertheless, gratifying to observe that the general export of manufactured goods still continue on a large scale, and contrast favourably even with the most prosperous years, whilst the latest published returns for the same period of the year show that the exports for the month have been the largest on record, and embraces nearly all the leading articles. This is strong evidence of the healthy state of the trade of the country; and although increased taxation, together with the high cost of the necessaries of life, have pressed heavily upon the people, they have been to some extent mitigated by the extended employment occasioned by the war, and we believe that on the whole the labouring population has seldom been more fully or profitably employed. There is perhaps no branch to which these remarks more particularly apply than to the wool trade, the large contracts which have been given out for army clothing having given a great stimulus to this branch of business. These orders, as far as concerns our own government, have been mostly completed for the present, although for the French government there are still some orders in execution.

**HOME DEMAND FOR WOOLLEN GOODS.**—This trade has been by no means active, which is not to be wondered at; for we invariably find that when the first necessities of life are dear, a check is given to the consumption of all other articles, the humbler classes having little to spend on the comforts of their families.

**EXPORTS OF WOOLLEN GOODS.**—The trade has, on the whole, been good, and on a sound and solid basis; there has been no overtrading, and most of our colonial as well as our foreign markets seem to be in a healthy state—not overstocked; and we look for a great expansion of trade, particularly in the United States, owing to their abundant harvest; and the high prices which they will obtain may be expected to lead to a great increase in our exports, the trade there being in a prosperous condition; and as the shipments during the last two years have been much below the average, there has been no opportunity for stocks to accumulate.

**CONSUMERS.**—With the exception of those branches of the trade which have been occupied with Government orders, we do not think that in general they have done a profitable

business, having been to a great extent deprived of their best customers—the home trade; but, fortunately, they have had the advantage of cheap raw material, and if they have not made large profits, they have at any rate been enabled to work their concerns without loss, which, during a period of such uncertainty, cannot be considered altogether unsatisfactory. We have previously, on various occasions, alluded to the rapid progress making on the continent in wool manufactures, and in particular, to anyone acquainted with the German trade, the change that has taken place there during the last fifteen or twenty years is truly marvellous; while in France and Belgium the improvement has been almost as great, and even in many minor States this branch of industry has assumed a degree of importance within comparatively recent years. Unfortunately, we have too long trusted to our own supposed supremacy; but as regards the finer branches of the cloth trade, it has for some time been apparent that this was altogether illusory, and that we must yield the palm entirely to our continental rivals, who have attained such superiority in dyeing and finish that their goods completely supersede ours in all foreign markets. These facts have been more fully brought out at the late Paris Exhibition; and it has been fully conceded that also in the finer qualities of plain stuff goods we are far behind the continent. To whatever cause this is to be ascribed, it is little creditable to our national industry, possessing, as we do, the free and unrestricted import of all raw materials from every quarter of the globe. It is said that the superiority of French Merino goods is to be attributed to their being made from French wools. For many years great attention has been paid there to the subject: the growth has been materially extended, and is now estimated at about 150 millions of pounds annually. If these wools really possess such peculiar properties, it seems strange that none have hitherto been imported into this country; it would surely be worth while making the experiment, to ascertain if this be really the cause, or whether it may not be more properly ascribed to the greater ingenuity of the French manufacturers; and it is known that their mode of washing and preparing the wools differs materially from that in use in this country. The French are regular buyers of large quantities of wools here, which are burdened with very heavy import-duties; and so extensive are their purchases of Irish wools, that if it continues at the present rate, they will in a few years almost absorb the entire clip. It is understood that the question of import-duties has for some time engaged the attention of the French Government, with the view to the introduction of a more liberal tariff; and should this be carried out, it will more than ever render it necessary to adopt every improvement in this country, as the competition will be so much increased. Our pre-eminence seems to rest in the lower qualities of goods, and everything seems made subservient to producing an article to sell at the lowest possible price, and in this department at least our position appears to be unrivalled. It is gratifying to observe that in the manufacture of alpaca and mohair, mixed with cotton and silk, our superiority was fully established at the Paris Exhibition, and a just tribute has been paid to Mr. Titus Salt, of Saltaire, whose energy and successful enterprise have done so much to develop the trade, by awarding him the decoration of the Legion of Honour.

**WOOL TRADE.**—Business has been heavy throughout the year, and buyers have shown the greatest caution, limiting their purchases to immediate requirements, which, as events have shown, has been the wisest course they could have pursued. There has been little change in prices, except in such kinds as have been required for military clothing, some of which, through scarcity and a pressing demand for the moment, as in the case of gray wools, were forced up to extravagant prices; but they have since declined, and the general range of prices at the present time present an unusual affinity to the same period last year, except bright-hair combing wools, which have advanced 1d. per lb. during the month. The blanket and flannel manufacturers have had a profitable trade; but in most other departments complaints have been general, and, we believe, not altogether without cause.

**WOOL IMPORTS.**—The receipts at this port bear testimony to the growing importance of this market, greatly exceeding any former year; but, while the total imports into the kingdom show a trifling increase in the number of bales, it should be observed that this excess is chiefly in small bags, namely, 4,400 ballots Alpaca and Peruvian, and 9,100 bags mohair, whilst German, Russian, and Mediterranean, the bales of which are mostly of a large size, show a considerable decrease; consequently, the total imports in pounds falls far short of the previous year. This deficiency in foreign may be traced to the unremunerating prices, and a better demand existing in other countries; many kinds which we have been accustomed to import freely are at present quoted from 10 to 20 per cent. higher at the shipping ports than they would realize on this side; the consequence is that we are left completely destitute of stocks, and certainly at no period within our memory has there been so small a supply of foreign wool in this country.

**WOOL EXPORTS.**—A uniform and at times brisk demand has existed. This trade is each year assuming more importance, and new markets are constantly opening to us. For many years the French have been large purchasers, chiefly of Irish and Kent wools, while the Belgians and Germans (confined to the Rhenish Provinces) were regular customers for certain descriptions, and occasionally there has been a large business done to the United States; but so extended has this trade now become, that we have a regular demand for all parts of Germany, besides Italy and Sweden, while even occasional purchases of fine wools have been made for Barbary; at the same time the demand has grown so general that there is scarcely a description which is not now taken for export.

As compared with the diminished import and greatly increased export of 1854, the past year shows a still further very considerable decline in the import of foreign (33 per cent.), and a continued large increase in the export of both foreign (54 per cent.) and British (30 per cent.); assuming the growth of the latter to be the same as in the previous year, and deducting the export of colonial, foreign, and British from the entire import, the supply for home consumption is less by 21 per cent. at the present time than at the same period last year.

**AUSTRALIA.**—The public sales in London have been generally well attended throughout the season, but notwithstanding the failing supplies of Russian, Spanish, German, and all other fine foreign descriptions, prices have ruled moderate, in a great measure to be ascribed to the very large quantities brought forward at each series, which offer a good opportunity to speculators, but is certainly detrimental to the interest of the importer. The growth seems to have assumed a stationary position, and we look in vain for the accustomed increase which we have relied upon in previous years; still, under the circumstances, this is as favourable as could be expected, considering the changes that have been brought about in the colonies since the discovery of gold. Each year more attention is being paid to rearing cattle, which must eventually materially interfere with the growth of wool. It will be noticed that a considerable quantity of Australian wool has been received here this season—with very trifling exception it has been sent forward for sale in London. We have long felt the fullest confidence that a large portion of the clip would reach this port; it cannot be otherwise, considering the close connection we now have with the Colonies, and the very superior class of our vessels, in addition to the inducements which the owners are prepared to offer to promote a trade here, and the time may not be distant when our fine colonial wool sales will attract as much attention as those in London. For the present, however,

it is an important fact to record that last year we received 18,756 bales of Australian! against 1,096 bales in 1854, and that the largest import in any previous year was 5,512 bales. The importers, of course, must have felt good reason for removing them to London for sale, but they must be based on sounder arguments than have been set forth by some of the parties most interested in the present state of things, the chief of which are—"the CENTRAL position and established advantages of the London market," and that "buyers PREFER the wools not being brought for sale into too great proximity to the consuming districts!" very reasonable conclusions in some respects, but certainly not calculated to promote the interest of the importer, who can have little difficulty in interpreting the real meaning. The position of the cotton trade is in a great measure analogous; and it can scarcely be questioned that it is altogether owing to its proximity to the chief consuming districts that Liverpool owes its pre-eminence. Here, also, as in the case of wool, there is a large regular export demand, and vast quantities are annually sold for all parts of the continent of Europe, and yet we hear nothing of the disadvantage of our position as regards this trade, while cotton is in a great measure subject to a higher rate of freight, the bales, in some cases, not being so tightly compressed as wool; and also, the cost being generally less, the freight forms a higher per-centage than on wool. It is estimated that about three-fourths of the import of Australian and Cape wools is consumed in Yorkshire and Lancashire, which are so easy of access that buyers can visit this market, and, after transacting their business, return, if necessary, on the same day. For the manufacturing districts of Wales and Scotland we are also certainly more favourably situated than London, both in economy of time and carriage. Their only advantages are the West of England and the continent of Europe; but even those are trifling, and it requires only a few hours more to come to Liverpool, whilst by way of Hull and steamers, the carriage to the continent is reduced to a very low rate to promote the trade, and there is very little delay in goods reaching their destination. Besides, our charges are much less both to the merchant and the buyer. We can see no reason why this should not become an important market for the sale of fine colonial wool; our position is a strong one, and better reasons must be assigned than any hitherto brought forth to the contrary. We have heard it asserted that the system of sampling here is considered very objectionable, it being inferred that the wool pulled out of the bales at the time of examination, and sold as samples, is the perquisite of the broker; but it is well known that this is sold in the catalogues for owners' account, and is generally considered a more preferable plan to stuffing promiscuous qualities into the bales, which, with the greatest care, cannot be avoided under that system. Such a statement is hardly worth referring to, as it could only proceed from parties not conversant with the trade, or with a view of perverting facts. We should certainly not advocate bringing forward public sales here, unless of sufficient magnitude to command a full attendance of both the home trade and foreign buyers, say 5,000 bales as a beginning, or in the early months of the year less would suffice to draw a full attendance, and acting upon this our disinterested advice has hitherto been to send the wools to London. The only argument we can conceive to weigh against us is that London brokers are more competent to conduct the business than "local agents," as they are pleased to call us; but this is surely no reason to incur the expense of forwarding the wools to London. At any rate, if this be the case, we think the trade will soon become of such importance that they will find it worth their while to establish branch houses here.

**CAPE OF GOOD HOPE WOOLS** have engaged considerable attention throughout the season, and have commanded uniformly steady prices, which is due to the very marked improvement that has taken place in the flocks generally, and we look upon the prospects of the colony as encouraging in the highest degree, particularly as regards the Algoa Bay district. There has been a considerable increase in the growth of wool, of which the import of this year, large as it has been, forms only a partial index, a great quantity having been kept back for want of shipping.

**GERMAN.**—There has been a still further falling off in our imports, and prices have ruled so much higher there that it would have paid to re-export, which has been done in some

cases. For certain purposes German wools are almost indispensable with our manufacturers, but beyond this the trade may be considered to have ceased, the greatly increased consumption there, and the superiority of their fabrics, having outstripped their production, and they have even become importers to a considerable extent.

**SPANISH AND PORTUGAL.**—There has been a very trifling supply of the finer descriptions, and business has been altogether of insignificance, the moderate prices of colonial wools being quite a barrier to imports. In Portugal still further restrictions have been placed upon our goods, with the object of protecting native industry, and, in consequence, the receipts have been very limited, the growth having been chiefly retained for domestic consumption. Long Oporto fleece is at present in good demand, owing to the improvement in value of English combing wools.

**UNITED STATES.**—Our commercial relations with this country are of such vast extent that any unfavourable circumstances existing on the one side must to a considerable extent exercise an influence on the other; and, we believe, the effect of the war and the pressure in the money market have been felt there scarcely less than in Europe. Everything there seems to be on a sound footing, and holds out the prospect of an active business at, we hope, no distant date. The adoption of a more liberal tariff of import duties, on the principle of our own, which seems likely to be brought forward this session, will, if carried, prove a great boon to trade. The transactions in wool have not been of any importance, and the export has not equalled the quantity received from there, consisting chiefly of Peruvian.

**BUENOS AYRES AND RIVER PLATE.**—We have had a full average import, including most of the usual flocks so favourably known here, and we believe growers are perfectly alive to the advantage of consigning them regularly, rather than seizing an apparently tempting offer to sell on the other side. These wools continue to be taken more freely for home consumption, and we have no doubt they will be much more used, and if our manufacturers will retain even their present position they must give up old prejudices. The burr has hitherto been an insurmountable objection with many, and we have had the greatest difficulty to get them to make the trial—but there is no longer the same reason for these objections, owing to the improvements that have been made in burring and moiting machines—and most of the best flocks are now sent home classed and packed with the same care as Australian wools, and the marks can be as much relied upon; consequently, those who have had them before, purchase them with the fullest confidence. This is no slight advantage, equal to 5 or 10 per cent., besides insuring a more ready sale; for these wools, being generally so extremely tightly packed, are difficult of examination, and buyers have therefore to depend to some extent on the good faith of the shippers, or the representations of the brokers. Common qualities have been very much neglected; but during the last few months a considerable clearance has been made. Cordova: The early arrivals of the season met with ready sale at full value; but for some months the sales have been limited, at rather reduced rates.

**PERUVIAN AND ALPACA.**—The receipts of Alpaca have been on a rather liberal scale, although not equal to former years. The demand has been good, and sales have been freely made for arrival, so that scarcely at any time we had any stock in the market. Prices have been constantly advancing, and have ruled with great firmness, having reached at one point 2s. 9d. per lb.; but this being found so much above the relative value that could be obtained for the goods, the transactions for some time past were limited; of late, however, there has been more disposition to do business, and some large sales have been made for arrival, including, also, the only parcel on the spot, at 2s. 6½d. to 2s. 7d. per lb. Sheep's wool has only been in moderate favour, excepting superior qualities, which have always been in demand at full prices. There is very little stock of any kind. Lima wools, or as they are here more favourably known as "Chili," being an article liked, have met with ready sale at full value.

**EAST INDIA.**—The total receipts into the country have fallen short of last year, as we ventured to predict they would, but still they have been of considerable extent, and this trade

promises to become of great magnitude—already it is next in importance to the Australian trade; and with remunerating prices and judicious management, there seems still a fair field for extension. We have frequently suggested the advantage of the introduction of our heavy-woolled tupas for crossing with the native breeds, by which means we should secure a much heavier weight of fleece, with the still further important consideration of, to some extent, eradicating the kemp, which is the chief objection to East India wools, as it prevents them from taking the dye, and therefore renders them unsuited for certain purposes. We are fully aware of the difficulty in carrying out this view, but still we think it is worthy of attentive consideration; for East India wools have now become so essential to the wants of our consumers, and the demand is constantly extending, that we feel no hesitation in still asserting, as we did when the import was comparatively trifling, that the trade would freely take any quantity that could be sent. It is satisfactory to be able to notice that the shipments of this season have, on the whole, presented a favourable contrast in comparison with former years, and the more remunerating prices such kinds have invariably commanded will prove the greatest inducement to persevere in this system. We may point with some degree of exultation to our position in this trade, our receipts being very nearly three-fourths of the entire imports, and as these wools are now very largely taken for export, it still further disproves the assumed advantages of the London market.

**CHINA.**—A moderate import has taken place, all of which has been to London. We are unable to state any improvement in the mode of getting them up, while in many cases the wool has been slightly moth-eaten, which has operated against their sale. This description is more free of kemp than East Indian, and also of a softer nature, making every allowance for the grease which generally exists to a great extent. If these wools were sent to market in good order, they would meet with ready sale. They should be properly washed, and if this was done in the first instance, it would in a great degree prevent the yellow tinge which so much prevails. And here we may also remark, that the universally large quantity of yellow East India, quite out of proportion to what we receive from any other quarter, is in a great measure to be traced to the wools being allowed to remain too long in the grease; and, in addition to this, if they become wet or damp, it would cause them to sweat, which would prevent them washing a white colour.

**RUSSIA.**—There has been a total cessation of the trade, with the exception of one parcel sent through Prussia, at such an enormously high rate of carriage that the experiment was found too costly to repeat. We have not at all found the want of these wools, and the stocks in the country, consisting altogether of Donskoi fleece and autumn, which have been held for two or three years, small as they have been, have exceeded our requirements, owing to the moderate prices of English combing wools, and the depressed state of the moreen trade. Of late there has been a better inquiry, and the stock is reduced to a mere trifle. There is no prospect of obtaining supplies from any outports, as they would stand in fully 20 per cent. more than they are at present worth here.

**MEDITERRANEAN WOOLS** generally have engaged little attention, and prices have been unremunerating. The effects of the war have checked the import, while the supplies have been freely absorbed on the continent for the purpose of military clothing, which has caused prices to rule throughout the year much higher than in this country, where there has been a good choice of home-grown and East Indian wools.

**EGYPTIAN** is not in so much favour as formerly, and has in a great measure lost its character, being now often mixed with Syria and other inferior kinds, which are unsuited for the same purposes, and it is now rare to see the good parcels we formerly received; still, when these are to be met with, they find ready sale at full prices.

**TURKEY GOATS' WOOL AND MOHAIR.**—The high prices ruling at the beginning of the year, we stated; in our last annual report, were likely greatly to stimulate imports, and such has proved the case, our receipts having been nearly double the previous year's; prices have ruled with great steadiness, but have scarcely at all participated in the advance that has taken place in alpaca. The Greek houses in London still retain this trade chiefly in their hands, and seem somewhat jealous of the monopoly they enjoy.

**MOGADORE AND BARBARY.**—The receipts have fallen off considerably, and have been less than for many years past. For some months there has been a good demand, and stocks have been completely cleared off. Fair parcels have generally met with very current sale, at full prices, and are at present much sought after. The temporary demand on the continent, occasioned by the war, has diverted many shipments into other channels, and as long as this continues we do not look for imports of any consequence.

**ICELAND.**—There has been a considerable falling off in the import; several cargoes which have reached this country have been sent on at once to Copenhagen, being limited a trifle above what could be obtained here; but we think the result has proved that the owners would have done better to have accepted current rates here. There is nothing held by importers, but a fair stock in second hands, which is held off the market for the present.

**DOMESTIC WOOLS.**—At no former period have we known such uniformity of prices to prevail during twelve months, and, owing to the great caution displayed by buyers, and the tenacity of holders, there has been an extremely firm tendency throughout this period, which even the unprecedented advance in the Bank rate of discount, in scarcely more than one month, during September to October, from 3½ to 6 and 7 per cent., at which it still stands, failed to produce any effect beyond a temporary dulness. The general average of prices

is somewhat higher than at this period last year, and with more tendency to advance than the reverse. There has been at times a good deal of machinery standing idle, but when we take into account the number of new mills brought into work during the last few years, we think it somewhat questionable whether the consumption has not been to an average extent.—**IRISH:** The principal demand has been for export, and the business has been rather considerable. What remains is altogether in growers' hands, who are not disposed to part with their stocks unless at advanced rates, consequently there is little doing at present, although there is a brisk inquiry.—**SCOTCH:** Cheviot wools have been in good demand for military clothing, and have brought full prices; but since the completion of the Government orders they have engaged less attention, and prices have given way a little. White Highland has been in fair request, but all other kinds have been rather dull, although of late they have met with more inquiry.

**SHEEP SKINS.**—Buenos Ayres have been in good demand, and the better kinds have been of very current sale at full prices. Of Australian skins the supply has been limited, but they can always be sold at their proportionate value. Inferior and bad-conditioned skins are of difficult sale, and can only be disposed of at low prices.

HUGHES AND RONALD,  
Wool Brokers.

Liverpool, 1st January, 1856.

## HULL GENERAL ANNUAL TRADE REPORT.

PUBLISHED UNDER THE AUTHORITY OF A COMMITTEE APPOINTED BY THE HULL CHAMBER OF COMMERCE AND SHIPPING.—P. BRUCE, SECRETARY.

On taking a retrospect for the past year of the trade of this port—which, it is well known, is largely concerned with the North of Europe—it does not appear that the business has been so much limited by the war with Russia as might have been reasonably anticipated, although it must be remarked that no port in the kingdom has suffered so much from the interruption of business with that country. The principal imports from Russia previous to the war consisted of hemp, flax, iron, tallow, linseed, hides, wool, tar, and deals, with large quantities of wheat and oats, when prices in this country were such as to induce a trade in grain. The frontiers of Prussia being open for the transport of goods to and from Russia, it appears that the articles of flax, hemp, tallow, and linseed, to some extent, have been able to bear the heavy land-carriage charges for shipment from Memel and Konigsberg, so that the importation of these articles (except linseed) has been kept fully adequate to the consumption of this district. With a continuance of the war there seems no probability of a want being felt for these articles, as, with increased experience, the arrangements for the land transport will be more maturely effected; and this expense of carriage is not so injurious, on the whole, to Russia as was expected—that on their exports being greatly paid by the enhanced prices in this country, whilst their imports, as being much more limited in quantity, obtain the benefit of *back* carriage, which, being in considerable supply, can be furnished at much reduced rates. A large portion of this land-carriage goes into the hands of the Russian landowner.

The land-carriage on hemp, flax, and tallow from the Petersburg districts to Memel is understood to be about £10 to £12 per ton, whilst return goods are taken at much lower rates; thus the lower values bearing the heaviest charge. As with the transport of Russian articles over the Prussian frontiers, so it has been by the coast of Sweden on the Gulf of Bothnia. Previous and subsequent to the blockade of the Finland ports considerable traffic has taken place between these two countries, and it is through this channel we have received the Finland tar; while considerable imports into Russia have thus been effected of colonial and other produce.

The principal disturbing features affecting the general trade of the country during the past year have been the reports, both early and late in the year, of the probability of pacific arrangements being effected; the deficient result of the wheat

crop not only in this country, but to a greater extent in Germany and in France; and the gradually increased rates of discount of the Bank of England, the latter having a natural tendency to limit trading operations.

The shipping which has entered the port during the year is about 770,000 tons, against 850,229 tons in 1854, and 888,056 tons in 1853.

In taking a review of the CORN TRADE for the year just closed upon us, the first striking feature is that a country like this, so largely dependent on foreign imports, and at war with so formidable a power as Russia, furnished with only a moderate crop for present use, could pass over a period of twelve months with no greater fluctuation in the staple food of the people than has proved to be the case. The present age of steam communication and telegraphs, combined with the general spread of knowledge amongst our second-class or smaller agriculturists, appears to have dissipated the former notion of *war prices*; and the speedy transmission of information by the reduction of the newspaper stamp affords to rich and poor alike ready access to those elements which govern the values of the chief articles of commerce; and to these, in a great measure, is to be attributed the comparative steadiness of the corn trade, under circumstances which to sanguine minds would appear to have induced a much higher range of prices. The predictions of those fabulous rates indulged in at the commencement of the war appear not likely to be realized. The corn trade during the past year, may be said to have been almost entirely devoid of speculation; the relative high value has checked the cautious, whilst the stringency of the money market, and the much-to-be-admired and increasing mode of prompt payment for all cereal produce has put a stop, in a great measure, to the incautious operator; and the uncertainty as to the intentions of Government with regard to the overtures of peace, have continually kept in abeyance that spirit for speculation which is one great characteristic of the corn trade; and whilst colonial and Russian produce has been affected to a great extent by the uncertainty of peace or war, the value of grain has been regulated almost solely by "*supply and legitimate demand.*" The Press has made several uncalled-for attacks on the trade, as to the price of corn being kept up by speculation and held back on the part of the growers; this need scarcely be referred to, as to any at all conversant with the trade such remarks must appear mere fiction.

An encomium should rather be passed on the agriculturists for bringing forward their supplies so freely, indicating anything but a speculative feeling.

One great feature in the corn trade this year is a continental demand, and export of Wheat to the Baltic ports; but this was limited by advanced markets in this country.

The year commenced with high prices; but taking into consideration the splendid quality of the WHEAT crop of '54, fully 7s. to 8s. per qr. below the present value. We find in January, '55, fine red Wheats of home growth quoted 70s. to 72s.; red Danish and Hambro', 66s. to 68s.; Konigsberg and Dantzie, 78s. to 80s. These quotations are for English 63lbs. per bushel, foreign per bushel of 60lbs. The trade continued dull and drooping in February—prices had receded to 68s. to 70s. per qr. for good red English; and this state of things continued until March, when there was almost a stoppage to business, owing to the death of the late Czar of Russia, and the uncertainty this important event would have on the future. The warlike attitude of Russia, and extensive preparations for carrying on the war by the present Emperor, appear to have dissipated all ideas of peace; and at the latter end of April and beginning of May, there was a general rush to get into stock, and prices forced up 6s. to 8s. per qr. in a few days. In the first week in May prices advanced for English from 68s. to 70s., to 76s. to 78s. per qr., and foreign in proportion; and towards the close of May farmers were holding out for "even money," or 80s. per qr. for best-class of English red wheats. June and July pass over with very trivial fluctuations, a shilling or two up or down, 80s. continuing about the standard for English. At the commencement of August markets began to recede—a false idea appears to be formed of the coming crop. Arrivals exceed demand, there is a disposition on the part of holders of foreign to sacrifice; and, in spite of heavy rains, crops laid, and acknowledged injury done to a very great extent throughout the kingdom, prices continued to decline, and about the middle of August good English wheats are quoted 73s. to 74s., and foreign red 70s. to 72s. The depression was not destined to be long-lived, for at the close of August and commencement of September there is again a sudden start, and prices rally 4s. to 5s. per qr., 80s. being again the value of English red, and foreign in proportion. This advance was not only well maintained, but rather exceeded during the early part of September, until the news of the fall of Sebastopol and glorious successes of the allied armies in the East caused a temporary stagnation to the trade, and prices again rather gave way until the end of the month. When the new crop comes to be tested by the thrashing-machine, the quality is found very indifferent compared with the crop of '54, and the yield also to a much greater extent than was anticipated; and prices gradually advanced during October, until the first or second week in November, when farmers were busy with seed-time, and owing to the lateness of the harvest could scarcely supply consumptive demand, and about the middle of November the climax, or highest point, is reached, red wheats of old crop realizing close upon 90s.; and in several of the agricultural markets 100s. was not only reached, but exceeded for fine old white wheats. Meetings were held in London, and fears entertained at this period of some outbreak in the manufacturing districts; but these fears appear to have been unfounded. A splendid seed-time enabled farmers to proceed rapidly, and get their work finished under the most favourable circumstances; the continental demand rather abated, the thrashing-machines were in full work again, and markets abundantly supplied. Although there was little or nothing reaching from abroad during November and December, compared with the average of years, still the supplies of home-grown have been amply sufficient to meet the present consumptive demand, curtailed in a great measure by the relative cheapness of potatoes, and we close the year with trade dull and drooping, 76s. to 78s. (63lbs.) being the value of the best runs of red wheat of the new crop. Old wheats, from scarcity, command higher rates, but are generally held above the present value. The quotations for foreign are more nominal than otherwise. The stocks are very low—11,000 qrs.—and imports show a considerable falling-off from the previous year, being only 118,460 qrs., against 208,175 qrs. in 1854.

There can only be one opinion that great inroad has already been made into the present crop, clearly ascertained as under an average both in quality and quantity. Without speculative remarks as to the future, it may still be observed that there

are strong forebodings of higher prices of wheat before another harvest, especially if the war continues. The accounts from America appear to show more of a shadow than a substance, and at the present moment this seems the only country to look to in case of emergency. There is but little to hope for or expect from the continent of Europe, from whence considerable supplies are usually drawn; and, under existing circumstances, it behoves all classes of the community to practise economy, and to bear in mind the proverb, "Waste not, want not."

BARLEY has, during the present year, not played the usual prominent part in the trade of this port, in consequence of the bountiful yield of the crop of 1854, which has almost been sufficient to supply the requirements of the country, and caused Denmark and other northern countries to seek other markets, or to use their surplus produce at home; whilst from the Levant very little has come this year. It is thus found that the total import amounts to only 27,045 qrs., which is scarcely more than one-third of the imports of the previous year—viz., 72,906 qrs.—and even smaller than 1845; whilst in all the intermediate years of the last decennium, each year has been considerably larger, some even by eight or nine times the quantity imported in this. The fluctuations of prices have also been less marked than last year: a decline of 3s. to 4s. per qr. took place during the first three months; since then a gradual rise of 10s. to 11s. per qr. was experienced, but prices are now again not so high by 2s. to 3s. as they were some five or six weeks ago, when the highest point was reached, being at present 40s. to 42s. per qr. (56lbs.) for English malting, and 37s. to 39s. per qr. (52½lbs.) for English and foreign grinding qualities. The corresponding prices at the same period last year were 36s. to 38s., and 31s. to 33s. The yield of this year's crop is also abundant, but the consumption is very extensive upon this grain for various purposes; and since the 1st October a law has come into operation allowing malt to be used in the distilleries duty free (in lieu of the drawbacks and allowances made before), which also tends to augment it. It is therefore probable that foreign supplies again will be required; but hitherto the relative values here and abroad offer no margin for importation. The stocks in this port are very insignificant, being only 3,000 qrs., against 8,511 qrs. in 1854.

OATS have also been subject to less fluctuation in value this year, compared with last; and it is a curious fact that neither this nor any other spring corn or pulse, though generally following wheat as regards the movements of the market, have reached the same height as last year by several shillings, although wheat, on the average, may be considered 6s. to 8s. per qr. dearer this year than last. It may be remarked that the increased cultivation in Sweden, and even Norway, bids fair, with this grain, fully to fill up the gap caused by the blockade of the Russian ports, especially that of Archangel, and will be a rival to the Russian markets for future years. The lowest point was in March, when oat prices were 4s. to 5s. below their present range, which again is a shade above what they were a twelvemonth ago. The foreign imports are about one-third in excess of those of the previous year, being 36,059 qrs., against 24,245 in 1854. Stocks are, viz., 3,600 qrs., against 3,638 qrs. Present price of new foreign, 29s. to 31s. per qr. (42lbs.)

BEANS have been less imported from abroad than last year, especially from Egypt, and the sanguine expectations indulged in by many holders were not realized, 50s. to 54s. per qr. having never been exceeded for fine old, and in March last that description could be bought as low as 40s. to 41s. The present value of new English, which has been a good and abundant crop, is 49s. to 50s. per qr., being about 2s. below prices at the corresponding period last year. Imports are 42,050 qrs., against 62,019 qrs. in 1854; and stocks 8,500 qrs., against 8,511 qrs.

PEAS.—The fluctuations in this article have been greater than in any other, wheat excepted. The lowest period was in March, when white boilers were selling as low as 41s. to 42s. per qr. (63lbs.), and the highest in October, when 56s. to 57s. was reached; but transactions have mostly been of a retail character. The imports having been 9,018 qrs. against 9,710 qrs. in 1854, the year closes with stocks computed at 2,600 qrs., against 2,914 qrs. The present nominal value is 52s. to 53s. per qr. (63lbs.) for white boilers, and 48s. to 50s. for grinding qualities, or about 5s. more than quotations were in January, 1854.

LINSEED, being the article most largely imported here for local consumption, claims special notice. The only supplies from Russia came during the first six months in the year, amounting to 106,416 qrs. of Black Sea seed, since which period the total absence of direct imports from Russia has been acutely felt, although some parcels resembling the fine Petersburg and common runs of Riga have been received through Prussia.

The stoppage of Russian direct imports by *virtual* blockade has thrown a great demand on the East Indies, which has been freely responded to, and it is apparent the supplies from thence can be annually increased to a considerable extent, so long as prices remain encouraging.

Our imports in 1853 were 455,000 quarters; in 1854, 305,610 quarters; and in 1855 only 233,800 quarters—thus showing a deficiency as compared with last year of about 71,800; while as compared with 1853, the present year exhibits a deficiency of nearly one-half. It must be also stated that the import has been very unequally divided over the year, about 155,000 qrs. being received during the first six months, and only 78,800 qrs. during the last half year. On the 1st of January, 1854, the computed stock was 121,236 qrs.; in 1854, ditto, 83,695 qrs.; and 1855, ditto, 31,000 qrs.

These facts will account for the general high range of prices during the year. In noticing the fluctuations which have occurred, and taking good average Black Sea linseed as a standard, we find the price opening in January at 69s. to 70s. per qr. Towards the close of that month rumours of peace negotiations caused a gradual decline, and at the beginning of March such quality was barely worth 63s. per qr. The grave event of the death of the Czar early in that month caused a further sudden fall, and Black Sea seed at one period declined to 57s. No sooner, however, had the abortive result of the Vienna Conference in April been made known than prices immediately sprang up 5s. to 6s. per qr., and the value was 66s. at the early part of May. During that month our import was no less than 69,940 quarters. In June it was evident that the great bulk of the Black Sea shipments had come to hand, and that no further supplies from that quarter could be looked for; such expectation was subsequently realized, as will be seen by comparing the relative import of the first and last half year as above named. The idea of short supplies caused a gradual and steady advance, and November closed with Black Sea seed at 80s. per qr. Since then, in consequence of slack demand for cake and lower prices of oil, a slight reaction followed, and the year closes at 76s. to 77s. per qr. The values of oil and cake as compared with seed being unremunerative to the crushers, a great portion of the mill power has been at a stand; and at the present time (which is usually so active a period) not more than three or four mills are at work, out of a total number of 27 mills. Had the consumption of seed, instead of being thus curtailed, continued at the same ratio as in former years, there is little doubt that the stocks would have been long since utterly exhausted. It must be observed, that during the year a small quantity has been taken off for Holland and Belgium; while, on the other hand, there has been received a considerable quantity coastwise from London. The total consumption of the year for this town and immediate neighbourhood is estimated at about 290,000 quarters. Should the crushers find encouragement to resume full operations, it is evident a very considerable addition to the present meagre stock will be required during the next few months. From the lower Baltic ports little can be expected before spring. Shipments from India of considerable magnitude are reported as being afloat, chiefly destined for London, and some portion direct for this port. This source must be mainly depended upon for the requisite supply, assisted perhaps by a few cargoes from the Mediterranean; still the period of such arrivals is always a matter of much uncertainty, and leaves room for some anxiety lest a crisis of temporary scarcity should occur.

The remarks already offered as to future prospects refer chiefly to the early months of the year. Extending the view to the closing months of the coming year, the hope of honourable peace with Russia must not be discarded. The impulse already given will doubtless have paved the way for very large and regular supplies from India.

LINSEED OIL.—Though the importation of seed has much decreased here, it is not felt in proportion in the production of oil; the southern seed yielding, on an average, 20

per cent. more oil than the general shipments from the Northern ports. The market has been considerably influenced by speculators; but when left merely to a consumptive or foreign demand, prices gave way. The article was in lively demand to the commencement of the year, the price being 38s. 6d. per cwt. in casks; but the fluctuations in the trade were of almost daily occurrence, and speculators seemed influenced in their operations in a great degree, quite irrespective of the price of seed, and in many cases even of political events; these in January were £3 per ton downwards, at which the month closed. In February the price continued steady, and considerable business was done at £35 for home consumption and export. March: The transactions still continuing, prices rather improved the first week in the month; but on the death of the Emperor of Russia they became irregular, and the quotations were reduced to £33. The export commenced towards the middle of the month, and the demand was good at £32 5s. to £33 10s.; about 2,000 tons were awaiting ship-room. The final quotations of the month were £33 10s. firm. April commenced with a reduction to £32 15s.; afterwards £32 10s., when speculators came more freely forward, and advanced to £33 10s. with free buyers. Later on, the market improved considerably, and the closing quotation was £36 10s. May—the early part of the month £36, down to £34 15s., then £35 15s., £36, £37, closing at £36 10s. June—a good business, with gradually advancing prices to £37 10s., towards the close £38 10s., finishing at £39 10s. July opened rather slack, but in the middle of the month the price had run up to £42 10s. by speculation, again drooped, and at the close of the month stood at £41. August began with advancing prices of 30s. per ton, which afterwards reached £43, and attained £43 10s. at the close, with a good export demand. September—a further advance to £44, and during the month business continued active, the last quotations being £43 15s. October.—Market rather languid; forced sales brought it gradually down to £42, the closing price of the month. November—an improvement; in the middle of the month the value was £43 15s., subsequently forced sales drove it down to £41 15s., and throughout the month of December the article has continued dull, with declining prices, closing at £41 5s. Thus the extreme fluctuations of the year were £11 per ton.

It might have been supposed that higher prices generally would have ranged throughout the year, the opinion being formed on the state of the seed market; but though crushers have generally been free buyers of seed, they could not so readily find purchasers for their oil, the stocks of this article having been in advance of the demand.

The export of oil has considerably increased in its points of destination, and may now be considered equally as regular a trade as that for the consumption of the country; but the United States, to which occasionally very heavy shipments have been made, has not taken off any of consequence this year. The total export is circa 5,684 tons.

LINSEED CAKES, on the other hand, have felt the effect of the diminished import of seed, the high prices of grain, and a very deficient hay crop; they have obtained a price which has not been known for the last thirty years.

The opening value of Hull-made in January was £12 5s. per ton; after this a general decline occurred until the end of March, when good quality barely obtained £11. In the month of April, with a brisk demand and crushers working very sparingly, the stocks were all taken off, and it was found, in the early part of May, a great scarcity existed, while large consumption was still going on, and prices in consequence rose to £12. Genial weather now following, there was a reduction in June, and £11 became the value for a short time; scarcely, however, had the month closed when a speculative demand appeared, owing to the appearance of the grass crops, and stocks being exhausted, a sudden rise of £1 per ton occurred, dealers being free buyers at £12 per ton. After this a steady trade ensued at advancing rates. The continued drought gave a further impulse, and in September prices were driven up to £13 10s. per ton; a slight reaction took place in October, but during the following month a brisk trade ensued, and best makes ran up to £14 7s. 6d. and £14 10s. As the year closes the trade is quiet at £13 15s. to £14 per ton. The new year will commence with comparatively light stocks, and quite insufficient to meet any urgent demand. The import of foreign cakes has been to a fair extent, and they have sold at prices corresponding to the value of English.

**RAPESEED.**—The imports of the year have fallen far short of the previous one, being only 14,230 qrs., against 61,478 qrs. in 1854. It is considered that the cultivation of this plant is annually decreasing in Europe, owing to the encouragement for the growth of grain given by the alteration in the Corn Laws of this country, and also by the increasing annual supplies of the seed from the East Indies. Of the small import the greater part has been direct to the crushers, leaving but a very small portion for sale upon the market; in fact, during the first nine months of the year, in the absence of stock, the prices were quite nominal. Since September a few small cargoes offered upon the market established a value for the article, good quality of Danish seed fetching £45 per last—varying, with one exception at a particular juncture, up to £45 10s.; while for seed of less choice quality £44 to £44 5s. was submitted to. There is at present no stock in the port, except in the hands of crushers—about 500 qrs.

**RAPE OIL.**—The price at the commencement of the year was £53 for brown, when the consumption, occasioned by the high price of tallow, being great, the stocks became very much reduced both at home and in the countries from whence of late years large supplies have been drawn, and prices kept advancing until the high point of £60 per ton was attained, which checked the demand; prices, however, from the small quantity making in this country, and the deficiency of imports, 1,190 casks, against 3,055 casks in 1854, are well supported.

**OLIVE OIL.**—The scarcity of rape oil and high prices of tallow threw a very considerable demand on this article, which was freely provided for by current increased imports. The prices in January for Galipoli were £58 to £59 per ton, and for Spanish £55; these continued steady until March, when there was a decline of about £2 per ton; recovered a little in the summer, the largest consuming period of the year, and with the cold weather, and when the use is much curtailed, the value stands at £55 10s. for Galipoli, and £53 to £53 10s. for Spanish. The import this year is 4,363 tons, against 765 in 1854, and 853 in 1853. The stock is 775 tons, exclusive of six cargoes just arrived.

**FISH OIL.**—The result of the northern fishing was more unsuccessful than known for many years. This trade has been annually on the decrease, owing to bad success, always connected with heavy expense of outfit—but attempts are this year making to prosecute a *winter* fishing in the northern regions, and should this prove more fortunate, it will doubtless influence great attention again to this branch of commerce. The price in January was £44 to £45 without casks, and has gradually improved to the present rate of £53, none being in the importer's hands.

**RAPE CAKES.**—The import has been to a fair extent, and prices during the year have ruled high, occasioned by the best descriptions being used for feeding purposes, as a substitute for linseed cake; their present value is £7 5s. to £7 15s. per ton, and the quantity on hand, of good quality, small.

**FLAX.**—The total imports of flax into this port during the present year amount to 14,909 tons, against 12,389 tons in 1854, 16,262 tons in 1853, and 14,050 tons in 1852. Of the present year's import 7,465 tons are from the Baltic, against 4,331 tons in 1854, 7,832 tons in 1853, and 6,317 tons in 1852; the remaining quantities are divided as follows, viz.:—2,875 tons from Holland, 4,519 tons from Belgium, and 50 tons from sundries. Prices during the year have not greatly varied, although continually affected by the influence of political events and rumours. In the month of August the arrivals of Russian flax (via Memel) very much slackened, in consequence of which, holders pressed for higher rates, and prices in this market advanced 20s. to 30s. per ton. The arrivals into the flax-importing ports of Dundee, Aberdeen, Montrose, Arbroath, Kirkcaldy, and Hull, from the 1st of January to the 31st of August displayed a deficiency of 17,151 tons, being only 21,716 tons, against 38,867 tons to the same date in 1854; contrary however to general expectation, this loss has since been fully recovered, as the returns of imports into the above ports from the 1st of January to the 30th November were 43,226 tons, against 47,081 tons last year; and it is presumed by the end of the year there will be found little difference as compared with the close of 1854. The spinners have seriously felt the entire absence of the imports of the Archangel tow, which article, from its scarcity, has ruled high through the year. The German tows have come to hand in a very mixed

and dirty state, and have given general dissatisfaction in this district, where good clean tow is always extensively demanded. The present stocks of flax are moderate, although only a small proportion of the fine and light-coloured Riga kinds. For several weeks past the trade has been without animation, and in some instances holders have yielded a little from their previous demand. The spinners, under the present uncertain aspect of political affairs, act with much hesitation and caution. The present value of good usual W.C.M. may be noted at £50 per ton, other marks bearing a relative value thereto. In case of *peace* it is not thought the prices would be seriously affected, such not being at present extravagantly high—with the blessing of *peace* great revival in the demand might be looked for, while it is certain prices in the Russian markets would at once advance; added to which, the high prices of grain will tend to limit the cultivation of flax in Ireland. If *war* is to continue, the trade must struggle on as best it can. The total export of flax from Memel from the 1st of June to the 30th November, was 43,310 tons, against 31,958 tons to the same period last year, consisting mainly of Russian growth.

**HEMP.**—The year's import of hemp into this port, including cordage yarn, is considerable. With the increased facilities for land and other transport of Russian hemp via Prussia, which is apparent from the improved condition in which goods have latterly arrived, doubtless further supplies would have been received, had prices ruled sufficiently high on this side to have better remunerated the continental dealers. Prices, which opened in January at £57 for clean hemp, fell before the end of March to £45; in May they were at £47, and ruled during the remainder of the year at £42 to £43 for good clean and Rhine. The market is at present very inanimate. As anticipated in the last report, the consumption of Russian hemp has been materially affected by the substitution of other fibres. As of linseed, the East Indies are found capable of supplying any deficiency the war with Russia may occasion, in fibres from thence of similar adaptations as hemp; and with the inducement to competition, these articles will become better known and more available for purposes of machinery, so as to become staple articles of import. The Italian hemp are coming into more favour, and it is reported that the government have taken considerable quantities thereof for the purposes of the navy. The import this year is 3341 tons, and the present stocks here are estimated at about 1200 tons.

**TALLOW.**—The whole of the import has come through Prussia. This has been more influenced by speculation than any other article of Russian produce, and aided also by the price of home produce, which stands at high rates in consequence of the deficiency of food for cattle. The import is 1,528 tons, against 616 tons in 1854, and the supply has been less than usual for sale on the spot, so that business in this article has been exceedingly limited; prices almost invariably follow the London quotations. The present stock is about 400 casks.

**IRON.**—The whole of the year's supply has come from Norway and Sweden; but there are still stocks of Russian on hand. Prices have ruled tolerably regular throughout the year, and the market, except for Russian, has not been influenced by the war, and consequent cessation of Russian imports, though the consumptive demand has been far from brisk.

**HIDES.**—The import has been fully equal to last year, with the exception of Petersburg kips, of which there have been none. Prices of hides and skins have gradually advanced during the year, and are now considerably higher than at the commencement, from ¾d. to 1d. per lb.

**BONES.**—The imports have considerably fallen off, and of guano there have been but trifling direct supplies this year. It may be noticed there has been an increased intercourse with the River Plate, having had from thence seven cargoes with 2600 tons of bones and bone ash; this latter a new article of import, and for which there is likely to be a regular demand in consequence of the great attention now given to the manufacture of artificial manures, which appears to be annually on the increase, and must necessarily be so, as so amply remunerating the agriculturist by their extended use. The supply of bones from their customary ports of shipment is gradually diminishing. The import is 12,158 tons, against 15,706 tons last year. The stock is estimated at 1000 tons. Prices have gradually

advanced during the year, and are now at £7 2s. 6d. per ton; bone ash, £5 7s. 6d.

**TAR AND TURPENTINE.**—Since the abolition of the duty on foreign spirits of turpentine, the distilleries here consuming previously about 50,000 barrels annually of rough turpentine (chiefly indirect importations) have curtailed their operations fully to the extent of 2-3rds of that quantity: the British spirits are greatly substituted by the American. The increased consumption of resins, chiefly for the purpose of manufacturing into oil and antifriction and locomotive greases, are also principally supplied by the United States. Tar is likewise only distilled to a small extent, and the consumption of this article is materially affected by coal tar and its products, and the antifriction greases. The import of tar (all from the Baltic) is 13,820 barrels, against 11,069 in 1854, and 29,300 in 1853. The price in January was 30s., but declined as the year advanced, and went down to 23s., but subsequently recovered, and is now at 26s. to 27s. per barrel.

**COTTON.**—There has been only a small importation this year, and that from Bombay entirely; but the mills at this place are consuming about one million pounds per month, the larger portion for export twist.

**WOOD.**—This, one of the leading staple articles of the port, has throughout the year presented an unusually uninteresting aspect, and in no preceding season, for a great number of years, have imports, generally speaking, been conducted upon so reduced a scale. With only light stocks of Baltic wood at the commencement of the year, the trade ruled dull, with consequent depression in prices, and this state of things continued, with scarcely any intermission, throughout the spring and summer, the continuance of the war having apparently exercised an unfavourable influence upon this branch of trade in our consuming districts. Towards the autumn, however, a somewhat improved demand from the country sprang up, which continued for some time, and caused more enquiry for imports in first hands, with gradually improving prices, to exist; although with the then advancing season, and consequently enhanced rates of freights, this favourable reaction in the trade did not draw forth any marked increase of supplies. The stocks in first hands, now lying over at the end of the year, are quite insignificant; whilst those in the hands of the trade, excepting two or three principal holders, are light in comparison with what in former seasons have usually been the case. The stocks of wood on hand are mainly composed of Swedish and Prussian descriptions (although there are still some Russian deals held by the trade), with a smaller proportion of Canadian than for a number of years. It is needless to add there have been no supplies received from Petersburg, Wyburg, Riga, or Archangel. The custom-house returns of timber and deals *in bond* are discontinued, as calculated to mislead; immense payment of duties having been made in the beginning of this year, apparently in anticipation of an advance in the duty, which however did not take place. This, coupled with the partial nature of the return, has induced its discontinuance.

**COAL.**—The export of coals this year by sailing vessels amounts to about 62,500 tons, which is an increase of 7,000 tons compared with last year. The South Yorkshire Railway Company having made a beginning to send their own waggons

direct from the Barnsley district, greater accommodation will now be afforded to this port for the exportation of steam coal *on the government list*. The amount of light tonnage from hence to the Tyne and other coal ports has decreased one-half compared with last year, which proves there is a great falling off in such charters, and shews that Yorkshire coal is gradually getting more into favour.

**SALT.**—A considerable improvement has taken place this year in our export trade in salt; this is chiefly owing to the low price that has ruled here throughout the season, as compared with the Liverpool rates, and which diverted a considerable portion of trade to the East Coast. In the early part of the season, the cost of salt, free on board, was 17s. per ton; during the spring a slight fall took place, but 16s. 6d. to 17s. may be considered to have been the average price almost up to the close of the shipping season. In the month of October, various circumstances, and amongst others the high price at Liverpool, brought an influx of orders, and the value of salt rose rapidly until it attained 20s., at which it now stands. Freights have been moderate to Memel: the rate has varied from 5s. to 6s. 6d. during the greater part of the season. To Konigsberg and Danzig very high freights have been paid—say from 8s. to 12s. To Lubeck charters were effected at 12s. towards the close of the season.

**FREIGHTS.**—At the commencement of the season freights were extremely dull, and even at the low rates *quoted* as current, transactions were very few indeed—merchants, especially in the wood trade (a most important one for our shipping) seemed disinclined to do anything, although tonnage offered at rates quite unremunerative—as for instance, 30s. Quebec and Hull timber. About July an improvement took place, and from that time to the end of the year there was a better demand for vessels at increasing rates of freight. The year has been a very extraordinary one, and, although some vessels have done very well, there is no doubt that generally shipping has not been profitable; it is, however, a satisfaction that the prospect for the future is more cheering; and let there be peace or war, there is decidedly an opinion that the coming year will be a good one for shipowners. In A I freights there has been rather poor employment during the whole of the year, but during the latter part of the year vessels generally were wanted for export cargoes to the Baltic ports.

**SHIPPING.**—It is very true that the auxiliary screw is fast trenching on the sailing vessel, as steam vessels are annually on the increase, and wherever there is a direct trade, there a steamer is placed. Besides the long-established lines to Antwerp, Rotterdam, Amsterdam, Bremen, Kampen, Hamburg, Christiania, and Gothenburg, we have them now to Harburg, Tonning, Copenhagen, Konigsberg, Memel, and Stockholm; and this latter has opened out the route by the inland navigation, commencing at Gothenburg, without discharging the cargo, and thus avoiding the passage of the Sound, and the payment of its dues, and giving a prospect of this route also being adopted for goods to Petersburg, whenever communication with Russia is revived, at least for the more valuable and less bulky goods, should the Sound dues not be abolished. At present many of our largest-class steamers are employed in government service, but these were chiefly in the Petersburg trade.

## ANNUAL REPORT OF THE LINSEED TRADE.

SIR,—We have again the pleasure to address you our Annual Circular; and, in doing so, beg to call your attention to the complete revolution effected in our trade by the war unhappily still continuing between this country and Russia. The range of prices and sources of supply are altogether different from former years; and the latter consequence of the war is a subject for great congratulation, and more than reconciles us to the loss of Russian produce, inasmuch as it so materially benefits our own East Indian dependencies. When we last wrote, the southern Russian ports were still unblockaded, and, with respect thereto, as linseed is one of the principal articles of export, the effect upon her trade in those provinces can hardly be said, until very lately, to have been materially affected, for they were enabled to dispose of their crop of 1854. Now, however, the *actual* blockade must be very detrimental to it; and, as she has no friendly

neutral territory next her frontier in those districts, across which to smuggle her produce, the effect upon her commerce must indeed be most seriously felt. The advantage to India would be even now considerably greater were it not for the unsettled state of politics, for doubt always paralyzes trade, and both crushers and merchants are deterred from sending out orders whilst these pacific rumours are afloat. It is to be hoped, immediately on the assembling of Parliament, we may have a *full and honest* statement of the *actual conditions entertained*, so that merchants may have the opportunity of exercising their own judgment, and not be left in a state of idle perplexity by the stock-jobbing rumours daily propagated to the great prejudice of legitimate business. Our retrospect will be found very interesting, from the great fluctuations which have occurred; and we hope, also, the information afforded as to the supply expected

may not prove of less interest, and be useful to you in forming an opinion as to the best course to be pursued with reference to the requirements for the remainder of the present season, as well as for those of 1856-1857.

LINSEED into this port exhibits a large increase; but the returns either here, or into Liverpool, would be very delusive, unless considered with reference to the existing state of things. The bulk being now from the East Indies, and the ships in that trade chiefly large vessels carrying mixed cargoes, these two places get nearly all the import; whereas when the Russian trade was in full play, they got scarcely more than a fourth of it. From Liverpool, transshipments now take place to a few of the mills in the north and west, and London supplies the ports on the east and south coast, as well as the Continent. The total supply of the United Kingdom again shows a falling off of about 100,000 quarters, as compared with last year, and is 300,000 quarters less than the supply of 1853, being, according to the official returns, only about

700,000 qrs. in 1855 against	
827,714	1854
1,035,336	1853
796,561	1852
630,471	1851
603,986	1850
626,495	1849

The aggregate being made up of the following quantities:—330,000 qrs. from the East Indies, namely, 300,000 Calcutta and 30,000 from Bombay; Black Sea, 210,000 qrs.; all of which arrived during the early months of the year, and discharged as follows:—At Hull, 108,000 qrs.; London, 38,000 qrs.; Grimsby, 14,000 qrs.; Yarmouth, 9,500 qrs.; Ipswich, 7,000 qrs.; Lowestoft, 6,500 qrs.; Southampton, 6,000 qrs.; Dover, 5,500 qrs.; Newcastle, 4,500 qrs.; Dublin, 3,000 qrs.; Lynn, 2,500 qrs.; Liverpool, 2,500 qrs.; Boston, 1,500 qrs.; and Gloucester and Leith, each about 1,100 qrs. Besides which, a further 56,000 qrs. in vessels, which called at Falmouth for instructions, were ordered to sundry continental ports, and 44,000 delivered in Belgium, and 12,000 qrs. in Holland. Archangel supplied a solitary cargo of 1,200 qrs., which got away after the raising of the blockade, and the rest is made up of about 15,000 qrs. from Alexandria, 5,000 sundry Mediterranean ports, and 100,000 qrs. from the Prussian Baltic ports.

The 306,245 qrs. seed above stated into London were received from the following places, namely:—East Indies, 259,000 qrs.; Black Sea (including transshipments from Constantinople, and various Mediterranean ports), 38,000 qrs.; Alexandria, 2,300 qrs.; Baltic Ports, 4,800 qrs.; Archangel, 1,200 qrs.; and sundries, 1,200 qrs.

The re-export has been unprecedentedly large, amounting to nearly 130,000 qrs. The quality of the Black Sea seed was very various, and a good deal of it arrived very heated, having been shipped off in an ill-conditioned state, as fast as it could possibly be got to the seaboard, in the daily fear of an effective blockade being established. On the whole, however, it was quite up to the average of late previous years. Calcutta seed has, with few exceptions, been very indifferent; the quantity to be obtained, and not the quality, appearing the chief consideration of the shippers, giving a new character altogether to Calcutta shipments, and sadly to their prejudice. This, doubtless, has been caused by the anxiety to get away as much as possible to supply the deficiency of Russian seed, and is in so far, we trust, exceptional. Now that facilities for a larger trade become more developed, and the means of shipment better organised, we hope we shall see its former good character restored. The great outcry lately raised here on this subject will go far also to improve it, and thus, next year, we may have quite a different report to give. The Bombay continues of the most satisfactory description, and we are glad to see the quantity so greatly on the increase.

The Baltic seeds were of the usual mixed character, and chiefly consisted of low descriptions. Although all came from Prussian ports, part was evidently of Russian origin, thus further illustrating the highly profitable character to Prussia of her non-intervention policy. At the present time, we have in granary here about 28,000 qrs., namely 9,000 of Black Sea, 3,500 of Bombay, and 15,500 of Calcutta. There are also some cargoes of Alexandria, &c., at Falmouth, besides about 20,000 qrs. Calcutta arrived in the docks, but not yet landed, nearly the whole of which, however, is for transshipment to various outports and the Continent. On the way there is about 132,000 qrs.—say Baltic 10,000 qrs., Alexandria 8,000 qrs., Bessarabia (via the Danube) and Roumelia 10,000 qrs., Bombay 4,000 qrs., and Calcutta 100,000 qrs., by far the greater part being already sold to arrive.

Hitherto we have taken Black Sea seed as the standard price, but the altered circumstances of the times induce us this year to quote Calcutta for that purpose, and in doing so we wish to remind you that we write of good average seed, avoiding the fine Patna grain on the one hand, and the low mixed qualities equally so, on the other. It will probably be within your recollection that we had a dull market at 70s. when our last Annual Circular was issued: within a few days afterwards, the announcement of the desire of Russia to make peace caused quite a panic, which continued during January, and hardly a transaction was entered into until we had settled down to about 63s., which was some six

weeks subsequently. Early in March the startling news of the Czar's death reached us; and this circumstance, coupled with the opening of the Conferences at Vienna, induced every one to work out of stock, that a fall to 58s. took place. In April some of the Greek houses, receiving reliable information of the satisfactory progress of the negotiations, sold largely of Black Sea seed (for until now no blockade had been established of the southern Russian ports) at 56s., which price was the lowest touched during the year. At the end of this month the conferences were broken up, and with very excited markets we quickly recovered to 65s. on the spot, and 2s. to 3s. per qr. more money was paying for seed to arrive. A slight reaction followed, but the rise was too well grounded to be easily checked, and a further advance of 2s. to 3s. was established and maintained up to the end of June. In July the natural anxiety as to future supply kept the market in a feverish state, and a large export enquiry for seed, coupled with a good trade for cake, and a speculative rise in oil of £2 to £3 per ton, enabled holders to establish a further rise of 6s. to 7s. per qr., and about 75s. was a current price from then until the end of October. In November an animated demand for cakes, and a further speculative rise in oil, increased the value to 80s. (as high as 84s. was paid for Bombay on arrival); since which, the pacific rumours afloat have rendered our market very unsettled, and 75s. was again accepted at beginning of last month. To-day the market is quiet, but firm at 76s.

The future course of prices naturally enough depends on the duration of the war, but there is no doubt the present high rates are causing the development of resources in our East Indian possessions, which the most sanguine had not expected within so short a period. Already do we receive nearly as much from there alone as the total import of some years since, and should we have a protracted war, the larger cultivation and increasing facilities of transport in India, will render us wholly independent of Russia, and, whilst adverse to her, add greatly to the prosperity of our own dependencies. Our chief concern, however, is with the present season, the perplexing uncertainty regarding the extent to which pacific proposals have been considered, rendering it altogether out of the question to speak of another year. We have, therefore, simply to direct your attention to the following figures. To estimate the supplies correctly, we ought to take them for the period when the mills are actively at work, namely, from autumn to spring, and if we compare the imports from 1st July to 30th of the following June, the result shows as under:—

	Qrs.
1848-49, 1850 51, 1851-52.....	700,000
1849-50 .....	600,000
1852-53 .....	825,000
1853 54 .....	1,030,000
1854-55 .....	1,006,000
whilst 1855-56 will probably not exceed..	500,000

The actual import of seed up to June was in excess of the previous year by about 180,000 qrs., and at that time it will be remembered our stocks were all but exhausted, proving an unprecedented consumption, and to which we refer in a subsequent paragraph of this Circular. Since June the import is comparatively less, by about 300,000 qrs., so that it is scarcely necessary for us to add how very short the present stocks must be by comparison with 1st January, 1855; the mills closed, and the numerous others working only short time, tell their own tale in this respect. In the ensuing six months our supply will probably be about 250,000 qrs. In the first six months of 1854 it was 450,000 qrs., besides another 60,000 or 70,000 qrs., which went direct to the Continent. Crushers last year held to the utmost of their ability, fearing the blockade, always threatened, but so long delayed. The quantity here, and at Hull, in public warehouse, also amounted to 150,000 qrs., which this year does not exceed 60,000 qrs., so that, in fact, we anticipate a working deficiency (irrespective of the short stocks in the mills) of nearly 400,000 qrs. for home and continental use as compared with last season. Another element must be considered also in reference to the same subject, and that is the prospect of supplies for use early in the autumn of 1855. Should terms of peace be even immediately arranged, although they would induce every one to work quite out of stock, they would bring him but a very little increased supply of seed for next season. Russia until lately grew more than 1,000,000 qrs. of linseed for consumption in Europe, but there can be little expectation much was sown last seed time, with no prospect of a sale for it (especially in the south, which gives three-fourths of the whole). It is well known most strenuous exertions were made in the winter of 1854 to get off the whole of that year's crop; every district within reach was swept of seed, and at such rates as would alone have tempted the holders, irrespective of the great inducement to quit their stock in anticipation of the closing of their ports altogether. Neutral ships made short trips to and from Constantinople, from whence it was transhipped here, and it is well known nothing of that year's crop remained. To such an extent, indeed, was this carried, that the last shipment had to be supplied by three of the principal shippers, neither one having enough left to load up an entire cargo. Our very heavy arrivals up to May (none of which need we look for this spring) prove the success with which those efforts were crowned. It is also certain that the small crop sown for 1855 was a failure, sq

that it is impossible we can have any quantity of consequence until 1857. Besides which, the smaller craft, by which the seed was conveyed from the interior for shipment, have been all destroyed by hostile fleets, and such craft are hardly likely to be rebuilt, until their owners feel secure they will retain them. The ordinary mercantile establishments, too, are broken up, and a considerable time must necessarily elapse before the trade can be re-organized to its former extent.

LINSEED OIL has been subject to frequent, heavy, and most anomalous fluctuations during the past twelve months, and the proverbial uncertainty regarding it has in no wise altered, but seems on the contrary to have increased. It always was written of as a "slippery article," and has latterly well borne out its designation. Our first quotation last year was £39, and our second (a few days subsequently) £35 10s., this effect being brought about by the rumours of impending peace. It scarcely rallied during all February, although for future delivery, 30s. to 40s. per ton more money was occasionally paid. In March, when news was received of the death of the Emperor Nicholas, and the satisfactory progress of the negotiations, the value fell to £33 10s., an immense continental demand alone keeping it even at this reduced value, and it remained within about 10s. per ton of that price until towards the end of April. As soon as the news of the breaking off of the Vienna negotiations reached us, a sudden rise of £3 per ton occurred; but the stock both in warehouse and crushers' hands was so heavy, and the desire to realise so general (after the disappointing experience of the previous year), that the rise was with difficulty maintained during the month of May. When the cake trade had ceased for the season, a slight rally occurred, and from £38 a rise of fully £2 was firmly established during June, with much disposition to buy for future monthly deliveries at a considerable advance on this figure. In July, the market was very stiff, a further rise of £2 to £3 being made, and £43 10s. currently paid both by the home trade and for exportation; an almost immediate reaction set in, and £41 was accepted at the end of the month, followed by a rise early in August to £43, during which month also a considerable demand for the French market enhanced the value to £45. This unusual export demand supplied, the market relapsed to its previous quotation of £43, and, on the average, it has hardly varied since, the highest rate having been £44 5s., which was in November, and the lowest early last month, £41 10s., having been then reported accepted. To-day, we have buyers at £42 10s. to £43. The consumption of this article continues undiminished, notwithstanding the enhanced price since 1853, for it is still relatively much cheaper than any other oil or grease, and, from the make being within the last few weeks so materially reduced, probably in no previous year was there less stock than the present. In second hands likewise there is next to nothing, whilst last year several thousand tons were held. The export will be found in excess by about 2,000 tons, and amounts to 17,500 tons, or the same as in 1853. In 1854 it was 15,500 tons against 15,000 tons in 1852, and 13,500 in 1851. It is curious to note the alteration which has occurred in the period of exporting. Last year 11,000 tons went during January to June, and about 6,500 tons since; whereas in 1854, the proportions were reversed, being then 4,000 tons within the first, and 11,500 tons in the last six months of the year. Comparatively so little has been exported since June, particularly to the continental ports (which show only 3,000 tons as against 6,000 tons in 1854), that their stocks must be equally light with our own, and we look confidently for a considerable export demand, as in the early months of last year. We must say we cannot understand the apathy with which this article is at present regarded, for, with a make which this winter cannot exceed 25,000 tons against 50,000 to 60,000 tons in 1854 and 1853, and an undiminished consumption owing to its relative cheapness, it must, as the spring and summer advance, be found very seriously deficient. An immediate peace would not be likely permanently to depreciate its value for some months; Russian supplies must first come forward freely, and the causes which exist against the probability in any case of our getting much next season, are already shown in our article on linseed.

LINSEED CAKES met a ready sale during last winter and spring, and with all the mills at full work, a larger consumption must have taken place than during any former season. There was very little variation in the price of town-made from January to June, about £12 to £11 10s. for best makes being the current value. After that period the enhanced value of all descriptions of corn, and the rise in seed, produced a corresponding advance in cakes, and the price rose gradually until it reached £14 in November. The advance has not been sustained, and £13 is the value to-day, with a more than usual slack Christmas trade. The importation of foreign will be found about on a par with last year, namely 75,000 tons. The trade for the latter description has been very brisk all through the season, the demand being chiefly for American, of which our supply principally consisted. In June and July the dealers went very freely into the market for the purpose of holding over, but it was all used long before the regular consuming season, and they were free buyers at continually advancing prices, until November, when £14 5s. was paid for barrel American, and £13 15s. to £14 for bags; since that time we have had a quieter trade, and about 10s. to 15s. less money has been accepted. We quote the price of

New York barrels to-day, £13 15s.; New York and Boston bags, £13 10s.; Westerns in bags and barrels, £13, and thick round, £12 10s.; Square Marseilles, £12 10s.; Lille, £12 10s. cost and freight; and Belgian, £12 10s. to £12. It is stated that the present high price has materially interfered with the consumption of this article, but from all we can learn, it is more in idea than in reality: unquestionably less will be consumed, for the import of seed will not admit of so much being made by 75,000 tons! It is true, consumers buy as little as they can possibly do with, and dealers dare not hold stock at current values; but neither consumers nor crushers hold any stocks, and this shows that the actual consumption hitherto must have been very nearly on a par with previous years. Meat is about the same price, tallow £4 per ton dearer, and if the relative price of other feeding stuffs in former seasons is compared with that now, there is no disproportion, or if any, it is rather in favour of cakes, for barley is quite 30s. per ton dearer, beans 20s., and hay 35s., whilst cakes are not more than 20s. in excess of 1855. We argue, therefore, that with such a diminished make, as there must necessarily be, there is no room for any decline below present prices.

RAPESEED AND OTHER OIL SEEDS.—The importation into London shows a great excess, but as this port has received nearly all that came, the total into the United Kingdom presents only a moderate increase. No less than 100,000 qrs., or two-thirds of the London import, have been re-exported, the actual quantity left for home consumption being far less than for several previous years. We commenced the year with a price of 64s. for the best East India seed, and with a variation of not more than 1s. per qr., we had a fair demand up to the end of June; at this period the short quantity and bad condition of the continental crops having been clearly ascertained, the demand became so extensive that a steady rise occurred, and during July to September we had week by week to raise our quotations until they at length reached 75s. to 76s. The stocks are so light that the rise has been well supported, and from 75s. to 72s. have been paying since October. The quantity in warehouse at this time amounts to about 5,000 qrs. On arrival the value has always been 2s. to 3s. below the rates current on the spot, and once the difference was as much as 5s. to 7s., namely, in October, when the value was 75s. for arrived parcels, and we had sellers at 68s. for lots on the way. The quantity afloat is large, say 110,000 qrs., but it is likely to be all wanted, and the rates now paying will probably be current until after the harvest of the growing continental crops. All other oil seeds are scarce, and quoted as follows:—Sesame, 72s.; Teel, 69s.; Niger, 56s.; Gingelly, 70s.; Poppy, 66s.

RAPE OIL.—This article being now so universally used, has most materially increased in consumption, and in consequence has also become a favourite with speculators. The account has generally been bearish throughout the year, and frequently at the end of the months it has commanded 20s. to 30s. per ton more for settlement of contracts than for consumption. The price of refined opened at £54 10s. in January, and during February, March, April, and May it scarcely varied 20s. per ton, and was reported scarce and in steady demand all throughout this period. In June, after the great failure in the continental crops had been unmistakably ascertained, and in anticipation of the principal season for consumption, oil began to rise, and by the end of that month had reached £38, making a further 10s. rise during July. An increasingly large demand, and very light stocks, improved it to £62 in August, and to £64 in September, after which it declined temporarily to £59, but in November it again rose to £62 10s. During last month the market was quiet at £62. To-day it is dull at £61. The importation shows a serious decrease compared to the previous year, being about 5,000 tons against 10,600 in 1854, and 11,000 tons in 1853. There is no stock, and all indications of a continuance of present rates, owing to the high price of seed, and the general estimation in which this description of oil is now held for burning purposes.

RAPE CAKES have been in continued extensive request, and being much used for feeding, have to some extent kept pace in value with linseed cakes, and now bear a proportionately higher price than formerly. They scarcely varied throughout the spring and summer from £6 10s. to £7 per ton; but since September they have been firm at £7 10s., which is to-day's value, and the article is in steady demand. The probability is that this rate will show but very little variation for some months to come.

SPIRITS OF TURPENTINE was flat early in January at 39s., and very quickly receded to something under 30s., the price gradually giving way until end of March, when it touched 31s. During April it fluctuated from 33s. to 35s., and in May was steady at about 34s., down to 33s. in June, and further receding to 30s. during July. In August and September our quotations were dull at 32s. to 33s.; but early in October it rose rapidly to 38s., receding to 35s. 6d. before the end of the same month. In November it again recovered to 38s., but has since lost the advance, and last month was down again to 35s. To-day it is quoted 32s. 6d.

FISH OILS have fluctuated more than usual, and, as noted below, the tendency has been of an upward character. Spermin

oil was at £1.0 in January; £125 to £127 in March and April; £132 to £136 in May. After this it receded gradually until October, when it stood at £115, but has since recovered to £128. Pale seal has risen steadily from £43 to £57, and is very scarce. Southern is but little used now, and prices are very nearly nominal; net £43 to £46 were the spring and summer quotations, since when it has advanced to £50 to £52, and the latter is today's value. Cod oil was £43 in January; £41 in April, but has gone on advancing since until it now marks £49 to £50.

TALLOW has been subject to the most serious fluctuations throughout the year, and in the present political uncertainty, with a large consumption and a manageable stock, there is every prospect of its continuance in a very feverish state for the next few months. As in 1854, so in last year, prices have varied simultaneously with the events and prospects of the war. In following the course of prices it will only be necessary to call your attention to the facts narrated in the earlier portion of this Circular, to account for the rise or fall which has occurred, and we shall therefore content ourselves with merely quoting the fluctuations which have occurred, and they were as follows:—On 1st of January the price was 64s.; a few days subsequently it was 59s.; and receded step by step to 55s. before the end of February. There was quite a panic when the news of the Czar's death reached us, first week in March, and it was at once quoted 47s.; for a whole month it rallied very little, and early in April was still quoted 47s. 6d.; after that, however, returning confidence sent it up to 55s. at the end of the month, but the rise was not maintained, and 4s. to 5s. per cwt. less was accepted during May, leaving the value only 50s. We are, Sir,

Your most obedient servants,  
EDWARDS & EASTY.

80, Old Broad Street, London, 1st January, 1856.

CULTIVATION OF POTATOES.

DEAR SIR,—I have forwarded a gentleman's practice of growing potatoes, which is so good that I trust you will give your readers the benefit of it. This gentleman was one of the early purchasers of my Potato Pamphlet, and he has made large sums of money by following out the principles which I have recommended.

I am, sir, your very obedient servant,  
Camberwell, London. JAMES CUTHILL.

TO MR. CUTHILL.

DEAR SIR,—My plan for wintering potatoes is as follows: Having allowed the seed to green and harden on the land when the crop is raised (which causes the potato to make a firmer shoot), I place them in a barn end, and cover them over with straw until the end of January, by which time I find, by having been kept warm, they begin to show shoots. They are then laid out as thin as we can, say six inches deep, and so remain until they are planted, by which time the shoot will be quite firm. I never like to plant a potato less than one inch in diameter, and set them whole. I always preserve the strongest and best manure I make, a considerable portion being from pigs.

My land for next year's crop is now deeply ploughed; as soon after the first week in February as it will work, I shall harrow the top fine, put on twelve tons of manure, well spread it, and then set my crop as follows:—Each plough has two women to follow it, with sets, who plant the potatoes in every third furrow. The ploughs are set so as to leave a space of 26 inches between the rows, and we place the sets 14 inches apart. This appears wide, but I have tried and weighed all distances from 8 to 14 inches, and find 12 and 14 inches the best; and the latter distance has this advantage—it produces as much weight and less small potatoes, and also takes less seed for planting. Having ploughed them in, I leave the land exactly as the plough lays it; thereby it is open and light underneath, giving the potato room to throw out the wires; and being rough on the top, weeds do not get forward. As soon as the plants are well up in the rows, I roll the land down, and harrow it with a pair of light harrows, which moulds up the plants, and gives you a fine top. As soon as necessary, I hoe the rows well, cleaning out all weeds, and then mould them up. I find this plan inexpensive, and produces fine crops. The care of the seed is not so fully carried out as by your instructions, but I think it is close enough to your principle to derive all the benefit, and is more in accordance with a farmer's means, space of premises, &c., &c.

I remain, yours truly,  
E. C.

Water Newton, Jan. 9, 1856.

DEAR SIR,—In reply to yours I beg to say that I have never cultivated any sorts of potatoes but the "Regent" and "British Queen"—two varieties so similar in shape and size that there is little other difference in them than that the latter is an earlier sort by about ten days.

If you examine a sound potato, you will find one or two eyes at one end, and from four to five at the opposite; I rub off the shoots from the end last mentioned, leaving only the two; and hereby they are stronger. With the exception of three fields, which are good deep gravel, my farm consists of mixed soils; indeed, I can dig brick, clay, and gravel or stone, in every other field I occupy. When I took it, I found the strata of clay drained twelve inches deep, for which it was none the better: to the horror of my neighbours, I cut through that, five feet deep, into the gravel, where I found the water pent up. The clay is now disappearing entirely, for want of one of its component parts—water. I get good crops of potatoes on all these varieties of soil, generally the finest tubers on the strongest land. Since I have followed your plan of carefully attending to my seed—early sowing, early digging—I have had no disease of consequence; and for the last three years have not seen a really diseased tuber.

Yours truly,  
E. C.

Water Newton, Jan. 11, 1856.

P.S. I plant about sixteen acres yearly; this year I shall have eighteen acres.

TITHE COMMUTATION.

SIR,—As your readers may feel anxious to know the result of the Corn Averages for the seven years to Christmas last, published by authority in the *London Gazette* of yesterday, viz.,

	s.	d.	
Wheat . . . . .	6	6	per imperial bushel,
Barley . . . . .	3	8½	ditto,
Oats . . . . .	2	7½	ditto,

I beg to state, for their information, that each £100 of tithe rent-charges will, for the year 1856, amount to £93 18s. 1¼d., which is a little more than 4 per cent. above the last year's value.

The following statement, from my *Annual Tithe Commutation Tables*, will show the worth of £100 of tithe rent-charge for each year since the passing of the Tithe Commutation Act, viz.:—

	£	s.	d.
For the year 1837 . . . . .	98	13	9¾
1838 . . . . .	97	7	11
1839 . . . . .	95	7	9
1840 . . . . .	98	15	9½
1841 . . . . .	102	12	5¼
1842 . . . . .	105	8	2¾
1843 . . . . .	105	12	2¼
1844 . . . . .	104	3	5¼
1845 . . . . .	103	17	11¼
1846 . . . . .	102	17	8¾
1847 . . . . .	99	18	10¼
1848 . . . . .	102	1	0
1849 . . . . .	100	3	7¾
1850 . . . . .	98	16	10
1851 . . . . .	96	11	4¾
1852 . . . . .	93	16	11¼
1853 . . . . .	91	13	5¾
1854 . . . . .	90	19	5
1855 . . . . .	89	15	8¾
1856 . . . . .	93	18	1¼

20 ) £1972 12 7½

General average for 20 years . . £98 12 7½

I remain, sir, your most obedient servant,  
CHARLES M. WILlich,  
Actuary University Life Assurance Society.  
25, Suffolk-street, Pall Mall East,  
12th Jan., 1856.

## METEOROLOGICAL DIARY.

BAROMETER.			THERMOMETER.			WIND.		ATMOSPHERE.			WEAT'R.
1855-6	8 a.m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a.m.	2 p.m.	10 p.m.	
Dec. 22	in. cts. 29.82	in. cts. 29.90	14	27	27	Variable	gentle	fine	cloudy	fine	dry
23	29.53	29.49	24	45	43	S. West	brisk	cloudy	cloudy	fine	rain
24	29.60	29.66	38	47	42	S. West	lively	cloudy	fine	fine	rain
25	29.66	29.43	38	45	41	S. West	calm	cloudy	cloudy	cloudy	rain
26	29.27	29.26	40	48	47	S.W., S.E.	strong	cloudy	cloudy	fine	rain
27	29.53	29.62	45	50	46	S.S.W.	gentle	cloudy	fine	fine	dry
28	29.62	29.73	41	50	49	S.S.W.	lively	fine	sun	cloudy	dry
29	29.91	30.00	43	48	47	S.S.W.	lively	cloudy	cloudy	cloudy	dry
30	30.10	30.28	41	47	39	S.S.W.	gentle	fine	sun	fine	rain
31	30.28	30.09	38	48	33	S.S.W.	gentle	cloudy	sun	fine	rain
Jan. 1	29.95	29.82	32½	42	42	S. by E.	lively	cloudy	cloudy	cloudy	dry
2	29.70	29.55	38	48	44	Easterly	var.	cloudy	sun	fine	dry
3	29.55	29.57	40	45	44	South	gentle	cloudy	cloudy	cloudy	rain
4	29.65	29.64	41	44	43	E., S. by W.	gentle	cloudy	cloudy	cloudy	rain
5	29.54	29.45	41	50	47	South	gentle	cloudy	cloudy	fine	rain
6	29.35	29.17	44	47	46	S. East	gentle	cloudy	cloudy	cloudy	rain
7	29.11	29.00	40	50	42	East	airy	cloudy	sun	cloudy	dry
8	29.00	29.15	38	42	40	North	gentle	cloudy	sun	cloudy	dry
9	29.15	29.17	38	34	38	E. by N.	gentle	cloudy	sun	cloudy	snow
10	29.33	29.57	34	37	30	N. East	gentle	cloudy	sun	fine	dry
11	29.82	30.02	27	33	31	N. East	lively	cloudy	fine	fine	dry
12	30.25	30.45	29	34	31	North	fresh	haze	sun	fine	dry
13	30.60	30.54	24	37	27	N. East	gentle	fine	sun	fine	dry
14	30.32	30.08	25	36	26	E. by N.	brisk	fine	sun	fine	dry
15	29.96	29.00	24	41	39	S. Westerly	gentle	fine	sun	cloudy	dry
16	29.92	29.85	37	42	40	S. Westerly	airy	fine	cloudy	cloudy	rain
17	29.61	29.50	38	45	48	S. Westerly	lively	cloudy	cloudy	cloudy	rain
18	29.42	29.43	45	49	45	S. Westerly	airy	cloudy	cloudy	cloudy	rain
19	29.30	29.22	43	48	45	S. Westerly	lively	cloudy	cloudy	cloudy	rain
20	29.17	29.08	45	48	46	S. Westerly	airy	cloudy	cloudy	cloudy	rain
21	29.09	29.07	44	50	49	S. Westerly	gentle	cloudy	cloudy	cloudy	

## ESTIMATED AVERAGES OF JANUARY.

Barometer.		Thermometer.		
Highest.	Lowest.	High.	Low.	Mean.
30.77	28.80	52	11	36.1

## REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
43.77	36.0	39.88

## WEATHER AND PHENOMENA.

December 22. Coldest; variable; double clouds.—23. Rapid change; wind and showers.—Much rain for several days (total fall of the month, 1 in. 71 cts.).—31. Fine and sunny.

LUNATIONS.—Full moon, Dec. 23rd, 19h. 39m. A.M.; last quarter, 31st, 0h. 4m. P.M. (five changes in December).

January 1, 1856. Overcast.—2. Sunny, with at night a shower.—3. Overcast, drizzly.—4. Occasional gleams.—5. Damp.—6. Changeable and showery.—7. Fine till sunset.—8. Overcast.—

9. Cold, with sleet and snow (melting).—10. Frosty.—11 to 15. Frosty period.—16. Sudden thaw.—17. Confirmed. From this date, an overcast sky; repeated drizzle; sharp shower on the 19th evening.—20 and 21. Cloudy, with small rain at times; last evening wet.

LUNATIONS.—New moon, 7th, 11h. 17m. P.M.; first quarter, 14th, 3h. 43m. P.M.

## REMARKS CONNECTED WITH AGRICULTURE.

A changeable period. One access of severe frost, terminated abruptly on the 23rd of December. On the 22nd, a frost of 28 deg. produced 5 inches of ice, and must have mellowed the ground deeply. Every fact, however, demonstrates the inadequacy of our draining. The land wants a deep tillage of at least 20 inches; and that, with a system of drains 12 inches deeper, would develop the resource and productiveness of our favoured land. Without them, generous, high farming is unattainable.

Croydon, Jan. 21.

JOHN TOWERS.

## CALENDAR OF AGRICULTURE.

This month introduces the spring quarter of the year, and in early climates begins the sowing of crops, as early peas on newly-stirred soils, in broadcast or by drilling; beans may be dibbled by hand or in ridges, or by drilling on the flat surface. Sow spring wheat on lands where sheep have consumed the turnips, and on last year's clay fallows, if any left from autumn sowing; sow spring vetches for feeding horses and sheep, and mix with barley, oats, or beans; sow cabbage-seeds on warm and well-prepared grounds, for plants to go to the field in May and June.

The general operations in this month will continue the ploughing of leys for Lent crops, and of stubbles, where impeded by frosts and snows during the previous month. In frosty weather, carry dung from the cattle-yards to the fields, earths for composts, and stones for drains. Provide fresh straw for live stock by regular thrashings, and provide a store of straw not to impede the spring work that is now approaching.

Begin to feed the fattening cattle with oil-cake, broken or bruised, in troughs for cattle in the yards, and for sheep in the fields. It much hastens fattening, and greatly improves the quality of the dung. Oats are very well used with it, and a portion of salt. Ewes will now drop lambs very fast: attend to shelter and ample supply of food. In good weather pull, dress, and lay in store-heaps turnips of all kinds, that the grounds may be ready for sowing. Continue the feeding of beasts in the yards, as has been directed.

Plant during fresh open weather, on suitable grounds, all kinds of forest trees, especially oak, ash, elm, and larch; the second year cut close by the ground all sprouting trees, to secure a more vigorous growth; and when two or three years grown, cut away all other shoots, leaving the strongest and most vigorous for a tree. Plant osiers in rows, on beds made on low damp grounds, that are not convenient for other use by reason of inundations. Lay the beds as dry as possible, and done a year before planting. Cut underwood, and fell timber during the whole month; plant new hedges, and plash and repair old ones.

Prepare artificial manures of all kinds possible, flood meadows, and, if the weather be fine, lay dung on grass lands, rough or strawy; bush-harrow and roll in dry weather, and pick off by hand the stones and rubbish. Begin to repair gates and fences, and to put grass lands into order by spreading tufts and mole-hills, and by removing any obstructions,

Dig hop grounds, open the hills, and apply strong manures—well-rotted farm-yard dung, composts of lime and salt, rags, and briny oleaginous substances do well. Dress the roots, and cut off the shoots for sets.

Continue underdraining and subsoil ploughing, and the thrashing of grain; sell and deliver it.

Collect and prepare all substances that can be burnt into ashes for manure.

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POTATO CHOLERA.—This inscrutable disease has greatly prevailed in this region again the present year, and it is almost an absurdity to speculate on its cause, as every suggestion as yet on that subject proves unreliable and futile. The preventive nostrums which have been time and again proposed by speculators and investigators, are at a dead fault. If Rochester knockings and spiritual mediums are to be of any benefit to mankind, they should be interrogated, and settle this much mooted point. There has, perhaps, been double the usual breadth planted with potatoes this year, owing to the high prices during the winter and spring—and many of them very late and in situations where it was too wet for corn until its period was passed. It has been a year of much rain, which, with late planting, is generally supposed to be provocative of the disease. In proof of which supposition, all those planted early and on high, light ground have mostly escaped infection. Early varieties, like the Early June and Manly, which ripened before the appearance of the curl on the leaf, have entirely escaped, and if we are to be annually visited with this pestilence, it would be well for farmers to turn their attention to this variety, as it produces fair crops and is as edible as any of the yellow-fleshed kinds. The great bulk of the loss this fall has occurred since digging and burying, and many large pits in three or four weeks became a perfect undistinguishable mass of rot and decomposition—particularly those buried wet, while those thoroughly dried and put in small lots in the cellar have not materially increased in the affected parts. We should like to hear from any of our readers, if they have tried either of the two leading nostrums recommended the past year,—one, the cutting off the vines close to the ground on the first appearance of the curl; and the other, thoroughly drying the tubers, after cutting, at a heat near to scalding water—both very strongly asseverated under hand and seal of the discoverers. We are not able to conjecture any reason why the cutting off the tops or vines should not arrest the growth in an immature and imperfect state, greatly reducing the quantity and injuring the quality. The generally received opinion of vegetable physiologists is, that the *virus* causing the disease is received through the leaves—the lungs of plants—and distributed by means of the circulation of the sap or the prepared pabulum for the increase of the tuber. The potato tuber has no roots—no spongioles whereby nutriment is procured to increase its bulk, and its sustenance is only derived from the single *umbilical* cord attaching it to the roots of the vine. The leaves of all plants are almost perfectly analogous to the lungs of the

animal being, through which a great portion of our diseases are derived, particularly the febrile and contagious ones, which sustains the probability that the potato rot has its origin from that source—some invisible *miasm* in the atmosphere,

that chemical science has as yet been unable to detect. It may be a fungus; a mildew; a filiform gossamer, on which rides the destroying angel; cholera.—*Moore's Rural New Yorker.*

## THE LATE PROFESSOR JOHNSTON.

BY A SCOTTISH FARMER.

Our readers will already be apprised of the melancholy death of Professor Johnston, which took place at Durham on the 18th of September last. We embrace the first opportunity afforded us of paying a passing tribute to the memory of one who has enriched the pages both of this Journal and of the *Transactions of the Highland Society* with his contributions. We are sure that we will meet with the sympathy of all lovers of scientific agriculture, in our expressions of grief at the loss of one of its principal promoters.

A Scotchman by birth and parentage, Johnston received that solid education usually given to the children of the middle classes in his native country. We are not aware that he manifested any predilection for the natural sciences before he went to Glasgow University to prosecute his studies; where, after his attendance at the chemical class, he resolved to devote his attention more particularly to chemistry. With this view, after grounding himself in his favourite science, he went to Sweden, and studied under the celebrated Berzelius. The years immediately succeeding his return to this country, and after his appointment to the office of Reader in Chemistry and Mineralogy in the University of Durham, were devoted to investigations in the laboratory, which he prosecuted with the greatest ardour. The results of his labours were, at this time, confined to valuable communications to the British Association, and interesting articles in some of the principal scientific periodicals of the day; so that his name was comparatively unknown, save to a limited circle of men of science.

Scientific agriculture, with which his name is now principally associated, did not appear to have occupied much of his attention till 1841, after the first part of Liebig's brilliant report upon the state of Organic Chemistry had been laid before the 'British Association for the Advancement of Science'. Occupying a high position in science, he, nevertheless, devoted his talents and energies to explaining to farmers the scientific principles of their profession. His *Lectures on Agricultural Chemistry and Geology*, addressed to practical agriculturists, bear testimony to the great success which attended his attempts to make everything plain to his hearers and readers; for "everything," he said, "in such lectures, which is not, or may not be easily understood by those to whom they are addressed, is worse than useless." And yet these lectures, addressed to a non-scientific audience, form one of the standard works in agricultural science. Not content with teaching the farmers the hidden truths of his favourite studies, he addressed himself to the children also, and used his utmost endeavours to have a class established in our parochial and other schools, for teaching the elements of agricultural chemistry, and, with this view, published his *Catechism of Agricultural Chemistry and Geology*, which has been of immense benefit to more than teachers and scholars. Its wide circulation has been evidenced by the publication of nearly forty editions.

His mind and pen were ever active to keep pace with the rapid progress of agriculture, and from time to time, important elementary and other works were issued by him, bringing before the farmer the latest discoveries in the science of his profession. Among these works we may particularise his

*Elements of Agricultural Chemistry and Geology*, which has already reached a sixth edition, and is mainly an abridgment of his lectures, with the subject still more popularly treated. His *Experimental Agriculture* is an admirable digest of all the published agricultural facts at the time; and though the suggestions for future experiments therein offered have been considered by some practical men as comparatively worthless, from their having failed when tried, we ought not to forget, in judging of them, that the facts at his command were comparatively few, and that, probably, the experiments suggested were tried under circumstances totally different from those on which he founded his opinions. His work *On the Use of Lime in Agriculture* brings before us all that is known on that important subject, displaying that searching diligence for which he was distinguished, and the power he possessed of explaining the simplest facts by a reference to scientific principles. And we must not omit to mention his *Contributions to Scientific Agriculture*, which is a collection of the very valuable and interesting papers which were published by him when Chemist to the Agricultural Chemical Association of Scotland.

He accepted an invitation to deliver a course of lectures in North America; and on his return he published the results of his observations. As was to be expected from his powers of observation, his extensive scientific acquirements, his knowledge of the applications of science to agriculture, and his clear and attractive style, his *Notes on North America* forms one of the best books on that country, and is alike interesting and instructive to the general reader, and most useful to the emigrant.

Were we to attempt to characterise the lectures and writings of Professor Johnston, we would say that they were eminently suggestive. He carried his hearers and readers to the very verge of known truths, to the *ultima Thule* of well-ascertained facts; but he did not leave them there—he showed them what they might expect to find beyond, and suggested how they might discover it. We have often thought that it was owing to this—a power of inspiring hopes in his readers and hearers—a most invaluable quality in a lecturer or writer—that some practical men were apt to consider him too theoretical in his suggestions and advices. But this was a mistake, arising very often from a misapprehension of his meaning—a want of discriminating between what he said would happen, and what might happen. We believe that, carried away sometimes in conversation by an enthusiasm in his studies, he did make statements to which few practical men would subscribe; but such were sedulously avoided in his lectures and works. We are certain of this, that there was none more conversant with the mass of agricultural facts published, and none who subjected these to a more rigid examination and comparison, than Professor Johnston. We will not extend this sketch by any laudatory expressions of ours. His works bear testimony of what he has done for science, for the instruction of the people, and for agriculture; the last of which, in particular, is deeply indebted to him for his valuable services,—services which will be ever more highly appreciated and acknowledged the more advanced the state of agriculture becomes.—*Journal of Agriculture.*

## AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR  
JANUARY.

The state of the weather has been a source of some anxiety to the farmers: numerous changes, many of them by no means beneficial to the land, have been observed in it, and the progress of outdoor farm labours has been slow compared with some previous months. It must, however, be satisfactory to learn that our accounts from nearly the whole of the leading districts, bearing upon the general appearance of the winter wheats, are favourable, and, further, that a very large breadth of land, compared with former years, is now under cultivation. The state of the political atmosphere has been productive of great anxiety, and a slight panic in the trade for wheat and other produce, followed by a corresponding reduction in prices, has been the result. Statements have been published tending to give a further depression to the quotations; but a little calm reflection on the part of the growers must lead to the conviction that to sell grain at a considerable reduction would be an act not warranted by present supplies, or by the prospect of future arrivals. It is just possible that we shall have peace with Russia, from the force of circumstances, because it is clear that that power is no longer in a position to continue the struggle; and the question is, what amount of supply will peace bring us from that country? Now, unquestionably, our wants, as well as those of France, are large; that the whole world will have to ship largely to keep down prices to their present level; and we may safely assert that the stocks remaining in this country are wholly inadequate to meet our requirements. Russia, it is well known, has made enormous sacrifices. She has withdrawn a large amount of able-bodied labour from the soil, and she has suffered from the failure of her harvests both in Poland and in the southern provinces. Had the war progressed favourably to Russia, and had there been no failure of the crops, we might well regard peace as the great indicator of plenty; but we feel great doubt whether the actual exports from the whole empire this year (assuming that peace will be shortly concluded) will be sufficiently large to exercise any great influence upon our quotations: indeed, this appears to be the opinion of most parties conversant with the trade. The prospects of peace, however, have induced great caution on the part of millers and others in adding to their stocks; and there appears to be a decided

determination amongst dealers generally not to purchase beyond immediate wants. Spring corn and flour have become heavy from the same cause, more especially as the imports of the former from European ports continue seasonably good, and as the arrivals of the latter, both from Spain and the United States, show no falling off.

As regards the supply of wheat at this time in the hands of our growers, we find that a great difference of opinion prevails on that subject. It is, however, tolerably evident that not a few farmers have under-estimated the yield of last year, and that they now find comparative abundance where actual scarcity was at one time apprehended. These features, coupled with the steady arrivals of food from abroad, and the prospect of heavy shipments of grain and flour from America, have rendered us in a great measure independent of Russian produce; and it would appear as a generally accepted principle, that prices of wheat have seen their highest range of value. We may mention one other cause which has operated against the value of wheat, viz., the immense abundance of the potato crop. Now, it will be recollected that, shortly after it was raised, we stated that we had secured a very large growth, notwithstanding that disease was observed in some districts; and the result of the trade during the last two months has fully confirmed the view we then took. Not only in England, but likewise in Ireland and Scotland, the root has turned out most abundant; and so large have been the supplies forwarded to the metropolis, though partly in bad condition, that growers have given way, from the impossibility of finding a demand. High prices invariably result in a decreased consumption, and this has been partly the case as respects wheat. True, we find that full average quantities of English wheat have been sold during the month; but then we perceive that the transactions in foreign have been on a very limited scale, the actual demand for food having evidently been made good by the large arrival of potatoes.

The various cattle markets have been tolerably well supplied with both beasts and sheep, but the demand for them—arising, in some measure, from the low value of rough fat—has been heavy, and prices, though fluctuating, have given way. The supplies to come forward this season from Norfolk are stated to be very large and in good condition, and we may anticipate extensive arrivals of beasts from Scotland. As regards future prices, we are

of opinion that they will not be so remunerative as were those of last year, because we perceive that supplies have in reality become more equal to our wants.

Both meadow and clover hay have continued to sell at very high rates; but the value of straw has been rather drooping. In the stock districts a large quantity of roots for consumption is still on hand.

The wool trade has become in a more healthy state than for some months past, and prices have shown a tendency to advance. The next sales of colonial wool will be held about the 20th of February.

In Ireland and Scotland most agricultural affairs have progressed steadily. The corn trade, however, has relapsed into a state of great inactivity, and prices have ruled lower.

### REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

The continuous changes in the weather, added to the immense supplies of slaughtered meat which have been received in the metropolis from Scotland and various parts of England, have had a most depressing influence upon the cattle trade during the greater portion of the month; and we have, consequently, to report a serious decline in the general quotations, although prices improved to some extent on the 28th. Another cause, viz., the sudden fall of 8d. per 8 lbs. in the value of rough fat, in consequence of the great depression in the price of tallow, the result of peace prospects, has induced butchers, generally, to purchase with extreme caution; and, altogether, the trade has been by far the most unsatisfactory we have had to report for many months past. That the numbers of both beasts and sheep exhibited in the Great Metropolitan Market have not been in excess of most corresponding periods, must be evident from our returns; but at the same time we must remark that, compared with the arrivals in the last six months of 1855, the stock, as regards weight, has come to hand in a much better state, though its condition has not been to say prime, if we except the supplies from Norfolk. As the graziers in that county have a full average supply of winter food on hand, and as we have received very few complaints as to the health of the stock generally, we may safely calculate upon full average arrivals from that county during the remainder of the season.

The heavy fall in prices has led many persons to the conclusion that consumption is rapidly falling off: we, however, entertain a contrary opinion, and we are convinced that the inactivity in the trade is

the issue of two causes, viz., unfavourable weather and over-abundant supplies of dead meat, together with the dulness in the tallow market; on this latter point, much might be said, though of a speculative tendency, because until peace is actually concluded, it is impossible to state with accuracy at what price rough fat may be selling. And the question to consider is, are we likely to have an abundant supply of that article? Judging from the state of those districts from whence the principal portion of our bullock supplies will be drawn for some months, we should incline to the opinion that the supply of fat will be somewhat large: in the event, therefore, of our information proving correct, and in the event of a speedy peace, it would appear certain that fat stock has seen its highest range of value. But here another question presents itself; in previous *Reviews* we have dwelt upon the enormous demand for stock in Holland, on French account; this demand has drawn from England large numbers of both beasts and sheep which otherwise would have been shipped to England. But already, we find that French dealers are less eager in their purchases, and that prices have as a consequence become more moderate in Holland. It must not, however, be assumed that we shall receive over-abundant imports this year, because the Dutch graziers are not in a position to meet any great excess in the demand; but as the markets throughout France have become much better supplied with native cattle, and as profits are now less certain, we may look for rather increased numbers being forwarded to this country, compared with last season. The total arrivals into London during the month just concluded were as follows:—

	Head.
Beasts .....	1,688
Sheep .....	1,227
Calves .....	377
Pigs .....	..
Total.....	3,292
Same time in 1855 . . . . .	9,102
„ 1854.....	7,919
„ 1853.....	12,847
„ 1852.....	10,567
„ 1851.....	9,018
„ 1850.....	3,220

Thus it will be seen that our importations of foreign stock, taken on the average of the six preceding years, for the month of January, have been unusually small. The severity of the weather on the continent has greatly interfered with shipments, and those which have come to hand have exhibited very little improvement in quality.

The total supplies of stock exhibited in the Great Metropolitan Market have been

	Head.
Beasts .....	17,532
Cows .....	435
Sheep .....	101,600
Calves .....	757
Pigs .....	2,930

COMPARISON OF SUPPLIES.

	Jan., 1852.	Jan., 1853.	Jan., 1854.	Jan., 1855.
Beasts ..	17,325	20,717	19,687	19,717
Cows ..	442	480	510	500
Sheep ..	102,976	96,800	95,080	120,470
Calves ..	1,336	2,148	887	962
Pigs ..	2,515	2,360	2,279	2,625

The highest and lowest quotations realized last month were as under:—Beef from 2s. 10d. to 4s. 10d.; mutton, 2s. 10d. to 5s.; veal, 4s. 2d. to 6s.; and pork, 3s. 8d. to 5s. per 8lbs., to sink the offal.

COMPARISON OF PRICES.

	Jan., 1852.		Jan., 1853.	
	s. d.	s. d.	s. d.	s. d.
Beef.....	2 4	to 3 10	..	2 6 to 4 2
Mutton ...	2 8	4 4	..	2 6 5 0
Veal.....	3 0	4 0	..	3 0 4 8
Pork.....	2 8	3 10	..	2 10 3 10
	Jan., 1854.		Jan., 1855.	
	s. d.	s. d.	s. d.	s. d.
Beef.....	3 0	to 4 10	..	3 2 to 5 0
Mutton ...	3 2	5 4	..	3 4 5 0
Veal.....	3 4	5 6	..	4 2 6 0
Pork.....	3 4	4 10	..	3 0 4 4

From Norfolk, Suffolk, Essex, and Cambridge-shire we received about 8,000 Scots and short-horns; from the northern counties, 900 short-horns; from other parts of England, 1,850 of various breeds; and from Scotland, 1,480 Scots. There have been about 900 beasts, 1,200 sheep, and 2,500 pigs on sale from Ireland, partly direct by sea, but chiefly *via* Liverpool. This stock has come to hand in good saleable condition, but the dead weights have much disappointed the butchers.

It is calculated that fully one hundred thousand carcasses of Scotch and country-killed meat have been received up to Newgate and Leadenhall in the course of the month. This enormous supply has caused the trade to rule heavy, as follows:—Beef, from 2s. 10d. to 4s. 4d.; mutton, 2s. 10d. to 4s. 4d.; veal, 3s. 10d. to 5s. 4d.; pork, 3s. 4d. to 5s. 2d. per 8lbs. by the carcass.

B E D F O R D S H I R E.

In sending you this, our first report for 1856, it may perhaps prove interesting if we take a retrospect of the harvest of last year, and its results, which are now pretty well ascertained—glance at the operations which have since taken place, and give you a short sketch of our present state and prospects. It was a happy circumstance that the weather was most propitious during the operations of last harvest; never was there a

finer opportunity offered for securing our crops in excellent condition, and those farmers who failed to do so have only to charge themselves with their own apathy or indolence. Much doubt was expressed about the probable produce of the wheat crop. The intense frost and the boisterous driving east wind which prevailed during the first few months of last year had damaged to a great extent, and in many parts utterly destroyed, the young plant; but this took place only on the exposed hills, and light sands, chalks, and gravels of this county. On the retentive soils, which form the larger part of it, the crop where the land was properly drained promised well, and has not deceived the expectation. On the whole, then, we gather, and believe, that whilst the wheat crop here falls short of that of 1854 by about twenty per cent., still we secured about an average crop—that of 1854 having exceeded an average to that extent. That the crop has been consumed to a vast extent, may be gathered from the fact that we have been told lately by all the owners of the portable steam thrashing machines that we know, and who work for hire (and these are not a few), that from harvest until this time their employment has been without interruption, and that their means have been quite inadequate to the calls made upon them. Our barley crop, in point of quantity, was certainly beyond an average; but as in general is the case, where the crops are very heavy, but a very small portion of the produce is of fine quality. This has been eagerly caught up by the maltsters, as much as 48s. per qr. having been paid in Bedford market. The heavy malt duty, which applies alike to all qualities, causes a wide range in this description of grain. Oats, beans, and peas an average crop. The turnip crop has had (although at first promising well) so many difficulties to contend with that it may be deemed now almost a failure. Late in August the leaves of the most luxuriant plants, as well as others, became covered with myriads of lice, which completely checked their growth, and in some cases destroyed the crop. Then came mildew, and fingers-and-toes (grapes), to an extent altogether unprecedented; and it was not until the rains which ushered in November that the plants exhibited any return to vitality. In the hope that, although late, they might still improve, farmers in general neglected to pull them until past the usual time; then came the intense and early frost in December, which, acting on the diseased bulbs, completely effected their ruin. Such have amongst a once fine crop it has never been our lot to see before. As a pleasant reverse, we may state that the crops of mangel-wurzel were never finer, and were all secured in good order. It would give us much pleasure to see this invaluable crop cultivated to a far greater extent; and as the land in this county gives each year more and more unmistakable evidence that it is becoming wearied of the oft-repeated swede, we have no doubt but that it is destined before long largely to supply its place. In considering the weather which has taken place during the last few months, and referring to our diary to help our recollection, we are thankful to acknowledge that, on the whole, it has been most propitious to the active agriculturist. Wheat was never committed to the soil under more favourable auspices; nor did we ever see it at this period present a more cheering aspect. Slug and wireworm appear to have absented themselves, and the plant is regular and flourishing. We believe the quantity of acres sown is under the usual extent; and this is not surprising, when we recollect the great breadth devoted to this grain during the two previous years. Winter ploughing is well advanced, and the general condition of well appointed farms is satisfactory. Stall-fed cattle have this season entailed a most serious loss; the high price of linseed cake is far from adequately met by that of beef. Our corn markets were cheerful and buoyant until the close of last week, when the anticipation of an early peace put a stop to all business in grain for a time. A rally must, however, soon take place; the consumption of the miller will not be lessened; and where for the next few months are we to look for increased supplies, from the continent? We indulge a confident hope that in the struggle for improving cultivation, this county will not be behindhand in the race; and, with the example and encouragement which is proffered not only by the most extensive proprietor, but by many extensive proprietors, it were shame were it not so. On their part we see everywhere around us new piles of farm buildings, excellent cottages for the labourer, small enclosures disappearing, miles of old hedgerow stocked up, and extensive parties of drainers employed.

Among the tenantry we see each year improved cultivation, a more liberal use of fertilizers, more perfect implements, and steam-power and complete sets of barn machinery introduced. To such perfection has the latter been brought in many cases, that the most experienced purchasers cannot distinguish the barley which has been prepared by it from that which is thrashed by the flail. We have however two or three antiquated maltsters in our markets who will not buy any barley without being assured that it has been thrashed by the flail, and then they will give three or four shillings per quarter more than the market price. But some sad tricks are frequently played upon these worthy men.—Jan. 25.

## AGRICULTURAL INTELLIGENCE, FAIRS, &c.

**AYLESBURY JANUARY FAIR**, (Friday last.)—There was a large supply of Cow stock, and there being a good attendance of dealers, very little remained on hand at the close, prices being as follows: Milch Cows, £10 to £19; barreners, £8 to £12; and stirks, £4 to £7 each. There were very few Horses on offer, and trade rather dull, prices asked being very high. Sheep in short supply, and trade dull, at the following quotations: Store wethers, 26s. to 40s.; store tegs, 18s. to 28s. each. In Pigs very little doing, at high prices.

**BANBURY FAIR**.—Fat beef was in good supply and demand at a reduction in price, the prices being from 4s. to 4s. 4d. per stone. Store cattle did not sell quickly, but former prices were maintained. We had an average supply of sheep, but buyers would not purchase except at reduced prices; consequently the trade was very flat. We quote the prices, ewe mutton from 3s. 6d. to 3s. 8d., and shearlings 4s. 4d. to 4s. 6d. per 8lbs. The supply of horses was but limited, there not being near so many in the fair as in former years, whilst the attendance of buyers from all parts of this district was more numerous than heretofore. Good cart horses and nags were very scarce, by far the greater number of those exhibited for sale being of an inferior quality. The highest prices obtained were 75 or 76 guineas; but we may safely say that the prices realized were equal to the value of the animals. There was a great demand for good horses, and the supply being so short, many of the dealers had to leave the fair without making a purchase.

**BEDALE FORTNIGHT FAIR**.—We had a good show of fat beasts and sheep, which were readily sold at last market's rates. Lean stock and in-calvers were in request. Beef, 6s. 6d. to 7s. per stone; mutton, 5½d. to 6½d. per lb.

**GLOUCESTER MONTHLY MARKET** was abundantly supplied with beasts and sheep, which were of an inferior quality; consequently many remained unsold, and the trade was generally dull. Beef realized from 6½d. to 6¾d.; mutton, 6½d. to 7¾d. per lb.

**GRAMPOUND FAIR**.—There was a very small number of fat bullocks, the demand for which was not so good as it was a few weeks since, still the best ones were worth from 56s. to 60s. per cwt. There were rather more working-oxen and steers than have been at this fair for several years; but the sale was not brisk, and several pairs were not sold. There was a good supply of sheep, which sold freely at 6½d. per lb.

**KELSO FORTNIGHTLY MARKET**.—There was rather a small supply of fat cattle for the season, a few of the lots of which were of excellent quality. There was no scarcity of buyers, but prices were about 6d. per stone down from the market that day fortnight. Beef may be quoted at from 6s. 9d. to 7s. 3d., and some of the superior quality a shade higher. The sheep market was fully supplied, and a fair demand, at from 6d. to 6½d. per lb. A small show of milch cows, which were selling at from £9 to £14.

**MELTON FAIR**.—The show of cattle was not so large as on former occasions; still all kinds of stock made good prices. Good horses sold well, while inferior ones went off at about an average price. The show of meated beasts was larger than required, and prices had a downward tendency. Stores and milking cows were not very numerous.

**PENRITH FORTNIGHTLY MARKET**.—A very large supply of sheep, in very good condition. Prices a shade

lower. Beef may be quoted at former rates; easier, if anything.

**PETERBOROUGH FAT STOCK MARKET**, (Wednesday last.)—A good supply of Beasts, but the butchers did not evince much inclination to buy, and rather lower prices were submitted to. Sheep were not so numerous as last week, nevertheless there was a dull sale at from 6d. to 6½d. per lb. Pigs were more in demand, it being asserted that at this period Pork is more freely purchased than any other kind of butcher's meat. They sold readily at from 7s. 6d. to 7s. 9d. per stone.

**SHREWSBURY FAIR**.—Best fat beef made 6½d. per lb.; fat calves, 6½d.; wether sheep, 7d.; nice light weights making 7½d.; cows and calves in request, and fresh stores selling at fair prices; fat pigs, 6d. per lb.; stores selling well.

**TADCASTER FORTNIGHTLY MARKET**.—The stock had fair demand. Beef, 6s. 9d. to 7s. 3d.; bacon pigs, 7s. per stone; mutton, 6d. to 6¾d. per lb.

**WORCESTER FAIR**.—There was a very good attendance of buyers, who were anxious to do business. There were but few horses on offer, and little business done. Pigs a ready sale at 10s. 6d. to 11s. per score; stores very dear. Small supply of cows; fat beef made from 6d. to 7d. per lb.; in barrens prices lower, and many went back unsold. Good supply of sheep, which were not all disposed of; prices somewhat lower—ewes 6d., wethers 7d. per lb.

**YORK FORTNIGHTLY MARKET**.—Fat beasts were in greater supply than demand at from 6s. 6d. to 7s. per stone, kill and weigh. Mutton sheep were also above the requirements of purchasers, at from 5½d. to 6½d. per lb. Grazing hog sheep were greatly above the demand, at an average of from 28s. to 32s. per head. Calving and dairy cows were very abundant, at prices tending downwards. Lean beasts had very dull sale, at lowering rates. The market altogether was a very dull one.

**IRISH FAIRS**.—**ATHLONE** was largely attended by both buyers and sellers of all kinds of stock; the demand was good, and prices, generally speaking, most remunerative to the breeder. The horse fair contained an immense number of animals, several of them hunters; the majority, however, suited for farming purposes. They were in excellent request, and fetched capital prices. In the black cattle fair there was a great falling-off in the show of beef, compared with past years; but stores were as well represented as ever, and changed owners freely, at, however, £1 a head under Ballinasloe. Mr. Kirwan, of the county Galway, sold a lot of heifers to Mr. Evans; Mr. Maher, of Galla, bought 130 do. from various persons; and Mr. Whelan, of Smithfield, 100 do. There were a few first-class springers, which fetched as much as 20 guineas each, and a good supply of young stock, which sold well. The sheep fair was rather scantily supplied, the class exhibited of a very mediocre character, and the business transacted unimportant. The pig fair was the largest held in this, the most central town in Ireland, and contained all kinds—bacon, stores, and porkers. Bacon was most in request, as it was largest in supply, and brought, on the average, 48s. per cwt.

**BELFAST**, (Friday last.)—Butter: Shipping price, 100s. to 110s. per cwt.; firkins and crocks, 10¾d. to 11½d. per lb., Bacon, 56s. to 62s.; Hams, prime, 74s. to 80s., second quality, 66s. to 70s. per cwt.; prime mess Pork, 92s. 6d. to 95s. per brl.; Beef, 105s. to 140s. per tierce; Irish Lard, in bladders, 74s. to 76s.; kegs or firkins, 68s. to 70s. per cwt.

Jan.	Butter.		Bacon.		Dried Hams,		Mess Pork.	
	per cwt.		per cwt.		per cwt.		per brl.	
25.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1852..	77 0	82 0	33 0	44 0	54 0	60 0	60 0	62 0
1853..	86 0	93 0	51 0	53 0	70 0	74 0	87 6	90 0
1854..	95 0	102 0	53 0	58 0	70 0	74 0	87 6	87 6
1855..	96 0	106 0	56 0	60 0	70 0	76 0	92 6	95 0
1856..	98 0	108 0	56 0	62 0	74 0	80 0	92 6	95 0

**GLASGOW**, (Wednesday last.)—There were four carts, and through the weigh-house 4 tons of cheese. New cheese, 50s. to 52s. per cwt.; first-class, skim milk cheese, 27s. to 30s. per cwt.

**GLOUCESTER CHEESE FAIR** was well supplied for the season, about 40 tons being pitched, which met a ready sale at the following prices: Best doubles, 63s. to 66s.; singles, 58s. to 60s.; seconds, 52s. to 56s.; skim, 34s. to 36s. per cwt.

## REVIEW OF THE CORN TRADE DURING THE MONTH OF JANUARY.

The month of January commenced with the usual holiday appearance, to which pacific rumours (scarcely credited) brought uncertainty, which, with high prices, kept business on the most restricted scale. To all this was added an unusual arrival of foreign wheat from the Mediterranean, viz., 88,002 qrs. on January 2, and rates were only sustained by the general conviction of a somewhat deficient harvest, and that we scarcely knew where to look, excepting to America, to furnish the filling up of the average supply of five million quarters. Confidence not being full as to the adequacy of this resource, deliveries from farmers have been proceeding at much the same rate as at the same period last year, with its splendid crop, viz.: for the first week, 96,964 were Gazetted, at 77s. 2d.; the average of the first four weeks being 94,106, at 76s. 7d.; the average of the first four weeks for 1855 being 95,062, at 73s. 6d., being only the trifling weekly difference of 956 qrs. in favour of last year, with an increase this year in price of 3s. 1d. per qr. In foreign imports, this January exceeded the last by 47,510 qrs., the quantity arrived being 193,656, while the last was only 146,146—the difference being traceable to the heavy arrival on 2nd January. London, including flour, has been well supplied, the month's arrivals in wheat being 24,785 qrs. English, 26,013 foreign; country flour, 65,773 sacks; foreign, 3,258 sacks, 8,074 brls. The fluctuations of the weather have been great, and the preponderance of damp has done much injury to samples, while the liberal supplies of Norfolk flour have made millers indifferent buyers, even on short supplies of wheat. The first Monday gave a proof of this, when, with a heavy wheat market, flour was in demand at improved rates. As the week progressed the weather improved, and with it the tone of the markets generally, though quotations were not altered in London. The second Monday presented a healthy tone, and business commenced briskly at an advance of two shillings per qr. on all dry samples, which were far more plentiful; but the day closed with less animation than its commencement. All through the country there was a similar feeling, and the news up to Wednesday of Russia's partial rejection of the Austrian *ultimatum* left the general conclusion that the point of depression had been passed, and that there was nothing left to the Allies but a most

vigorous prosecution of the war. On Thursday, the 17th, however, the tidings came by telegraph that Russia had rescinded her qualified acceptance of the "Peace Proposals," and accepted them simply and purely, as the basis of pacification. Every market which this intelligence reached was immediately changed, and, as though the whole country had been in a state of siege, which was suddenly raised by the foe, who had left all his stores behind, the generality of holders took alarm, millers seemed to forget the bareness of their stocks, and business in the general surprise was utterly postponed. Under these circumstances the third Monday opened; and, with nothing oppressive in the supplies, it was evident enough that the paralysis of the previous Friday continued. Some, under the influence of a perfect panic, actually accepted 12s. under the former quotations, and the fortunate buyer found himself in immediate position to make a handsome profit; but we believe the benefit was received through the *mill*. Generally, the millers protected themselves by offers of 8s. less. Very near this reduction was occasionally taken, but it was generally resisted as beyond the necessity of the case; and the admitted fall on quotations was 5s. per qr., with very little trade. As the week progressed some recovery from the panic became manifest. In London there was a better feeling. In several of the country markets, as at Liverpool, Hull, Manchester, Birmingham, and Wakefield, there was a somewhat better price; but buyers mostly kept as much as possible on the reserve. The fourth Monday showed some readiness to quit by a better show of samples on the London market; and at its commencement factors evinced more confidence, asking fully, and occasionally exceeding the previous rates. But millers were retired; and as the day wore on, what with the increase of samples, the inferiority of the general condition, and the greater probability of peace, no way could be made, though the previous Monday's prices would readily have been accepted. A few picked parcels went off to necessitous consumers at unchanged prices, but the bulk was obliged to be passed over to the next day's chances. While, therefore, the estimated fall on good English wheat has been 5s. to 6s. per qr., foreign has only experienced a retail sale, for mixing off with the damp new, at about 2s. less money. Prices may be further influenced

by depression for a time, and the effect of the news has everywhere been felt in Europe, especially in France, which has received good American supplies; but the time that negotiations must take, the barriers of the winter season, the exhaustion of Russia, the poverty of her last crop as well as that of Northern Germany, and the almost impossibility that she can do much in the way of export before next harvest, seem to indicate that unless America can greatly excel her past exports from her this year's crop, we may yet be dearer again before next harvest.

The arrivals of barley in London have been quite on a moderate scale, the average supply per week being only about 9,300 qrs.; the foreign being quite trifling, viz., 746 qrs. for the month. The first Monday commenced with an indication of a tendency towards some reaction from the previous fall, prices for the best malting having settled at about 43s. to 44s., though business was far from active; the sluggish state of the malt trade, and the general inferiority for malting purposes this year, making maltsters indifferent buyers; and distillers showing no eagerness to add to their stocks, there being only a moderate consumption for grinding purposes. The second Monday, however, showed a further progress; and prices were generally quoted 1s. higher, but without a brisk demand being experienced. On Friday, the 18th, the steady progress was changed to an almost cessation of business by the news of the previous day; and on the third Monday, a fall of fully 2s. to 3s. was generally noted; and though, on the last Monday, there were symptoms that the depression had reached its point, by the greater facilities of business no improvement in value could be reported. The fact that Belgium has taken some of our malting qualities, and the improbability that they will be this year replaced from Silesia, seem against any considerable further reduction in the better sorts; while the generally high prices of corn for the purposes of human food, throughout the Baltic, are against low rates, even in grinding and inferior sorts.

Of oats, the supplies in the London market have been fair, the four weeks showing the quantity to be 113,000 qrs., about half being foreign, and the remainder from the United Kingdom; leaving the average arrival at rather over 28,000 qrs. per week. Trade at the commencement of the year opened dull, the open weather in the Baltic giving the idea of continued supplies from Denmark and Sweden, whence chiefly they have been obtained. The second week showed no improvement on the features of the first, the foreign arrivals being then at their height, say 38,000 qrs.,

and the tendency to improve being thereby lost. On the following week the effect of the news was shown by a reduction in the quotations of 1s. 6d. per qr., with extreme difficulty to sell, especially Irish, which then were arriving in some quantity. More Scotch and Irish afterwards appearing, though the fourth Monday had scarcely an average exhibition of samples, and was deficient in foreign, quotations were still further reduced 6d. to 1s. per qr., the greatest reduction being on inferior Irish, which this year form a large proportion of the growth of that country. We can scarcely look for much lower rates, as England is now relatively cheaper than the Baltic; and should there be peace, and an accumulation of oats at Archangel, the arrivals from that port can only appear here on the eve of our next harvest. At Stralsund 32 lbs. oats have lately brought 28s. to 30s. per qr.

The month commenced with small arrivals of beans, but closed with a liberal supply from Egypt. In all, the foreign have been about 8,500 qrs., the English 3,040 qrs., making the average weekly supply nearly 2,900 qrs. The trade opened dull, with only short arrivals; but improved the following week to the extent of 1s. per qr.; then came the news, and a fall of 2s. per qr. on all sorts, the foreign requiring to be placed in granary for want of buyers; and at this point prices have rested. There is no doubt that liberal supplies will be forthcoming from Egypt. In continuation of our own samples being good this year, we do not expect high rates, though the present depression can be hardly expected to last.

Peas have not appeared in such quantity as respects foreign, there being only 1,025 qrs. for the month; but in English sorts they have about equalled beans, viz., the month has produced 3,033, making the average supply over 1,000 per week. The first Monday noted a fall of 1s. in hog peas, and 2s. in white boilers; the next week showed still a downward tendency, to the extent of another 1s.; and the peace news, in the third week, brought another fall, to the extent of 2s. per qr.; from this there was a partial recovery on the last Monday, so far as white boilers are concerned, which were quoted 1s. to 2s. higher, from their scarcity; all other kinds remaining a slow sale, at unaltered rates.

The cloverseed season is towards its commencement, and though there have been liberal importations from Bordeaux, holders have been firm, in the confidence of the almost total failure of the English crop of red; very little of the latter has appeared, and that only in trifling lots; the quality, however, being fine, from 80s. to 86s. per cwt. have been realized. French is held at about 76s.,

and prices are rising in France, 4 to 5 francs advance per bale having been paid there lately. Linseed has fallen about 4s. to 5s. per qr., and cakes have become easier to buy.

**CURRENCY PER IMPERIAL MEASURE.**

	Shillings per Quarter			
WHEAT, Essex and Kent, white, old..	72	to 85	extra	87 90
Ditto	new	60	76	— —
Ditto, red, old.	72	76	—	81 84
Ditto, new.	58	73	—	— —
Norfolk, Linc. and Yorksh., red, old	75	80	—	82 84
Ditto, new	58	72	—	— —
BARLEY, malting, new..	35	38	Chevalier..	36 41
Distilling....	34	36	Grinding..	33 34
MALT, Essex, Norfolk, and Suffolk....	74	76	extra	82
Kingston, Ware, and town made..	75	78	—	82
Brown'.....	64	69	—	—
RYE .....	—	—	—	50 54
OATS, English feed..	26	27	Potato..	27 32
Scotch feed, new	28	30, old	32 33	Potato 31 32
Irish feed, white .....	23	24	fine	27
Ditto, black .....	22	24	—	26
BEANS, Mazagan.....	35	35	36	37
Ticks .....	35	35	39	39
Harrow .....	39	39	43	43
Pigeon .....	41	41	46	46
PEAS, white boilers	46	50..	Maple	36 39 Grey 36 38
FLOUR, town made, per sack of 280 lbs.	—	—	—	68 70
Households, Town	64a.	66s.	Country	— 55 57
Norfolk and Suffolk, ex-ship	—	—	—	52 53

**FOREIGN GRAIN.**

	Shillings per Quarter			
WHEAT, Dantzic, mixed..	87	to 90	high mixed	— 90extra 95
Konigsberg .....	82	84	—	88 " 90
Rostock, new .....	80	84	fine .....	88 " 92
American, white ....	86	88	red .....	78 81
Pomera., Meckbg., and Uckermk., red	82	83	extra	83 87
Silesian .....	—	78	81 white	82 85
Danish and Holstein .....	—	72	78	— 78 82
Odessa, St. Petersburg and Riga..	73	75	fine	77 80
Rhine and Belgium .....	—	—	old	— —
Russian.....	—	—	French..	none
BARLEY, grinding	32	34	Distilling..	34 35
OATS, Dutch, brew, and Polands	29s.	to 31s.	Feed ..	26 27
Danish & Swedish feed	26s.	to 25s.	Stralund	26 29
BEANS, Friesland and Holstein.....	40	41	—	40 41
Konigsberg ..	40	42	Egyptian ..	35 36
PEAS, feeding .....	37	39	fine boilers	47 50
INDIAN CORN, white .....	40	41	yellow	41 44
FLOUR, French, per sack.....	—	—	Spanish	62 64
American, sour, per barrel	38	39	sweet	40 42

**IMPERIAL AVERAGES.**

FOR THE LAST SIX WEEKS.

WEEK ENDING :	Wheat.		Barley.		Oats.		Rye.		Beans		Peas.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Dec. 15, 1855..	79	11	41	3	27	10	55	4	51	8	49	1
Dec. 22, 1855..	78	9	40	4	27	1	54	6	50	8	48	11
Dec. 29, 1855..	77	2	39	4	26	11	54	11	49	0	47	6
Jan. 5, 1856..	76	10	39	0	26	9	52	7	47	7	47	3
Jan. 12, 1856..	76	2	38	3	25	11	53	6	46	5	45	7
Jan. 19, 1856..	76	1	37	8	26	7	53	4	46	0	44	9
Aggregate average of last six weeks	77	6	39	4	26	10	54	0	48	7	47	2
Comparative avge. same time last year	73	1	34	1	27	7	46	7	47	2	45	6
DUTIES .....	1	0	1	0	1	0	1	0	1	0	1	0

**LONDON AVERAGES.**

	£	s.	d.		£	s.	d.
Wheat ..	3,718	qrs.	3 18 4	Rye ....	3	qrs.	2 12 0
Barley ..	2,150		1 19 4	Beans....	318		2 1 1
Oats ....	3,111		1 6 6	Peas ....	386		2 5 1

**PRICES OF SEEDS.**

**BRITISH SEEDS.**

Tares, winter (per bushel).....	6s. 6d. to 7s. 6d
Coriander (per cwt.).....	20s. to 24s.
Carraway (per cwt.).... new .. s. to 50s., old .. s. to .. s.	60s. to 63s.
Canary (per qr.).....	00s. to 00s.
Hempseed (none) .....	00s. to 00s.
Linseed (p. qr.) sowing .. s. to .. s., crushing	73s. to 80s.
Linseed Cakes (per ton) .....	£14 0s. to £14 10s.
Rapeseed (per qr.) .....	new 88s. to 90s.
Ditto Cake (per ton) .....	£7 10s. to £8 0s.

**FOREIGN SEEDS, &c.**

Hempseed, small, (per qr.) .. s. 56s., Ditto Dutch,	58s.
Coriander (per cwt.).....	15s. to 20s.
Carraway .....	42s. to 46s.
Linseed (pr qr.) Baltic, 71s. to 73s.; Bombay, 75s. to 78s.	
Linseed Cake (per ton) .....	£13 10s. to £14 0s.
Rapeseed, Dutch .....	88s. to 90s.
Rape Cake (per ton).....	£7 0s. to £7 10s.

**HOP MARKET.**

BOROUGH, MONDAY, Jan. 28.

Our market has continued steady during the past week, and all Hops of good quality are in fair demand at fully the currency of the last few days.

**POTATO MARKETS.**

**SOUTHWARK WATERSIDE.**

MONDAY, JAN. 28.

During the past week the arrivals coastwise have not been large, but a fair supply by rail, and from Kent and Essex more liberal than it has been at this period of the season for the last ten years. Trade is extremely dull, and second-rate or inferior stuff quite unsaleable. The following are this day's quotations:—

	s.	d.	s.	d.
York Regents .....	80	0	to 100	0
Kent and Essex do. ....	65	0	75	0
East Lothian do .....	80	0	85	0
Ditto, reds .....	75	0	85	0
Perth, Forfar, and Fifeshire Regents .....	50	0	70	0
Ditto, reds and cups.....	45	0	60	0

**BOROUGH AND SPITALFIELDS.**

MONDAY, Jan. 28.

Very large supplies of Potatoes continue to arrive up to our market, coastwise and by land-carriage. The trade generally is heavy, as follows:—York Regents, 80s. to 100s.; Kent and Essex do., 80s. to 90s.; Scotch do., 70s. to 80s.; do. Cups, 60s. to 70s.; middlings, 50s. to 60s.; Blues, 70s. to 80s.; Lincolns, 70s. to 80s. per ton. The imports last week were 1 ton from the Continent, and 215 bags from Ireland.

**COUNTRY POTATO MARKETS.—YORK, Jan. 19:**

We had a good supply of potatoes, of moderate quality. They sold at from 7d. to 8d. per lb., 2s. to 2s. 3d. per bushel. LEEDS, Jan. 22: A moderate show of potatoes sold at from 8d. to 9d. per 21lbs. wholesale, and from 9d. to 10d. retail. MALTON, Jan. 19: A moderate show of potatoes sold at from 2s. to 2s. 3d. per bushel. SHEFFIELD, Jan. 22: A fair supply of potatoes sold at from 9s. to 9s. 6d. per 18 stones. RICHMOND, Jan. 19: Potatoes, 2s. 8d. per bushel. MANCHESTER, Jan. 22: Potatoes, 7s. to 10s. 6d. per 252lbs.

**POTATO TRADE.**—At our Friday market purchasers of potatoes were few, and prices on the decline even for the best samples. The accounts from the southern markets show a still farther fall in prices, even below what are current here; and, besides, the cargoes now arriving in London are in bad condition.—*Perth Courier.*

**PRICES OF BUTTER, CHEESE, HAMS, &c.**

<i>Butter, per cwt.</i>	<i>s.</i>	<i>s.</i>	<i>Cheese, per cwt.</i>	<i>s.</i>	<i>s.</i>
<i>Friesland</i> .....	112	to 118	<i>Cheshire</i> .....	70	to 84
<i>Kiel</i> .....	100	120	<i>Cheddar</i> .....	74	90
<i>Dorset</i> .....	110	120	<i>Double Gloucester</i> ..	66	72
<i>Carlton</i> .....	108	112	<i>Single do.</i> .....	60	70
<i>Waterford</i> ....	93	102	<i>Hams, Fork, old</i> 96	108,	<i>new</i> 90
<i>Cork, new</i> .....	100	112	<i>Westmoreland</i> ..	91	104
<i>Limerick</i> .....	98	102	<i>Irish</i> .....	84	90
<i>Sligo</i> .....	94	108	<i>Bacon, Wilts., dried</i> ..	70	72
<i>Fresh, per doz.</i> 18s. 0d.	18s. 0d.		<i>Irish, green</i> .....	60	64

**ENGLISH BUTTER MARKET.**

JANUARY 28.

We note a dull trade, except for fresh Butter, which is scarce, as usual at this period of the year.

<i>Dorset fine</i> .....	108s. to 112s.	<i>per cwt.</i>
<i>Do. middling</i> .....	98s. to 100s.	
<i>Fresh</i> .....	12s. to 17s.	<i>per doz. lbs.</i>

**CHICORY.**

LONDON, SATURDAY, JAN. 26.

The demand for most kinds of Chicory is very inactive, on former terms. This week's imports are 1163 bags from Harlingen.

<i>Per ton.</i>			
<i>Foreign Root (in £ bond) Harlingen</i>	<i>s.</i>	<i>£ s.</i>	<i>Roasted &amp; ground</i>
<i>English Root (free)</i>	0	11 10	<i>English</i> .....
<i>Guernsey</i> .....	9	0 9 10	<i>Foreign</i> .....
<i>Fork</i> .....	9	10 10 0	<i>Guernsey</i> .....
			14 0 20 10
			30 0 36 10
			26 0 28 0

**COVENT GARDEN MARKET.**

SATURDAY, JAN. 26.

The supply of most things has greatly improved this week, and prices generally are lower. There has been some excellent salading from France, consisting of Endive, Cabbage Lettuce, and Barbe du Capucin. The arrivals from Cornwall in the shape of Broccoli have also been good. English Pines are in somewhat better demand than they have been hitherto. Pears consist of Winter Nelis, Glout Morceau, and Colmars. Chesnuts are 18s. per bushel. Spanish Nuts fetch from 16s. to 20s. per bushel, Barcelona from 20s. to 22s., Almonds 24s., Brazils from 12s. to 14s.; Lemons, 6s. to 12s. per 100. Oranges fetch from 1s. to 1s. 6d. per dozen, or from 3s. to 10s. per hundred. Seville Oranges have made their appearance; they are likely to be very fine this season. The present price is from 10s. to 14s. per hundred, or from 1s. 6d. to 2s. per dozen. The Potato trade is not good, but best samples are scarce, and maintain fair prices. There are large arrivals from Scotland and Yorkshire. What Cornish Broccoli has come to hand this week has been excellent, and realized good prices. Spanish Onions fetch from 1s. to 4s. per dozen. Some green French Asparagus has just arrived. Lettuces realize from 6d. to 9d. per score. Cutflowers consist of Chrysanthemums, Heliotropes, Euphorbias, Camelias, Azaleas, Mignonette, Chinese Primroses, Cyclamens, Heaths, and Roses.

**FRUIT.**

<i>Pineapples, p. lb.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
<i>Grapes, per lb.</i> ..	6	0	@ 8	0	<i>Pears, per doz.</i> ..	1 0 3 0
<i>Apples, p. hf. sv.</i>	1	6	2	6	<i>Do., per hf. sv.</i>	2 0 5 0
					<i>Filberts p. doz. lbs</i>	9 0 0 0
					<i>Cobs, do.</i> .....	11 0 0 0

**VEGETABLES.**

<i>Cabbages, p. doz.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>	<i>Celery, per bund.</i>	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
<i>Savoy, ditto</i> ....	1	3	2	0	<i>Onions, p. bush.</i>	2	6	4	0
<i>Cauliflowers, p. doz.</i>	4	0	8	0	<i>Do., Portug., each</i>	0	2	0	3
<i>Broccoli, per bun.</i>	1	6	3	0	<i>Leeks, per bunch</i>	0	2	0	3
<i>B. sprouts, p. hf. s.</i>	3	0	3	6	<i>Artichokes, p. 1/2 s.</i>	1	3	1	6
<i>F. beans, per 100</i>	3	0	4	0	<i>Shallots, per lb.</i>	0	6	0	8
<i>Potatoes, per ton</i>	60	0	100	0	<i>Garlic, per do.</i> ..	0	6	0	8
<i>Do., per cwt.</i>	4	0	6	0	<i>Endive, per score</i>	1	6	4	0
<i>Do., per bush.</i>	2	6	4	0	<i>Lettuce, Cab., do.</i>	1	0	1	6
<i>Carrots, p. bunch</i>	0	5	0	6	<i>Small Sal. p. pun.</i>	0	2	0	3
<i>Turnips, ditto</i> ..	9	3	0	4	<i>Horsrad., p. bund.</i>	2	0	4	0
<i>Spinach, p. sicve.</i>	3	0	4	0	<i>Mushr'ns, p. pot.</i>	1	0	1	6
<i>Cucumbers, each</i>	4	0	6	0	<i>Parsley, p. bunch</i>	0	4	0	6
<i>Beet, per doz.</i> ..	1	0	2	0	<i>Mint, green, ditto.</i>	0	9	1	0
<i>Rhubarb, p. bund.</i>	0	9	1	3	<i>Marjoram, ditto.</i>	0	2	0	3
<i>Asparagus, p. 100</i>	4	0	10	0	<i>Savory, do.</i> .....	0	2	0	3
<i>Seakale, p. punnet</i>	1	0	3	0					

**WOOL MARKETS.**

**ENGLISH WOOL MARKET.**

THIS DAY.—The firmness with which the public sales have progressed, both at Liverpool and Edinburgh, has given more confidence to the holders of home-grown wools; and the

prospect of peace has operated favourably to the market. The business doing since Monday last has not been to say extensive, yet prices generally have been well supported. The supply here is but moderate.

	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
<i>Down tegs.</i> .....	1	1	to 1	3
<i>Down ewes</i> .....	1	1	— 1	2
<i>Half-bred hogs</i> .....	1	1	— 1	2
<i>Half-bred wethers</i> .....	1	0	— 1	1
<i>Kent fleeces</i> .....	1	1	— 1	1 1/2
<i>Leicester fleeces (mixed)</i> .....	0	11	— 1	0 1/2
<i>Combing skin</i> .....	0	10	— 1	1
<i>Flannel wool</i> .....	1	0	— 1	2
<i>Blanket wool</i> .....	0	9	— 1	0

EDINBURGH WOOL SALES.—The January sale took place on the 23rd inst., within the Corn Exchange. The attendance of buyers was very large, those from England being more numerous than on any previous occasion. The number of bales was about 900, and, apparently, had the quantity been twice or three times as large, all could have been well disposed of. The competition for "laid Cheviots" of good quality was keen; and one lot from Swiney, in Caithness (Mr. D. Gunn's farm), fetched 22s. 6d. per stone, while other Caithness and Sutherland wools of this class varied from 10s. to 20s. For good parcels of Cheviot and half-bred wools, suitable for combing purposes, the competition was animated in the extreme. In Cheviots, a parcel of "Border wool" brought 29s. 6d. per stone; and the Thurston clip brought 27s. wethers, and 28s. hogs, per stone. In half-bred wools, the Thurston lots topped the list also, and fetched 28s. and 29s. 6d. per stone. The Southdowns from the same estate were also good, and brought 29s. 6d. to 30s. 6d. per stone. A few parcels of half-bred from Caithness were highly creditable, and fetched as high as 29s. per stone. Farmers must be pleased with the result of this sale, and doubtless the prices realized will be compared with those of Liverpool and elsewhere. In this, however, the Edinburgh wool sales will lose nothing, but the reverse must be the result, and prove they are the best mart for the sale of Scotch grown wools. The following are the prices realized:—White wools, Highland unwashed, 11s. to 13s. 6d.; do., washed, 14s. to 17s. 6d.; cross, washed, 18s. to 21s.; Cheviot, washed, 24s. to 29s. 6d.; bred and half-bred, 23s. to 29s. 6d.; Southdown, 28s. 6d. to 30s. 6d. Laid wools—Highland, 8s. 6d. to 9s.; do., washed, 9s. 6d. to 10s. 3d.; cross, unwashed, 12s. 6d. to 13s. 6d.; Cheviot, 15s. to 18s.; do., Sutherland, 17s. 6d. to 20s.; do., Caithness, 19s. to 22s. 6d. Mr. Girdwood has advertised for consignments for another sale.—*Scotsman.*

LEEDS WOOL MARKET, Jan. 25.—The alteration in the duties on wool and yarns, &c., by the French Government has caused considerable purchases of combing wools on French account this week; and prices of middle qualities may be quoted 5s. to 10s. per pack higher. There has also been more doing by the spinners and manufacturers in consequence of it. We do not quote any alteration in the demand for, or price of, English clothing wools.

**LIVERPOOL WOOL MARKETS, JAN. 26.**

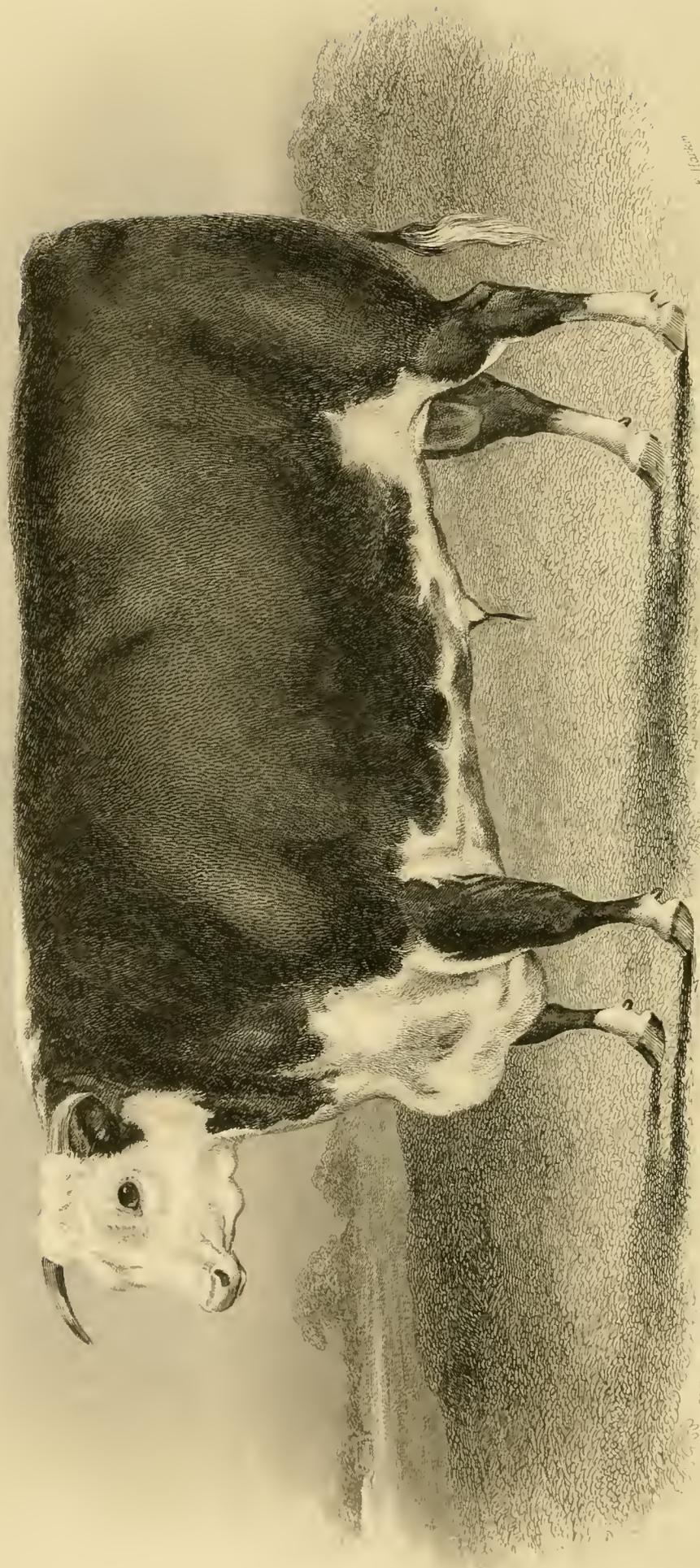
	<i>s.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>
<i>Laid Highland Wool, per 24lbs.</i>	9	0	to 10	0
<i>White Highland do.</i> .....	12	0	13	6
<i>Laid Crossed do. unwashed</i> ..	12	0	13	6
<i>Do. do. washed</i> .....	13	6	14	6
<i>Laid Cheriot do. unwashed</i> ..	14	0	16	6
<i>Do. do. washed</i> .....	17	6	21	0
<i>White Cheviot do. do</i> .....	24	0	26	6

**FOREIGN WOOL MARKETS.**

HAMBURG, Jan. 25.—In fleece wool there was a lively market, but for ordinary sorts there was little demand.

BRESLAU, Jan. 22.—About 1,500 centner have been disposed of within this last fortnight, consisting chiefly of Russian combed wool at 58 to 68 r., and unwashed Silesia at 58 to 65 r. The demand for the latter article was greater than could be satisfied. Many bargains were being made for the coming clip at 100 to 110 r. for the finer qualities; whilst on the other hand middling sorts remained neglected. The arrivals from Russia and Poland were few, on account of the high price of the raw material at home.





F. H. 1830

W. H. Day

*Black and White Friesian Bull*

*Property of the Hon. Mr. John B. Esq. of Crowthell, near York, bred by Mr. J. B. Esq. of Crowthell, near York, Aug. 1830.*

*Printed and Published by Deighton, London, 1830.*

# THE FARMER'S MAGAZINE.

MARCH, 1856.

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## PLATE I.

### A HEREFORD BULL—"ATTINGHAM;"

BRED BY AND THE PROPERTY OF THE RIGHT HONOURABLE LORD BERWICK, OF CRONKHILL,  
SHREWSBURY ;

For which the prize of 30 sovs. was awarded by the Royal Agricultural Society of England, at the  
Carlisle Show, August, 1855.

#### PEDIGREE.

"Attingham," calved in September, 1852, was got by Walford (871), dam (Damsel) by Tom Thumb (243), g. d. (Damsel) by Young Trueboy (32), g. g. d. (Pretty Maid) by Cholstrey (868), g. g. g. d. (Old Damsel) by Coleman's Bull (purchased from the late T. A. Knight, Esq., of Downton Castle), g. g. g. g. d. (Old Daisy) by Chancellor (156), g. g. g. g. g. d. (Cherry the Second) by Mr. Knight's Bull (winner of the Hereford Cup in 1807), g. g. g. g. g. g. d. (Cherry the First), bred by the late Mr. Knight.

#### PERFORMANCES.

At the Shrewsbury Show, December, 1853, Attingham took the first prize as the best Hereford bull.

At the Lincoln Meeting of the Royal Agricultural Society of England, 1854, he was highly commended.

At Ludlow, September, 1854, in the Sweepstakes, he was passed over without even a commendation.

At the Carlisle Meeting of the Royal Agricultural Society of England, he took the first prize as the best Hereford bull in the Aged Class ; and at the same meeting an own brother (Denistown), since sold for Australia, took the first prize as the best Hereford bull in the Young Class.

"Walford," the sire of these animals, took, amongst other prizes, the first prize of 40 sovs. for Hereford bulls, at the meeting of the Royal Agricultural Society of England at Windsor, 1851 ; and the first prize of 40 sovs. and gold medal, for Hereford bulls, at the Paris Exhibition, 1855.

Lord Berwick has long been renowned as a breeder of Herefords, which he appears to be even still gradually improving. In our own report of the Carlisle meeting it is written—"There were many good judges considered Lord Berwick's bull the best in the yard;" while one of our correspondents, who made it his duty to go at more length into the several classes, thus describes him :—"Attingham, red, white face, two years nine months and twenty-six days old : This is a superb animal ; he is high enough, is well formed, cylindrically shaped, deep and good throughout ; good girth and chest, level back and broad, but ribs, thighs, and twist not quite corresponding ; extraordinary flank, long and good ; frame long, full, and noble ; head and neck commanding. We incline to class him as the best bull in the yard ; such uniform depth and substance, and offal very fine." To this we may add, that Mr. W. Simpson, in reporting as senior steward, in the new number of the Society's Journal, on the stock exhibited at Carlisle, speaks in yet more unqualified terms of approval :—"HEREFORDS : The two bulls in Classes 1 and 2 were considered, taking into consideration weight, quality, symmetry, and early maturity, *the best animals ever shown.*" These were Attingham and his own brother Denistown.

## PLATE II.

## THE VEDETTE.

“Notwithstanding the prospect of peace,” writes *The Times*' Correspondent from the Crimea, “horse-flesh, at first depreciated by the announcement, is in pretty good demand, and there was some brisk bidding at last Donnybrook horse fair. In the first place, many people are disposed to be incredulous about peace, and then they say that even if it be made it will be months before the army can get home, and meanwhile they must have horses, which here are no luxury, but a necessary of life.”

Not only *here*, but there and everywhere a good horse will still command a good price; and peace, we should fancy, will no more stop the breeding of horses than it will the growing of wheat. It is one of the agreeable varieties of a farming life, that with all the opportunity for pursuing it, it has never yet been done anything like justice to. We seem, however, at last to be gradually improving. The entries for the last two seasons, of hunters, hacks, and harness horses, at our different agricultural shows, have been much on the increase both in numbers and merit: it will be our own fault if this be not still further encouraged. Strange to say, though, after what we saw brought together both at Lincoln and Carlisle, the prize sheet of the Royal Agricultural Society for the next meeting, as yet, offers no premiums for such classes. Chelmsford, we are afraid, has no mayor to aid us here; and if the Council cannot still step in with a prize or two for that grand desideratum, “a good sort of horse,” we can only trust some patriot may yet be found in the district we are about to visit—say, a small “whip” from the different masters of hounds, and the thing is done. It would be a great addition to the attractions of the show, and a seasonable compliment to the agriculturists of the eastern counties. We have seen a good hack show, ere this, only next door, in Suffolk; while the Royal Agricultural Society, with a little stir, might give us a grand one. Was the meeting to be held a town or two lower down we have no doubt this hiatus would be speedily filled up, and we have only to hope Chelmsford, or the county will do as much.

## OUR UNDERGROUND LABOURERS.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

When, on some former occasions, we were employed in tracing the burrowings of the common earth-worm—were marking in the excavations of the Surrey claypits and of the Suffolk crag his deep and useful labour, we noted that he did not possess the subsoil all to himself; we found that there were other living things, whose roots seemed to keep pace with his almost unnoticed borings. If the worm had penetrated close to the surface of the water-line beneath the soil, and when that water-line was by improved drainage lowered, if the worm by this operation was able to deepen his borings, so side by side, and sometimes even within these borings, the roots of the other tenants of the soil to an equal extent increased and kept their way. But in noting these facts, another and equally interesting question arises: for what purpose are these roots extended into soils apparently so barren? and why do they seem to follow as it were the retiring water? Are there no small hints to be derived from the labours of the chemist, that in explaining the phenomenon

may be useful to us, now that the best season for land-draining is approaching? We may perhaps usefully remember, before we dive down into these pits, for the purpose of tracing the long roots which the gently caving in of the earth has uncovered, that through these roots, more than one, by us little understood, operation is going on; that through them are absorbed, not only the substances soluble in water, which the plant requires, but the silica, the alumina, and other matters, which are not so easily dissolved. It is evident, however, that these roots in some mystic way accomplish these things; and when we notice, as in the pits to which I have been referring, the roots of the wheat plant extending to a depth of four or five feet, and those of some of the common field grasses nearly as far, we can hardly escape the conviction that there must be something in the soil; “some good,” as the ploughman says, in these apparently inert subsoils, of which these rootlets are in search. My examination of these roots were chiefly confined, on the



A. Cooper R.A.

E. Fisher

The <sup>4</sup>Edette.

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recent occasions to which I have alluded, to those of the cereal and other grasses; other persons have noticed the great and interesting extensions of the roots of plants of a larger class, and of the way in which they occasionally obstruct the farmers' drains. It was when speaking of the deep drains made by the late Duke of Portland, at Clipstone, that Mr. J. E. Denison had occasion to notice the considerable depth to which the roots of certain trees will penetrate in search of food: when alluding to these works, he remarked (*Jour. R. A. S.*, vol. i., p. 364) that great care must be taken not to carry these deep drains within a very considerable distance of trees; their roots seem to be attracted in a wonderful manner by the moisture of the drains; and if they once find their way into the tiles they throw out bunches of fibres, which soon mat together and stop the drains. "It is astonishing," Mr. Denison continues, "the depth that the roots even of the smaller vegetables will descend after the water; a deep drain outside the garden wall at Welbeck was entirely stopped by the roots of some horse-raddish plants, at the depth of seven feet in the ground. At Thoresby park, a drain fourteen feet deep was entirely stopped by the roots of gorse, growing at a distance of six feet from the drain. At Saucethorpe, in Lincolnshire, a drain nine feet deep was filled up by the roots of an elm tree, growing more than fifty yards from the drain; but then it was under these peculiar circumstances: the elm grew at the end of a sunk fence, the wall of which was formed of turf; the root of the elm got between the turf wall and the solid bank, and worked its way along until it got into the drain, which it soon filled up. The roots of all trees will stop drains, but especially of soft-wooded trees, such as willow, alder, poplar, &c.: ash trees, too, are very dangerous neighbours to deep drains. In one case the roots of grass stopped a drain two feet deep, in the parish of Mansfield Woodhouse; the drain had been carried across a field of old turf, to convey water for cattle from a higher level." The explanation of this disposition of the roots, both of vegetables and trees, to strike deeper than ordinary in pursuit of drains, appears to Mr. Denison to be this: in digging the drains, the sides are cut down straight, and the ground left like walls on each side, while over the drain the earth is all moved; between the solid and the moved soil, for a long time something like a fissure or crevice remains; when the roots in their progress through the solid land reach this fissure, they pass down it, and so follow its course into the drains. This, however, I take as only a partial and too mechanical an explanation of the phenomena; it only tells us that the roots penetrate because their progress is facilitated by loosening the soil, but it leaves unnoticed the

exciting object, as to what the roots are in search of. It is probable from the later researches of the chemist, that the almost insoluble substances of plants may be absorbed by the roots of plants, in combination with lime, ammonia, or other substances, silica for instance, being when thus combined slightly soluble in water. Way and Paine, when recording their observations on the silica strata of the lower chalk, did not omit to notice this property of the silicates; they determined (*Jour. R. A. S.*, vol. xiv., p. 241) that a gallon of water will dissolve about 20 grains of the silicate of lime, of which 15 are silica; we can mark, then, one substance which the roots of the wheat-plant for instance are in search of, to supply the abounding silica of its straw. Neither are the subsoils of many a farm so devoid of even nitrogenous matters, as we are too often content to believe.

The source indeed from whence plants derive their nitrogen has for some little time engaged the attention of the chemist, and it was when dwelling at considerable length on this important question, that Mr. Way had occasion to remark (*Jour. R. A. S.*, vol. xvi., p. 262) "that plants do absorb nitrogen in some form from the air, seems evident. Recent examinations of the ammonia contained in soils, some of them taken at considerable depths, and long out of the reach of cultivation, have shown a large quantity of this substance to exist in them: whence was this ammonia derived? not from manure nor from rain, for in one case I examined a clay of the plastic-clay formation, dug twenty feet from the surface; it was physically impossible, one would think, that either air or water could in any quantity at least get access to this depth, in so close and tenacious a material yet I found more than one part of ammonia in 1000 parts of this clay, and I ascribed its origin, as it appears to me it should be ascribed, to the waters of the seas or lakes from which the clay was first deposited, and from which, by its absorptive powers for ammonia, it had removed this alkali in an insoluble form." The existence of ammonia in a soil seems an inherent and inseparable result of the presence of clay in the soil, and we may well question whether all ordinary soils in a state of nature do not contain within reach of the roots of plants, especially of large trees, sufficient ammonia to account for any accumulation of vegetation.

The tracings, then, of these underground operations, lead us to still more and certain views as to the advantages derived from deepening the soil and lowering the level of the permanent water-line; we again see, in even the extensions of the roots of plants, and those of the borings of "the common earth-worm," that Nature's hints are ever the most certain and the most valuable.

## THE OBJECTS AND PURPOSES OF DRAINAGE.

Our agricultural progress may be measured in two ways—by the amount of knowledge gained, and the amount of skill practised by the best farmers in the application of that knowledge; or by the absolute extent to which the best principles and practice have been followed. And how different the result of the two methods—of what we may designate the *qualitative* and *quantitative* analyses of our agricultural condition! Employ as your test the cattle and implement shows, and you form a very high opinion of the excellence of the breeds and superior character of the machinery common to British husbandry. Visit the more famous estates and farmsteads, or read prize essays and attend discussions, and you will obtain a like favourable view of the vast improvements in drainage, manuring, feeding, and general farm management, and also of the intelligence and ability of the owners and occupiers. But come to a quantitative estimation of the several ingredients; inquire what extent of land is managed in the best style—what proportionate number of the farmers work first-class implements, feed superior animals, and embark the large amount of capital in their business which is sanctioned as safe and profitable by many examples; ask what proportion of the farmers of England take an interest in the more scientific and theoretical questions connected with tillage, and which occupy so large a space in our lectures and discussions and the columns of the agricultural press; and you will find it true that, while a few adventurous spirits have pushed forward, and while much certainly has been accomplished of late years, yet the great want still remains for a diffusion over the entire kingdom of the light now shining from many but widely-separated centres. John Bull in fact has yet room to improve on his character as a practical man of business. When cholera sweeps off our neighbours and friends, we make a loud outcry for improved sewerage; but the scourge will come again, and find the towns still uncleansed. And in agricultural drainage—proved to be the first requisite of good husbandry fifteen years ago, tried in all parts of the country, and discussed until the subject seemed long ago exhausted—we find that our country is most miserably behind-hand. The authorities who have lately discussed the subject were obliged to confess that, after so many years of experiment and practice, no conclusions had been come to, as to the precise principles which should govern the practice of the art; and, indeed, the very objects and purposes of drainage seem to

have been apprehended as yet by only a few of our chief drainers, more stress having been laid upon the importance of *drying* the surface soil than of carrying water and air deeply down into the subsoil in order to feed it with fertility. And, to the discredit of the agricultural public, we have had no systematic observations instituted to ascertain the relative amounts of rainfall and *discharge* on different soils, and with various depths and arrangements of drains. After so many years, it remains true, as affirmed by Mr. Bazalgette, that “we still want data for comparing the relative value of pipes at given depths for carrying off rainfall; whereas upon a number of carefully recorded facts it would become easy to base sound theories. We want to know, with showers various in density and duration on different kinds of soil, what proportion of the rain will pass off through the surface channels, and what proportion through the under-drains; and whether this latter proportion is greater with deep or shallow drainage. Again: we want to know how soon, after the rain commences, the drains begin to run, and how long they continue to discharge after the shower is over. Some of the farms already drained must afford excellent opportunities for such observations, the results of which, carefully recorded and collected, cannot fail to be of national benefit.”

But after all these years of teaching and trial, of Government loans and drainage companies, of tile-and-pipe machines, draining-tools, and Fowler's steam draining-engine, how much of the land originally requiring it has actually been drained? Two-thirds, or three-quarters? No. Astounding as the fact may appear, permanent under-drainage has been confined to mere plots and corners, as it were; and only *one part out of sixteen* of the English acres needing it have received this improvement.

Mr. Bailey Denton computes the area of land in England, cultivated or capable of cultivation, to be 43,958,000 acres; and estimates the proportion of “wet land” in this area at 22,890,000 acres, or rather more than half. And of this quantity of wet land he assumes that 21,525,000 acres still remain to be drained. Had we an organised system of collecting the statistics of our produce, it would be comparatively easy to arrive at a pretty accurate estimate of the extent of land under-drained; or, indeed, to discover the relative prevalence or restrictedness of any other practice of husbandry. But, reckoning from the public and private moneys

borrowed, from reports, from correspondence with all parts of the country, and practical acquaintance with many different counties, Mr. Denton has tabulated approximative results, which no person, during the consideration of his paper, ever ventured to call in question; and which, indeed, agree with calculations previously made by Mr. Scott.

As only *permanent* drainage is included, however, there must be a considerable extent of land besides, which is receiving the benefit of partial or temporary drainage; as, for instance, such as is treated every few years with thorn or bush draining, the use of the mole-plough, &c. But if we take the area so periodically drained as equal to that permanently drained with tiles, and thus double the above estimate, we shall then have only 2,730,000 acres, or about one-eighth of the wet lands, brought under the improvement.

It is natural to suppose that the most dropsical grounds have been the first tapped; lands the most obviously and ruinously wet have been for the most part drained or begun with, excepting low places oppressed by flooding streams. Still, however, the enormous remainder consists of corn-producing fields, upon which under-drainage would be followed by an augmented yield; upon which high ridges and surface-grips are a necessary and prolonged nuisance, tilling operations are hindered many seasons, and no valuable plants grow healthily.

If drainage, then, be after all a comparatively rare and undeveloped improvement—almost unknown in some districts, and fully completed in none—how can we expect that the subsequent practices of subsoiling, deep trenching, and high farming, should universally prevail? Here are we, setting Professor Way to work, to investigate the action of the atmosphere in the recesses of the soil, offering great premiums for the invention of a steam cultivator that shall surpass the spade; and yet, over the larger portion of our country, the want of the very first requisite of good husbandry is practically repudiating all such advances as inapplicable, and therefore absurd. We will not say, let us relinquish all other speculations and improvements until the land has been drained; but we do assert that no landowner has a claim to be heard on the side of agricultural improvement until he has shown himself in good earnest in draining so much of his property as requires it; and that no tenant-farmer has a right to be considered as a practical “authority” as long as he lives resigned to his fate upon an undrained farm. If landowners will not attend to their duty, occupiers must be instructed to feel the disadvantage under which they labour; and a public cry for the drainage of the soil ought to proclaim itself in a voice which no one shall dare to disregard or deny.

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## THE POWER OF THE PRESS TO PROMOTE THE ADVANCEMENT OF AGRICULTURE.

Upon a previous occasion we adverted to the influence of the Press upon agriculture. In returning to the subject, we may have no hesitation in saying that the Press has been mainly instrumental in the dissemination of information upon every department of science and art, and especially in our own province upon agriculture itself. As public journalists, therefore, we claim for ourselves a privilege in that respect, not ostentatiously, but, as we trust, for the advancement of that interest upon which, as the mainstay, the prosperity of the nation really depends.

When agriculture came to be acknowledged as a science, and the necessity of invention had widened the channel for its advancement, the press undoubtedly supplied the current upon which it was borne onward; and by such aid it became advanced to a degree of perfection never before attained, and even now advances at an accelerated force, with increased speed and more powerful impetus. As we proceed, one fact becomes the stepping-stone to another, which is dis-

seminated by the press throughout the breadth and extent of the land, so that where formerly but one mind investigated a question, thousands are now brought to bear upon it, and by the reflux of the same tide that had carried it forward, it becomes returned again to be investigated with accumulated power, throughout districts situated many hundreds of miles from the original point of introduction, and into recesses as dark as they had hitherto been remote.

We thus perceive that the extension of information has consummated the maxim of the great philosopher Bacon, that “Knowledge is power;” and as it becomes advanced, the pure rays of science so dispel prejudice and error, that, combined with practice, it inevitably attains a position that even the most sanguine scarcely contemplated. Whoever, therefore, asserts that agriculture is but in its infancy, even comparatively, cannot be right; whilst, on the other hand, he who places it at perfection may, too, in a measure be wrong—like the tidal current of the ocean, it is ever flowing

onward, yet never appearing to reach its destination.

In a country like England, with its limited area and increasing population, the contemplative mind foresees that the time must quickly arrive when her own productions will not suffice for her growing population; and that, however we may extend the one by improvement in cultivation, yet notwithstanding, the data supplied establish the fact as sooner or later inevitable. But as in human affairs the impending blow is warded off as long as possible, so in a matter affecting the destiny of a nation, it behoves its statesmen to foster and encourage agriculture, and by every means to advance the production of grain, to meet the exigencies of deficient harvests, or of such an eventful era as that through which we are now passing.

It was in fashion some years since, with the advocates of free-trade measures, to argue that Great Britain needed not to cultivate wheat at all; that her lands should be converted into pastures, and that her hardy sons of toil should divert their labour to manufactures and the development of her mineral treasures. This, if carried out, would have been the utmost rashness and folly; it would, in fact, have been reducing us to a state more dependent than that which existed in the early pastoral times, when the patriarch of old had to seek the sustenance of himself and his family in a foreign land. A question here presents itself, as to how far England would be prepared, in case of failure of her harvests, to meet even one year of great deficiency; and if that year should be succeeded by a series of others having deficient harvests prevailing not only at home, but throughout the states of Europe, what would be her position? It has been subject of notoriety in the present year, that, long before the late harvest had been gathered in, such was the pressing demand for wheat throughout the kingdom, that all the improved appliances of steam and mechanical power barely enabled her to obtain a supply equal to the daily demands of the people. And had the harvest been untoward, or had the wheat been carried in a damp state, unfit for immediate consumption, how then could the supply have been afforded, unless of a character that had been before experienced, but which few now living recollect, when war, famine, and disease threatened to overwhelm the country at the same time.

It was the custom, when the imposition of duties upon corn existed, to accumulate it in large quan-

ties under what was then called the bonding system. Immediately, however, upon the reversal of the corn-laws, that practice was abandoned, and England became dependent upon the supplies from month to month or week to week as the speculation or cupidity of merchants and farmers might have determined. And it had been carried to such an extent, that we had not one month's consumption upon the market at one and the same time. Such events themselves only forebode others of like character; but, with all such experience, where is the wisdom of our legislators? Are we not in these matters as deficient in foresight as in every other that pertained to the late campaign—without statistical information of any kind, without anything as a guide beyond mere guess computation of the cultivable acres of the kingdom? We are steering onward like a vessel without a compass and shrouded in darkness, we may, perchance, under a kind Providence, hit the port; but the chances are much against our doing so; whilst in the endeavour the ship may become a wreck, or the crew perish by starvation.

The fact is, that nothing beneficial is effected by legislation until the pressure from without *compels* it. The object of legislators is but too often to secure party advancement rather than to promote beneficial measures; and as agriculture is worse represented in Parliament than any other department, little beyond the immediate necessity is ever attempted. A spontaneous act of Government is rarely directed to an admitted grievance, or to remedy a glaring defect.

The subject of statistics has long occupied our attention; yet here we are, in the third session of Parliament since its general agitation, in much the same position as regards its completion as when we first started the question. How long are such things to remain? is a question no one can answer; but if the Press does its duty and proceeds as it ought, little fear need be entertained of the result. Still is there nothing more required? Would it not be beneficial—nay, is it not absolutely necessary, that the Government should by enactment, as far as it is able, provide for a regular supply of breadcorn? And might it not be effected in a beneficial manner, not only to the consumers, but the producers also of the kingdom at large? The Press can effect all this, and more; and if the Legislature may not take the initiative, let it come from the "Fourth Estate."

THE POTATO TRADE.—SMITHFIELD FOR A CENTRAL MARKET.

One of the most remarkable features in modern farming is the extraordinary improvement and increase that have taken place in the culture and growth of potatoes. The chief cause of this increase is unquestionably the high price to which they have attained since the commencement of the "potato disease," still inexplicable. Happily we have encouraging tokens of its disappearance, and grateful shall we be to the Giver of all good, when it shall please Him to remove this severe and trying scourge from amongst us. We, however, believe it has been of signal service to the population of the sister kingdom. It has taught them the more extended use and value of other kinds of food, particularly that cheap and nutritious variety of human food to be obtained from Indian corn, the consumption of which is so rapidly on the increase in Ireland, that the imports have been, for the five years ending 1854, as follows:—

	Qrs.
1850 .....	1,286,263
1851 .....	1,821,513
1852 .....	1,479,890
1853 .....	1,554,434
1854 .....	1,356,379

Total.....7,498,479

of the money value of about from £20,000,000 to £21,000,000 sterling.

The first year of its very general adoption as food for the Irish people was in what is termed the year of famine—1847-8. Since then it has become a necessary and prime article of food, and a most satisfactory substitute for the potato—the Irishman's potato. However, it has by no means retarded the culture of that invaluable root in that kingdom. The growth of potatoes is regularly increasing, and is becoming one of the principal articles of export from that country. The following account shows the gradual increase, since the year 1852, in the number of acres cultivated for potatoes:

	Acres.
1852 .....	876,532
1853.....	898,733
1854.....	989,660
1855.....	981,529

being an increase of more than 110,000 acres in four years. The returns for Scotland give 143,032 $\frac{3}{4}$  acres of potatoes, and the eleven counties enumerated in England and Wales give 192,287 acres under potatoes; but none of these counties comprise a large potato-growing district, *i. e.* Lincolnshire, Cambridgeshire, East-Riding, and

Huntingdonshire, and others, where they are grown to a large extent. We believe the number of acres cultivated for potatoes in England and Wales might be taken from 800,000 to 1,000,000 acres at least, which would give a total of nearly 2,124,661 $\frac{3}{4}$  acres—nearly 2 $\frac{1}{4}$  millions of acres annually cultivated for and under growth with potatoes! The weight of food grown is enormous, and the trade that has sprung up out of it is immense. Besides our own growth, large importations arrive from other countries. During the three years ending 5th January, 1854, the importations were as follows—

	Cwts.
1852 .....	636,771
1853 .....	773,619
1854 .....	1,133,609

a large portion of this supply no doubt coming from Ireland. Be that as it may, the quantity brought into the British market is astonishing, and demands the most attentive consideration of the public, as to the best means of its disposal; the regulation of the supply; the cheapest means of transit; the eligibility of markets; and the best mode of effecting sales.

In London, the principal markets are the Borough, Covent Garden, Spitalfields, and a few smaller markets, where the business is more or less carried on by a class of men called potato salesmen, who sell on commission, and transact their business after the order and regularity of commission agents generally, as in the cattle and stock markets. The greater portion of this amazing supply does not pass through a public market at all, but is sent to the warehouses of potato-salesmen in various parts of the town, at great expense, and is there sold by them to the retailers and green-grocers, &c., to be again sent out.

I advocate public sales in public markets, where every opportunity is given to inspect the samples and compare their quality, so that the best samples shall make the best price. The salesman at his warehouse can only dispose of his stock to the customers of his connection, which may be more or less extensive. This is not open competition. What would the corn-factors of Mark Lane say to this mode of doing business? What would the salesmen at the Metropolitan Market say, if each was expected to have his own cattle-sheds or sheep-pens on his own premises? And what would the customers of both say, if they were compelled to visit the offices of the one, or the sheds and pens

of the other, to procure their weekly supplies? The analogy holds good with respect to potatoes.

The great importance to which the potato trade has attained, the amount of capital involved in it, the immense quantity sent to the London markets, and the thousands of individuals engaged in carrying it on, demand, we repeat, the best public attention, but more particularly the attention of the authorities connected with the Metropolitan Markets. What is wanted is a large central market contiguous to the principal railway stations connected with the northern part of London, *i. e.*, so as to be easily reached from the various termini of the goods' stations. This would ensure a more equable price in delivering. The cost of carriage for potatoes from the Great Northern station to the Spitalfields market is 3s. 6d. per ton, from the Eastern Counties station 1s. 6d. per ton, and others in proportion.

It appears to me that the Order of the trade should be thus,—1st. A central market shall be established. 2nd. Samples should be sent to the different salesmen in this market, from the stations or shipping, for sale. 3rd. The bulk, till sold, shall remain at the various stations, or on board ship, and from thence be delivered to order, as given by salesmen. This would save much expense in carriage to both consumer and grower. The minor details could be readily arranged.

I am myself a grower, to some extent, of potatoes for sale at the London markets, and feel seriously the loss I sustain in costs. My last bill, dated Jan. 22nd, gives account of the sale of 5 tons

5 cwt.: they made £22 17s. 6d., the charges deducted £4 16s. 6d., balance £18 1s.; more than one-fifth the price in costs, to which the retailer adds another cost of carriage from the salesman's warehouse to his own store.

I desire to call attention to this matter as one of considerable public importance, and hope to see it taken up by the press generally, as a subject well worth their advocacy. I would urge it upon the City authorities as well worth their most favourable consideration; I would suggest to them the desirability of converting a portion of the old Smithfield Market into a Central Potato Market, or to appropriate for that purpose, a site on Copenhagen Fields, near the Metropolitan Cattle Market: but this would not be so convenient as the old Smithfield site, which is now the resort of many dealers, &c., to purchase hay, straw, &c. There is ample room for this appropriation besides following out the decision lately come to, *i. e.*, to make of it a dead-meat market, &c. I believe the project would be well received throughout the country, by the growers, as a step taken in the right direction; I believe the purchasers and retailers would approve it. The trade would become more general. Innkeepers and householders, and others, would be able to make their purchases in the potato market as they make them in the corn, cattle, meat, and other markets. Salesmen would have good reason to approve it, as giving less occasion for providing expensive warehouse room, and the City authorities would approve it as yielding an improved revenue.

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### THE GROWING FEELING IN FAVOUR OF AGRICULTURAL STATISTICS.

There are some matters, which however remote at times they may appear from attainment, we feel nevertheless must "come." The question of Agricultural Statistics is one of these. Whatever the difficulties which still remain to be dealt with, there are few amongst us but who regard their ultimate establishment as a foregone conclusion. Day by day we find all opposition gradually lowering its tone. The most hostile now admit that, with certain provisos, no great harm may follow the collection of such information. A vast majority, on the other hand, affirm far more decisively that not only no injury would result, but that a great benefit even to the agriculturist himself would be a necessary consequence.

It is remarkable that whatever objections individuals offer, no public body of men who meet to fairly consider the question ever now separate without expressing their approval of the object con-

templated. We speak here more especially with reference to those immediately interested in the pursuits of agriculture. The Lords' Committee, after taking evidence of all kinds and from all quarters, commence the series of resolutions they arrived at with this unqualified opinion—"that amongst the many classes that would benefit by agricultural statistics, none would derive greater advantage than those connected with agriculture." The Highland Society of Scotland afford us a yet more practical reply. The members of that body have not merely given in their assent to the proposition, but they at once set to work to realize it. The London Farmers' Club, again, has been by no means unmindful of so important a matter. The Club has now discussed the question on no less than three separate occasions—in December 1846, in March 1854, and in February 1856; that is, on Monday evening, Feb. 4.

From each and all of these meetings we gather but the same conclusion. At the first of these, when the subject was introduced by the late lamented Mr. Shaw, it was unanimously declared "that, in the opinion of this meeting, an accurate system of agricultural statistics would be highly beneficial." At the one held two years since, when a practical farmer, Mr. William Bennett, of Cambridge, opened the question—"that in the opinion of this Club it appears to be expedient for the public benefit that an efficient system of agricultural statistics should be established." And on Monday evening, when another essentially practical man, Mr. Williams, of Baydon, had the topic of debate associated with his name, the members decided, "that a system of agricultural statistics, carried out on broad and equitable principles, would be of general advantage to the country."

Individuals, we repeat, may demur; but no united body of men has yet declared against the good policy of obtaining the statistics of agriculture. There has up to this time, to be sure, been a kind of exception where silence might be interpreted to mean anything but consent. The Royal Agricultural Society of England has been remarkably coy in committing itself to the experiment. Up to this very last week we would defy any one to have said what the members, as an associated body, thought on the subject; while this doubt was of itself anything but encouraging to the advocates of the measure. We are happy to announce that this exists no longer. The new number of the *Journal* is just published, and in this number one of the most remarkable and able articles is devoted to a full and comprehensive consideration of agricultural statistics. The paper has, too, all the weight of authority, as well as of ability, to recommend it; for it emanates from one of the editors of the *Journal*—Mr. Chandos Wren Hoskyns. We pay this gentleman but a justly-merited compliment when we add that he has proved himself so far signally well qualified for the duties he has undertaken. On this thesis he has left nothing untouched—the blue-book of the Lords, the letters and arguments offered in our own columns and those of our contemporaries, the opinions of the farmers themselves, for and against, are all in turn considered and summed up. The conclusion is still the same: "It is a thing too mortifying to believe that the agriculturists of England have ever seriously declined or hesitated to perform their part in this most useful national inquiry. We would rather believe—and we do believe—that the 'attempt, and not the deed, confounded us'; that the mode in which they were appealed to was erroneous. Evidence of this has been sufficiently adduced on the part of those whose admission is conclusive; leading to

the *conclusion* that nothing is really wanting but the adoption of a system specifically suited to the end in view, and which the agriculturists as a body can recognise as the natural and proper channel of communication between the Government and themselves."

We need hardly recommend a careful perusal of Mr. Hoskyns' paper to the members of the Society. It is certain to command the attention it deserves. The report of the meeting at the Farmers' Club will be also read with interest. It will be seen from this that the introducer of the subject scarcely went as far as some of those that followed him, and that the majority of the meeting was, consequently, against the qualified resolutions he submitted to them. What is very noticeable here is, that toning down of the opposition to which we have already referred. Mr. Spearing, one of the Hampshire dissentients, who but two years since sent back the forms, and distinctly refused to make any return, "has since modified his opinion, and is inclined to think there can be no danger in furnishing the acreage returns sought for." Mr. Stenning, we believe at one time by no means prepared to admit as much, "anticipated that something could be done in regard to agricultural statistics, and for his part he had no objection; for he thought it was only right the country should know what were its capabilities of production." The other speakers are nearly all one way, the chief points being as to how far the collection of statistics should be carried, and what advantage the farmer himself could reap from the command of the information thus arrived at. We shall take some early opportunity of returning to the consideration of two so important items in the account.

The general advantage, then, of agricultural statistics, like that of the good wife in the old song, is a settled question: the only difficulty is, "how to get them." To this we have still seriously to apply ourselves. Mr. Hoskyns, "in bringing to a close for the present" what he modestly terms "a mere preliminary and imperfect essay to open a subject itself as yet imperfect," still gives us a promise that it is one "whose growing and self-correcting details will probably furnish hereafter a topic of annual notice in the *Journal of the Society*." Might we venture a suggestion on this? The Council of the Society has at times, we believe, both a difficulty in selecting its subjects and obtaining competition for the premiums they offer. Let them devote one to this question. They will serve both themselves and their country by doing so. It is not even yet too late, and they will be sure to have several good papers to choose from—"A prize of fifty sovereigns on the best means to be employed in obtaining the statistics of agriculture."

## ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A MONTHLY COUNCIL was held, at the Society's House in Hanover-square, on Wednesday, the 6th of February. The following Members of Council and Governors of the Society were present: Colonel CHAL-LONER, Trustee, in the chair, Earl of Essex, Lord Berners, Lord Feversham, Sir John V. B. Johnstone, Bart., M.P., Sir Archibald K. Macdonald, Bart., Mr. Raymond Barker, Mr. Hodgson Barrow, M.P., Mr. Barthropp, Mr. Barnett, Mr. Bramston, M.P., Mr. Brandreth, Mr. Cavendish, Mr. Evelyn Denison, M.P., Mr. Druce, Mr. Garrett, Mr. Brandreth Gibbs, Mr. Fisher Hobbs, Mr. Holland, M.P., Mr. Wren Hoskyns, Mr. Jonas, Mr. Kinder, Mr. Lawes, Mr. Laurence, Mr. Milward, Mr. Main-warding Paine, Mr. Allen Ransome, Professor Simonds, Mr. Simpson, Mr. Thompson, Mr. Turner (Barton), Professor Way, Mr. Burch Western, and Mr. Woodward.

The following new Members were elected :

Alison, John, Ilford Lodge, Ilford, Essex  
 Appold, John George, 23, Wilson-street, Finsbury-square, London  
 Barnard, Henry, Snettisham, King's-Lynn, Norfolk  
 Bickley, Andrew, jun., Lineal Wood, Ellesmere, Salop  
 Biggs, James, Desborough, Market-Harborough, Leic.  
 Brown, Lord John Thomas, Westport, Co. Mayo, Ireland  
 Cameron, A. H. F., Lakefield, Glen-Urquhart, Inverness-shire  
 Chick, Thomas, Stratton, Dorchester, Dorset  
 Cottam, George H., St. Pancras Iron Works, Old St. Pancras Road  
 Crosskill, Alfred, Iron Works, Beverley, Yorkshire  
 Finnis, Steriker, The Elms, Hougham, Dover  
 Gibson, Sir Alexander Maitland, Bt., Clifton Hall, Edinburgh  
 Gouthwaite, Richard, Lumby, Melford-Junction, Yorks.  
 Greenock, Lord, Wood-End, Thirsk, Yorkshire  
 Gulston, Alan James, Combe-Royal, Kingsbridge, Devon  
 Leader, Nicholas, Dromagh, Bonteen, Ireland  
 Leigh, John Shaw, The Hoo, Luton, Bedfordshire  
 MacLagan, Peter, jun., Pumphrestone, Midcalder, Edinburgh  
 Mouro, Mordaunt Martin, Enfield, Middlesex  
 Ord, Rev. J. A. Blakett, Whitfield Hall, Haydon Bridge, Northumberland  
 Osborn, Henry, Wceford, Lichfield, Staffs.  
 Pope, John Raymond, Chaceley, Tewkesbury, Gloucestershire  
 Ray, Samuel, St. Paul's, Belchamp, Halstead, Essex  
 Selmes, Frederick, Dibden, Southampton  
 Sherrard, James Corry, Kinnersley Manor, Reigate, Surrey  
 Simpson, John, Potterspury, Stony-Stratford, Bucks  
 Stafford, Marquis of, Lilleshall Hall, Shropshire  
 Tawke, Arthur, The Lawn, Rochford, Essex  
 Walker, John, Seatouharn House, Newcastle-on-Tyne  
 Wells, Charles, Barton-Seagrave, Kettering, Northamptonsh.  
 Western, Thomas Sutton, Felix Hall, Kelvedon, Essex  
 Williams, John, sen., Trimley, Ipswich, Suffolk  
 Williams, Williams, Walton, Ipswich, Suffolk  
 Winnall, John, Eccleswall Court, Ross, Herefordshire.

FINANCES.—Mr. Raymond Barker, chairman of the Finance Committee, presented the report on the

accounts of the Society, from which it appeared that the current cash balance in the hands of the bankers was £2,671. He explained that this general balance included £1,200 received from Chelmsford as a subscription towards the reduction of the expenses of the Society's country meeting to be held at that place in the present year. He also laid on the table the quarterly statements of account connected with the several branches of the Society's income and expenditure, assets and liabilities.

HONORARY MEMBER.—The Emperor of the French having graciously expressed his consent to the proposal that he should be elected an Honorary Member of the Society, the following resolutions were carried unanimously :—

1. On the motion of Mr. Evelyn Denison, M.P., seconded by Lord Berners :—“That his Imperial Majesty the Emperor of the French be duly elected an Honorary Member of the Royal Agricultural Society of England.
2. On the motion of Mr. Brandreth, seconded by Lord Feversham :—“That a Diploma of the Society, signed by the President, and countersigned by the Secretary, with the Great Seal of the Society attached to it, be forwarded.”
3. On the motion of Mr. Thompson, seconded by Mr. Hoskyns :—“That a copy of the sixteen volumes of the Journal of the Society, appropriately bound, be forwarded to his Imperial Majesty, together with the Diploma of his appointment as Honorary Member of the Society.”

STANDING COMMITTEES.—Reports were received from the chairmen of the standing committees of the Society, stating how often their respective committees had met, and how many reports they had made to the Council.

JOURNAL AND LIBRARY.—Mr. Thompson, chairman of the Journal Committee, laid on the table a copy of the new Part of the Journal (XVI., 2), and submitted to the Council suggestions from that committee for arranging, cataloguing, and completing the library of the Society. These suggestions were adopted.

CHEMICAL LECTURES.—Sir John V. B. Johnstone, Bart., M.P., reported from the Chemical Committee the suggestion of an alteration in the arrangement of the lectures to be delivered this spring by Prof. Way, the consulting-chemist of the Society, and announced on the 4th of July last. The Council adopted the suggestion, and agreed to the following amended schedule :—

1. On the influence of climate on the action of manures.
2. On the composition of land-drainage water.
3. A review of the progress of chemical science with reference to agriculture at home and abroad.

GUANO-SUBSTITUTE PRIZE.—On the motion of Mr. Raymond Barker, seconded by Sir John V. B. Johnstone, Bart., M.P., it was carried : “That the period

of the Society's liability for the offer of the guano-substitute prize shall terminate with the year 1856."

**CHELMSFORD MEETING.**—Mr. Barnett, Vice-Chairman of the Chelmsford Committee, reported to the Council the suggestion of the local authorities and of the Chelmsford Committee, that the period of the Society's ensuing country meeting, to be held this year at that county town, should be fixed for the week commencing Monday, the 14th of July. He also reported that the Committee had adopted the plan of the show-yard submitted to them by Mr. Brandreth Gibbs, the Honorary Director of the Show, and had given directions for the commencement of the works. This report was confirmed by the Council.

**AGRICULTURAL IMPLEMENTS.**—Colonel Challoner, as chairman of the Implement Committee, laid the following report before the Council:—

The Implement Committee have taken into their deliberate consideration the subject referred to them by the Council at their Special Meeting on the 10th of December last; namely, such a classification of implements for competitive trials at the future country meetings of the Society, and for which alone in each year prizes shall be offered, as shall insure the trial of every description of agricultural implement once in three years. The Committee recommend to the Council the adoption of the following rotation for the ensuing period of three years, namely:—

1856.		1857.	
Tillage and Drainage of Land.		Cultivation and Harvesting of Crops.	
Ploughs		Drills	
Harrows		Manure Distributors	
Cultivators		Horse hoes	
Subsoilers		Hay machines	
Clod-crushers		Mowing machines	
Rollers		Reaping machines	
Tile and Brick Machines		Horse rakes	
Implements for Drainage.		Carts	
		Waggons.	
	1858.		
Preparation of Crops for Market, or Cattle Food.			
Engines		Chaff engines	
Thrashing Machines		Mills	
Dressing machines		Oilcake Breakers	

The Committee accordingly recommend that the Implement Prize Sheet for the Chelmsford Meeting should comprise implements in the first of the above classes; with the addition of special prizes for the best Steam-cultivator and the first and second best Reaping Machines, and of a department for miscellaneous as well as for new implements. The Committee beg to suggest: 1. That implement makers wishing to have duplicate implements in the show-yard, may do so for the purpose of showing such implements at work. Stewards are to reserve to themselves the power to arrange such hours as may appear most convenient for the implement makers to exhibit their different implements in motion. The exhibitors to find the materials for such exhibitions. 2. That if any exhibitor shall send machinery away from home, so that it is not possible for it to arrive in time to be admitted into the yard, he shall forfeit the right of the reduced rate of railway transit.

(Signed) C. B. CHALLONER, Chairman.

The Report having been confirmed by the Council, Mr. Ransome and Mr. Garrett submitted to their con-

sideration a Memorial, signed by a great proportion of the exhibitors of implements at the Society's meeting at Carlisle last year, and conveying their views on the system of offering individual money prizes for competition among the implement makers; their satisfaction at the triennial division for the trial of implements already decided upon by the Council; their desire to have maintained the full severity of the tests for trial; and their strong wish "that the report of the judges, in such form as may express their approval, either entire or qualified (as the case may be), should be placed in the hands of the exhibitors before the general exhibition day, in substitution of the individual money prizes as heretofore offered on the Society's prize sheets." On the motion of Lord Berners, seconded by Mr. Evelyn Denison, M.P., this Memorial was read, and received the fullest consideration of the Council.

On the motion of Mr. Thompson, seconded by Sir John V. B. Johnstone, Bart., M.P., it was resolved:—"That in case of equal merit in two or more implements of the same class, the judges be instructed to divide the prize equally between them."

On the motion of Mr. Brandreth, seconded by Mr. Thompson, the following sums were voted for the respective classes of implements for which prizes would be offered for the Chelmsford meeting (exclusively of the steam-cultivator, £500; reaping-machines, £50; and miscellaneous awards), viz:—

For the class of ploughs	£40
" harrows	20
" cultivators, &c.	20
" subsoilers	20
" clod-crushers and rollers..	20
" tile and brick machines ..	20
" draining implements ...	20
	<hr/>
	160

And on this motion it was further resolved:—"That the several sums shall be divided or withheld at the discretion of the judges; and in no instance shall a prize be given unless there be deemed sufficient merit."

On the motion of Mr. Brandreth, seconded by Mr. Hoskyns, it was resolved that the following should be the terms in which the Society's Prize of £500 for a steam-cultivator should be offered, viz.—"For the steam-cultivator that shall, in the most efficient manner, turn-over the soil, and be an economical substitute for the plough or the spade."

**PARIS AGRICULTURAL AND INDUSTRIAL EXHIBITIONS.**—On the motion of Sir John V. B. Johnstone, Bart., M.P., seconded by Mr. Thompson, it was resolved: "That the best thanks of the Council are due to those of its members who so ably represented the Society at the International Exhibitions at Paris, for their exertions." Sir John Johnstone explained that it was intended to include in this vote of thanks the Deputation to the International Agricultural Meeting held at Paris in June last, consisting of Mr. Miles, M.P., as President of the Society; Mr. Hudson, as Secretary; Professors Simonds and Way, as Professors; Mr. Garrett, Mr. Hudson (of Castleacre), Mr. Brandreth Gibbs, Mr. Fisher Hobbs, Mr. Jonas, and Mr. Mil-

ward, as Members of Council:—Mr. Milward, as the English Juror of Cattle; and Mr. Fisher Hobbs, as the English Juror of Sheep and Pigs on that occasion:—and Mr. Evelyn Denison, M.P., the English Juror of Agricultural Implements at the Universal Industrial Exhibition held at Paris, subsequently, in the same year. Mr. Denison, M.P., and Mr. Fisher Hobbs, respectively acknowledged the compliment thus paid to themselves and their colleagues. They expressed their entire conviction of the great advantage which could not fail to arise in favour of the two allied countries from the friendly intercommunication so happily subsisting between them.

**FOREIGN CATTLE.**—Lord Feversham reported that the separate prize-sheet for the foreign cattle prizes, conditions, and regulations, would be submitted to the Council at its next monthly meeting.

**POULTRY PRIZES.**—On the motion of Sir Archibald Macdonald, Bart., seconded by Mr. Brandreth Gibbs, the schedule of prizes for farm-poultry proposed by Mr. Fisher Hobbs for competition at the Chelmsford meeting was unanimously adopted.

**FOREIGN OFFICE.**—Communications received from the Foreign Office by instructions of the Earl of Clarendon were referred to the Journal Committee, and the best thanks of the Council ordered for them. The Council adjourned to their weekly meeting on the 13th of February.

A WEEKLY COUNCIL was held on Wednesday, the 13th of February; present, Colonel CHALLONER, Trustee, in the chair; Mr. Appold, Dr. Calvert, Mr. Gray, Rev. L. Vernon Harcourt, Mr. Fisher Hobbs, Mr. Majendie, Mr. Marriott, Mr. Mainwaring Paine, and Prof. Way.

**SEA-SAND.**—The Rev. S. N. Kingdon, a member of the Society residing at Bridgerule, near Holsworthy, in Devonshire, informed the Council that a great quantity of sea-sand was brought into the adjoining district from Bude Haven, on the north-western coast of Cornwall, to be employed by the farmers as a manure; also from a neighbouring part of the coast called Widemouth Bay. No less than 59,000 tons of this sand had been sent inland for manure, in the course of a single year, by a canal formed for the express purpose; and a very large amount was brought away by waggons and carts sent to the sea-shore itself. As the fertilising qualities of this sand appeared to be very evident, he thought it would be an interesting inquiry to ascertain by chemical analysis the probable cause of such fertilising action.—Professor Way expressed the satisfaction it would give him to investigate the nature of this sand, and report the result to the Council, if the Rev. Mr. Kingdon would kindly send to him a portion for analysis, along with information under the following heads:—1. The nature of the soil benefited. 2. The quantity of sand put on. 3. How often applied. 4. For what crops. 5. The cost of application. Professor Way remarked that last year Mr. Scott had called the attention of the Council to a peculiar deep-sea sand containing fibrous matter and used in Ireland as manure under the term

“wool.”—Colonel Challoner was acquainted with a sea-sand on the Wexford coast, which produced wonderful crops of asparagus, and other similar vegetable products.

**CLINKER-MANURE.**—Dr. Ritterbandt desired to place at the disposal of members of the Society five tons of a manure obtained from the vitreous substance produced in the fluxing of iron and other ores, and known in the country as “Clinkers.” This substance was treated with sulphuric acid, and a dark gray sandy powder obtained. This powder Dr. Ritterbandt had found very advantageous to Potato crops.—The Council decided that they could take no cognisance of any manure submitted to them, unless accompanied by a suitable chemical analysis showing its composition; and that, even in such case, the trial of manures could only be undertaken by the members in their individual capacities.—Col. Challoner and the Rev. L. Vernon Harcourt expressed their willingness to give the manure a trial, in their private capacities, should the chemical analysis Dr. Ritterbandt might hereafter furnish hold out a probable indication of favourable results, and the estimate of cost and quantity to be employed render the application economical.—Mr. Jonathan Gray stated that in South Wales the use of clinkers to the land had been attended with no advantage.

**AFRICAN GRASSES.**—Mr. Donovan favoured the Council with a collection of African Grasses and a stuffed specimen of the great locust bird, referred to in the following communication:—

37, Nottingbam-place, New-road.

I beg you will receive, for the acceptance of the Royal Agricultural Society, the accompanying specimens, consisting of four books or vols. of Grasses, &c., two of which, marked Nos. 1 and 2, contain specimens of the common uncultivated indigenous Grasses of that part of Africa situated between the chain of Dengousberg Mountains and the Orange and Vaal Rivers; vol. 3 contains, beside pasture, herbs, and grasses collected in the districts of Colesberg, Richmond, and Beaufort, W., S.S.W. of the Orange River, some rough mountain heath, common vegetation in the Cape western district. The small collection, No. 4, are a few specimens hurriedly collected in the immediate neighbourhood of the Emperor Napoleon's tomb, St. Helena. I must also mention a specimen of natural history, “the great locust bird,” which I am induced to present to the British agriculturists on account of it being an object of great interest and service to the European agriculturists in Africa, who welcome with much pleasure the rare, unexpected, and mysterious visits of these birds, because of their habit of exterminating vast swarms of destructive locust. It will be found on examination that this specimen bears a great resemblance (with exception of the legs and beak) to the white storks in the British Museum. In conclusion, I beg you will intimate to the society that I shall be happy to answer any inquiries they may be desirous to make concerning the agriculture, wool, &c., of those parts from which I have gathered the grasses in question.

(Signed) JOHN CLARKE DONOVAN.

The Council voted their best thanks to Mr. Donovan, for the favour of these presents and communications, and would feel further favoured by his attendance at any of their weekly meetings, for the purpose of fur-

nishing such additional information as he might possess in reference to African natural history.—Professor Way had received information from the same part of Africa, where, he was told, the summers were short and bright; the grasses there were represented to him as being well worthy the attention of English agriculturists.—On the suggestion of Mr. Majendie, it was moved by Mr. Fisher Hobbs that Mr. Robert Brown, of the Linnæan Society, so eminently distinguished for his acquaintance with the botanical productions of the southern hemisphere, should be requested to examine these grasses, and favour the Council with his report upon them.

**IRISH GRASSES.**—The following is the report of Mr. Brandreth Gibbs on the dairy-land grasses obtained from Ireland last year by Mr. Thomas Scott, at the request of Mr. Miles, M.P., and referred to the favour of Mr. Gibbs's examination:—

“The packet of cut grasses from Blarney Castle contain—*Holcus lanatus*, Italian Rye-grass, *Dactylis glomerata*, *Cynosurus cristatus*, *Anthoxanthum odoratum*, *Lotus corniculatus*, *Carex*, Plantain, *Agrostis*, *Festuca ovina*, White Clover, Yarrow.

“In the turf, the only kinds that are in flower are the *Anthoxanthum odoratum*, *Cynosurus cristatus*, and Plantain. There are, however, apparently, several other kinds of grasses in the turf; but they have not any culms or flowers. We have, therefore, planted the turf in hits, so as to get the individual plants to spread and throw out flower, and when they have come to sufficient maturity, we will let you know the result.”

**GRAIN-AERATOR.**—On a former occasion Mr. Brown favoured the Council with his attendance, for the purpose of explaining to the members the progress of his inquiries into the best mode of fumigating growing crops, on the principle so long tried and found effectual in his hand-fumigator for garden use, namely, that of driving any kind of air or vapour, by means of revolving fan-wheels, through the fumigatory chamber, into a pipe conducting the air or vapour immediately to the plants, shrubs, or trees to which the application is desired. At the present Council meeting M. Salaville exhibited a working model of his machine for the preservation of grain, to which a first-class medal was awarded last year at the Paris Exhibition. The principle of M. Salaville's machine appeared to be similar to that so long ago adopted by Mr. Brown; its application, however, was different, namely, to large masses of grain, vegetables, or other substances in barns, warehouses, or ship's holds. The construction consisted of a fumigatory chamber, for receiving air, or for generating the sulphureous or other antiseptic preservative vapours, and of revolving fan-wheels for driving these vapours from the chamber into a horizontal layer of perforated tubes, over which the deep mass of grain, potatoes, hops, &c., was placed, and which received into their whole bulk the action of the vapours thus passed up through them. The fan-wheels are set in motion by hand or steam power. M. Salaville stated that by means of this machine, not only were all insects and their eggs destroyed at a very small cost, but a greater weight and brighter appearance were given to the grain. He invited the members to inspect these machines at full work at

the wharf of Messrs. Charles Devaux and Co., 62, King William-street, London-bridge.

The Chairman expressed to M. Salaville the thanks of the Council for his attention in submitting this machine to their notice; at the same time informing him that the Council in such cases expressed no opinion on the value of inventions brought before them. He would be at liberty to enter it for exhibition at the Chelmsford meeting, where it would come under the notice of the judges.

**MICROSCOPE.**—Colonel Challoner gave notice that at the next monthly meeting he should move that the Society should purchase a microscope of the most approved and complete kind for investigations similar to those to which M. Salaville's operations on grain would lead, namely, to ascertain the exact difference produced on the grain by the action of the vapours to which it had been exposed. In the meantime he would suggest that Professor Simonds be kindly requested to attend on that day fortnight with his own microscope, and show to the members that difference between the original and the vaporised grain.

**LOCOMOTIVE RAILWAY.**—Mr. Manning Fellows of Ormesley, near Great Yarmouth, informed the Council of an invention made 16 or 18 years since by Sir George Cayley, of a steam locomotive laying down its own railway; and of which a plate was published at the time in the “*Mechanics' Magazine*.” He also referred to “a trial with an endless chain for propelling boats in a canal; the chain, or the slack part of it, sinking to the bottom of the canal, and there, being detained by the mud, &c., formed a basis for motion: the scheme was found to be sound in principle, but was abandoned in consequence of the room the machinery took, and the water and dirt which came on board the boat.”

**COTTAGES.**—The reference made in the report on the farming of Dorsetshire (*Journal XV.*, 442) to Mr. Sturt's cottages having excited much attention, Mr. Sturt, on application to him, has kindly stated to the Council his willingness to give any of the members all the information he possesses in reference to their construction and cost.

**TREACLE FOR CATTLE.**—Mr. Tollemache, M.P., referred to the probable advantage that would arise, during the high price of oil-cake, from the use of treacle for the purpose of feeding cattle. It had already been tried, as such a substitute, with considerable success by some farmers in the eastern counties. A West Indian merchant had informed him that coarse brown sugar contained 95 per cent. of saccharine matter, while treacle contained not more than 15 or 20 per cent. He thought it desirable to ascertain how far the amount of nutritive value in food depended upon the saccharine matter it contained.—Professor Way remarked that treacle consisted almost entirely of saccharine matter, although not of that kind which could be crystallized out of it. The Government had a few years ago appointed a commission to inquire into the feeding properties of malt, when it was found that barley

malted was not better than barley unmalted; in other words, that sugar was not better than starch.

IMPLEMENT REPORT.—Mr. Fisher Hobbs gave notice that, in consequence of some omissions having been made in the Report of the Implements at the Carlisle Meeting, published in the last Journal, he should bring the subject before the Council at their next Monthly Meeting.

The Committee having referred to the Journal Committee papers by Mr. Fullbrooke on Meteorological Cycles, and by Mr. Dickson on Flax Operations,

arranged that on that day fortnight the following subjects be brought before them :—

1. Colonel Clinton's communication on Improvements in the Machinery for Raising Water and other Fluids, by which a great Economy of Steam-power is effected.
2. Mr. Riddell's Exhibition and Explanation of his Model of his new Reaping Machine.
3. Mr. Hancock's Exhibition and Explanation of his new Chaff cutting Machine.

The Council then adjourned to their Weekly Meeting on Feb. 20.

## THE IMPLEMENT MAKERS AND THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

The continual development of agricultural mechanics, during the last ten or fifteen years, is a fact as remarkable as it is altogether satisfactory. It would be only idle for a moment to question but that this advance is mainly attributable to the proceedings of the Royal Agricultural Society of England. Its endeavours to incite invention and encourage improvement have been ably responded to by the manufacturers; while the exertions of either have been fully appreciated by the agricultural public. At this present time, perhaps the greatest attraction, as certainly the most interesting feature, is the implement department of the Society's shows.

The system, then, upon which this section of the prize list has been carried out must be considered as eminently successful. We may still occasionally find a poor class or two of stock, but it is now rare indeed that the implement entries are not well filled. There may not be quite so many on the ground, but it is the inferior only that have been weeded out; and, as at Carlisle this very last year, there is scarcely a piece of machinery in the catalogue but is worthy of a place there. So far, certainly, so good. If we wished to pay the Society the highest compliment we could, we might instance what it has done, and is doing, in this respect. The only reasonable deduction to be drawn here is, that it should pursue a path that has so far been followed with so much general advantage. It is a very old bit of advice that tells us to let well alone; and many a man has been ruined, ere this, by not being satisfied with doing very well indeed. Some of our friends, though, seem to think we have done quite enough. It is but a year or two ago that nearly all our most distinguished implement-makers signified to the Council of the Society that they did not want any more prizes! Let the yard in future be merely a bazaar, where each man might show off his wares

to the best advantage; taking care, of course, in doing so, to proclaim the premiums he had received when premiums were in fashion. It is right to say that this magnanimous offer was never for a moment entertained. We are not now quite sure, indeed, whether it ever came on to a hearing; at any rate it died out very quietly—sufficiently so to lead us to imagine there was an end of it.

This, however, is not the case. The same idea has been revived in a considerably modified form. The manufacturers now petition that the trials should not come so frequently. When during this last winter the proposition was first broached to us by the head of a very eminent firm, it was that the Society should only have trials of implements once in two or three years, or, as it immediately appeared to us, there should be two dead years to a live one. A better mode, if it must come, and one which we suggested at the time, was, that certain implements should be tried triennially, but that at each show there should be something put to the test. To this the prayer ultimately came, and with this the Council have agreed. There is no doubt but that the experiment is something of a hazardous one. The annually recurring test kept men continually on the spur as to what they could do better by the next show; and it is a question whether we shall now make more improvement in three years than we have done heretofore in one. Our different inventions have certainly arrived at a high degree of perfection, so that a very frequent examination of their merits may not perhaps be so necessary as in times gone by. Let the Council, however, not forget to make a liberal use of that department by which they can still incessantly urge onwards "miscellaneous and *new* implements."

We are quite willing to admit the immense expense to which manufacturers are put, in attending the different agricultural meetings of the three kingdoms; though we cannot help thinking there must be something of a proportionate bene-

fit attached to their peregrinations. Above all, let us ever bear in mind that there are still young men coming on. Some of these may be made, as some *have* been made, eminent by the trial of their inventions before the Royal Agricultural Society. We could name flourishing houses, now well content to rest where they are, whose fortunes could never have been what they are, but for the incentive their founders received from the prize-sheets of the Royal Agricultural Society.

This brings us to another point. The triennial trial being admitted, the exhibitors recur to their first resolve, and request there may be no individual money prizes. They, nevertheless, desire "to have maintained the full severity of the tests for trial," but that the decision should only extend to a report of the judges—an approval, "either entire or qualified." It is difficult at first to understand the motive for this. If there are to be trials, why should there not be prizes for those who come best through them? 'But,' say the makers, 'there are no best—we are all good, and the difference is often so slight as to puzzle the judges which shall have the first prize, which the second, and which the commendation. Be kind enough to announce that we are all very good, and we shall be satisfied, but don't go and give a distinguishing prize to some fellow who won't be satisfied until he has done better than very good. It is unfair; for, according to this plan, there will always be sure to be somebody trying to find out some improvement or other, and there is no knowing where will be the end to it.'

Of course there will not. And is not this just what the Royal Agricultural Society ought to and does aim at?—Keeping you all continually alive to improvement. Never mind the very slight difference. If you are awake and watchful, you may turn that slight difference to your side, by the next show. It is precisely this slight difference that keeps us moving. Destroy the spirit of emulation, and you destroy the spirit of improvement. It may be argued, though, that such a course as that contemplated would not injure the spirit of emulation. We believe it would, in a very great degree. "It is honour," or honours, "prick us on," as Falstaff says. What would be the result of reporting a class of boys at school as a very good class, without any distinction for the best of them? Or the examination of our prize men at the universities, without prizes to give them? It is the tangible realized reward; the goodly-bound books, scholarships, fellowships, Royal plates, gold cups—aye! and Royal Agricultural prizes and gold medals, that keep us all going at our best pace. Who would be likely to do his best when

he knew there could be nothing better than "a dead heat with the lot"?

This request has, according to the report of the Society's proceedings in our last week's paper, "received the fullest consideration of the Council." If it has not, we have only to trust it may. There will be some advantage in the triennial trials, as it will give more time and opportunity for a proper examination of those implements under inspection. The trials of ploughs, for instance, at Chelmsford, we look forward to, as something particularly interesting. On the other hand, we can see nothing likely to be beneficial, either to the Society, the public, or even to the exhibitors, in the abolition of premiums and medals. Many a farmer will give a prize implement a trial, who would often pass it over without such an assurance of its worth. Let the Council, too, remember how, when they walk through the show-yards, they find everywhere these prizes and medals made the most of; and let them also bear in mind how seldom these have been ill awarded. They furnish the very metre of agricultural advancement, and when we lose them we shall proceed no farther to "the quick march" we have been accustomed, but fall back under orders to "stand at ease," and "as you were."

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#### MEMORIAL PRESENTED TO THE COUNCIL OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND AND ITS COMMITTEE ON IMPLEMENTS.

We, the undersigned Engineers and Manufacturers of Agricultural Implements, and Exhibitors at the Annual Meetings of your Society, desire to submit to your consideration our views on the question of the present system of offering individual money prizes for competition among the makers.

We object to this system on the ground that it operates as an undue stimulus to competition, tending less to the production of useful and practical machines, than to the development of ingenious peculiarities, by which, with the aid of highly skilled manipulation, the prizes may be won; but more especially is our objection taken on the ground of unfairness of its operation, having the effect of marking in a manner altogether disproportionate to the circumstances the appreciation of *one* to the depreciation of *all other* competitors, although, as very frequently occurs, the merits of several may fairly be considered to be equal.

We are desirous to express our entire satisfaction with the resolution of the Council, at its meeting in December, for dividing the trials of implements into three sections, so as that each section may be tested triennially. This will greatly relieve the labours of the exhibitors, and at the same time afford opportunity for more deliberate judgment. We have no wish to lessen the severity of tests by the instruments of your engineer, or by the close observations of competent judges; but we are desirous that the reports of the judges, in such form as may express their approval, either *entire* or *qualified* (as the case may be), should be placed in the hands of the exhibitors before the general exhibition day, in substitution of the indi-

vidual money prizes as heretofore offered on the Society's prize sheets.

In our desire for the abolition of general prizes, it is not our wish to prevent or discourage occasional offers of special prizes of high reward for such implements as may appear to require the peculiar application of mechanical intelligence to render ideas, not fully developed, practical for general usefulness. Nor do we wish the Society to be limited in the distribution of its smaller medals, in such cases as it may appear desirable to mark approval of new inventions as has heretofore been the practice.

We beg respectfully to press these views on the consideration of the Council, feeling confident that, if carried out, the active co-operation of implement makers, as a class, will be most effectually secured, and the objects of the Society more practically obtained.

(Copy of signatures.)

Ransomes & Sims.	Alfred Crosskill.	Pro B. Samuelson,
Barrett, Exall, & Andrewes.	J. & F. Howard.	B. Booth.
R. Hornsby & Son.	R. Garrett & Son.	John Palmer.
E. H. Bentall.	Tuxford & Sons.	Hugh Carson.
Smith & Ashby.	E. R. & F. Turner.	Robt. Reeves & J. Reeves.
Fowler & Fry.	Richmond, Chandler, & Norton.	W. Williams.
R. Coleman.	Barnard & Bishop.	F. Kealey.
Holmes & Sons.	Wm. Busby.	Hy. Goddard.
Chas. Hart.	Hill & Smith.	Chas. Bunting.
Clayton, Shuttleworth, & Co.	James Woods.	David Harkes.
	James Hayes.	

(Signatures attached by written authority.)

Emerson Archer.	E. Brayton.	Jno. Gray & Co.
Whitmee & Co.	C. Burrell.	E. & T. Humphries.
E. Wier.	Jno. Goucher.	Isaac James.
Harc & Co.	R. Forshaw & Co.	John Hope.
W. N. Nicholson.	Williamson Broths.	John Richardson.
W. Cambridge.	Wm. Coulson.	Thos. Robinson.
W. Smith.	Arthur Lyon.	Reeves & Son.
Jas. Smith & Son.	John Dalton.	Robt. Sewell.
Samuel Nye.	Thos. Buxton.	Wm. Sharman.
Robt. Hunt.	Wm. Dray & Co.	Alfred Sparke.
W. P. Stanley.	J. D. Ferguson.	Fred. Wilson.
W. F. Roe.	Anne Gilkerson.	Rd. Read.
Jno. Patterson.	Robt. Tinkler.	S. A. Williams.
W. Pearson & Co.	Robt. Boby.	— Cornes.
Mapplebeck & Lowe	Caldow & McKinnell.	— Morley.
E. & B. Johnson.	W. Archbold.	— Foster.
Jas. Harkness.	Ju. Caborn.	— Geddes.
Jas. Blair.		

## TO THE EDITOR OF THE MARK LANE EXPRESS.

SIR,—The following remarks, representing the feeling of exhibitors pretty accurately, and offered with a view to show the desirability of the Royal Agricultural Society altering their arrangements in a manner so as to secure good and efficient implement trials, as well as to effect the entire abolition of money prizes, I will thank you to insert in next week's *Mark Lane Express*.

Money prizes are a delusion to the purchaser of machines, and an injustice to the makers—more especially of late years, because the perfection and equality of many manufacturers have become a matter of certainty. A prize is offered for a machine; many go to trial; the decision is difficult because three, or perhaps four, are so near an equality in their results that the makers themselves might "toss for it." The judges are however compelled to decide upon one, and they then have to do a manifest injustice to the other three. If these four implements were put into a class, say first class, and the second-best lot put into

a second class, there would be some chance of a proper conclusion being arrived at, and the purchaser might be decided by some point that might be quite separate from its real qualities.

Practically the decisions of the Royal Agricultural Society's judges cannot be of that importance they suppose in fixing upon one implement, to the condemnation of its equal. For instance, Cornes' chaff engine has, with one exception, taken the prize since the York show, in 1848. It is a good implement, and should have become universal from so many repetitions of this decision. It is made by many makers besides the original, and yet it only takes its place upon an equality, and even inferior in number, to some others.

The trials of combined thrashing and winnowing machines is perhaps the most important of any. These machines are tried by judges who are capable of telling a good sample from a bad one, and also well able to tell whether it is well thrashed and dressed, and there is no doubt of their respectability and anxious desire to do what is right to the best of their judgment; but for the most part they are quite incapable of understanding the *mechanical* capabilities of what, under any circumstances, must be rather a complicated piece of workmanship. Its simplification as much as possible, liability to derangement, portability, the arrangement of parts so as to be easily got at, to adjust or repair or lubricate, and that important matter, the quality of work and materials, and the proper distribution of the latter to afford the greatest strength with least weight—these are all matters requiring a peculiar judgment, which is supposed to be given by the Consulting Engineer, but who, to render him qualified, should have the knowledge of the first-named judges combined with his own.

But, granting the judges to be good, and quite competent to perform the task assigned them, it is a perfect absurdity to suppose a trial of 20 or 25 minutes, with everything prepared, and men up to their work, and perhaps a "dodge" besides, can determine the merits of such a machine, or what the result of a day's work would be: in fact, some of them might not last a day through, and others might require to be pulled up to get at some difficult part to lubricate, so that at the day's end the last might be first and the first last.

A farmer requiring an engine and machine does not uniformly buy from the decision of the Royal Agricultural Society's judges. He goes round his own neighbourhood, or frequently many miles away, to see the machines of different makers, and hear their faults as well as good qualities, and then he decides. Why should not the Society adopt such a system of trials that it would be an advantage to the purchaser to know its decision?

With regard to steam engines. The trial of steam engines has become a matter of such notoriety that it is not likely the Royal Agricultural Society of England will again try them on the old system. The decision has hitherto rested, not on what the manufacturer sends out in his usual way of business, but by what he can produce in a single engine for that particular trial. The engines tried at the shows would scarcely be recommended by their makers to any of their customers, as not being so serviceable as their regular trade engines. In some cases they are very different in construction, in others fitted with three times the usual number of tubes. It would be curious, if it could be obtained, to have an exact specification of the engines shown at the Carlisle meeting; but unless something of this kind is done, the merits of the engines will not be understood. The Judges' reports too should not be delayed for six months—until the next publication of the *Journal*—but be ready by the first public show day.

AN EXHIBITOR.

## ON THE UNDER-DRAINAGE OF LAND IN GREAT BRITAIN.

THE DISCUSSION WHICH FOLLOWED THE READING OF MR. DENTON'S PAPER.\*

The CHAIRMAN of the evening (Mr. Chandos Wren Hoskyns) was extremely happy in being the medium of conveying the invitation of the Society to those gentlemen present who would kindly favour them with their opinions upon the interesting topic before them; but in doing so he would make the remark, that as their time was extremely limited, and as the different branches and views of the subject were, he expected, numerous, it would be most interesting to learn the experience of as many as possible, and this would be best carried out by gentlemen making their remarks in a condensed form. The subject was not a new one, and the views of each speaker would be rapidly gathered if that plan were adopted.

Mr. JOSHUA TRIMMER said, the remarks which he should make would be confined to the case of drainage upon the Keythorpe system, the principles on which it was founded, and the success which had attended it; and he should endeavour to reply to the objections raised against it, not only by Mr. Denton, but by others, on various occasions. The distinguishing character of that system of draining was, that it took advantage of certain subterranean furrows between the soil and the subsoil. He had for many years pointed them out to geologists as having important bearings upon the changes which the earth's surface has undergone, and to agriculturists with a view to drainage purposes. The last time he had brought them under notice, in respect to draining, was in a lecture before the Royal Agricultural Society, on which occasion he pointed out for examination a section of a railway cutting, showing the irregularities which existed in the junction of the soil and subsoil. Those irregularities were the sections of certain channels between the soil and subsoil, of which the Keythorpe system of drainage took advantage, by laying the drains to intersect them. He could not better illustrate these natural furrows, or channels, than by supposing the artificial ridges and furrows made by the plough, in Leicestershire and other clay districts, to be covered to the depth of three or four feet with a surface soil more permeable by water than the subsoil on which it rested. Rain sinking through the soil would collect in the furrow; and if there were any declivity in the channel, it would follow the line of the descent. The Keythorpe drainer cuts his drain across this diagonally, so as to preserve a sufficient fall in the channel. If it were asked how he finds out these channels, he would say that the drainer must dig numerous trial holes to find the point at which water enters, the height to which it rises, and the relative height which it maintains with respect to the holes above it. He then puts a drain in at the greatest distance from his upper hole that he has ever known to free it from water, and if that does not succeed he puts in another, and sometimes a third. Those were the principles upon which he proceeded.

He (Mr. Trimmer) then came to the advantages, which might be summed up in a few words. They were thus enabled to effect the draining of a certain area with fewer drains than by the system of parallel drains at equal distances. A saving of from 30 to 50 per cent. was effected on the cost of drains over intervals of eight or ten yards. The Keythorpe drainage had been sufficiently tested on the occasion of the ploughing match on Lord Berners's estate, on the 1st of November last. There had been 48 hours of incessant rain; indeed, it rained so heavily that it was feared the match would have to be put off. However, it cleared up towards morning, and the match took place in the presence of gentlemen who represented every possible system of drainage, though he was not aware whether a certain Welsh farmer was present, who, when advised to drain his land, said, "it was not intended to be drained, otherwise it would have been made dry by Providence." All those gentlemen were perfectly satisfied with the state of the drainage of the farm on which the match took place. He now came to the objections which had been urged against the system—the first being, that the land could not be sufficiently drained. He would not go into that question, but refer to those who were present here, and had seen it. The next objection was, that if it was drained, the description of the soil, subsoil, and substrata which he had given could not be correct, because it was impossible it could be drained in the manner stated. He had, however, put the facts on record in the "Journal of the Royal Agricultural Society," and should be happy to meet any objections urged against them in print. The third objection was as to the price, it being stated that 30s. per acre for the labour of draining land was preposterously low. Lord Berners had a map, on which, besides the areas of the fields, were laid down the distance and the depth of the drains, and the amount paid for the labour in draining each field. When he was drawing up the statement as to the cost, he took the average of nearly 400 acres, supplied to him by Lord Berners from the map. Lord Berners had also been examined before a Committee of the House of Lords on the improvement of land, when he put in a portion of this map as evidence, which gave an average for more than 100 acres, closely agreeing with the preceding statements. The result of these collective averages was only a few pence over 30s. Another objection was, that there were a certain number of drains only two feet deep; the answer was, that those were made in the old furrows between the old ridges. Immediately the draining was finished these were ploughed down, so that there were now no drains on the farm less than three feet deep.

The CHAIRMAN: There are a few at 18 inches on the map.

Mr. TRIMMER said, Lord Berners was present, and

\* Mr. Denton's own paper was given last month.

would explain the reason of that. It was a mixed system of draining. The next objection was, that professional men could not give their services in such a system of drainage, as they could not be expected to devote their time to probing the soil, to find these subterranean channels; but he (Mr. Trimmer) was satisfied there would be a class of men spring up who would willingly drain land on the cheap system, on the same terms as others drained it on the dear system. The last objection was as to the length of time Lord Berners had been occupied in draining his estate. It was said that it was bad policy to occupy nine years in the draining of an estate, and that it would have been better to have applied to some of the draining companies and borrowed the money, if necessary, in order to drain it out of hand, paying a terminable rent-charge in liquidation of the principal and interest. The tenant, not the landlord, it was said, paid for it, and the sooner the work was done the sooner would the landlord be in a position to avail himself of the improvement in an increased rent. That was a question on which landowners must judge for themselves—whether it was better to drain gradually and cheaply with their own money, or to drain at a dearer rate with borrowed money. He had thus gone over all the heads he proposed in the outset. Mr. Denton had told them the extent of land requiring to be drained. They had much of what was called practical draining going on, which was in most cases little better than a burying of pipes; they had much scientific draining, which, whatever its merits, involved a great burying of money. The Keythorpe system was founded on both science and practice; the generalizations of the former were confirmed by the operations of the latter. It was a system, therefore, well worthy the consideration of landlords who had estates requiring to be drained, and of tenants who it seemed were to pay expensive draining—it was well worthy the consideration of draining companies, draining engineers, and drainage inspectors; and though last, not least, well worthy the attention of the Inclosure Commissioners, to whom was confided the power of deciding how entailed estates should be drained, if the cost of it was to be charged on the inheritance.

The CHAIRMAN read a list of the depths of the drains on Lord Berners' estate, from which it appeared that they were of the respective depths of 18 inches, 2 feet, 3, 4, and 7 feet.

Mr. HEWITT DAVIS stated that he had anticipated that the discussion of the evening would have led to a further explanation of the advantages of draining to agriculture, and he had, therefore, prepared himself to have called attention to the advantages to the general health of the surrounding district by a properly conducted system of drainage. He confessed that he expected to have heard more about the principles of draining, and less of the details of particular practice. He had heard the observations of Mr. Bailey Denton with pleasure, but could not say he agreed with him in some of them—for instance, he did not believe there was any economy in shallow draining, for if the depth be diminished, so also must the distance between the drains, and in practice it would be found that the additional quantity of cutting, and the extra number of pipes so required, would be more than equivalent to the saving of price in the cutting. Also with regard to the extra closeness of the drains in districts where the fall of rain was greater, he could see a reason for increasing the diameter of the pipes, because they would have more water to discharge; but if the land between the drains were made porous, the quantity of rain that fell could not affect the drains in any other

way. With respect to what Mr. Trimmer had said, in his experience he had never found land lying with sub-ridge and furrow to admit of the practice that gentleman had advocated. It must be apparent that to hit these furrows the subsoil must lodge at a regular depth and the furrows at a regular distance, and that the drains must be cut exactly across the fall, so as to receive the water, and to hold it till its discharge. But where was land to be found in this state? How were the conditions to be discovered, and how were drains to be made to intercept the current? Drain pipes afforded the same facility for water to soak away on the lower side as to enter on the upper, and for this reason would never intercept when placed across the fall. He had prepared a few remarks upon drainage, with respect to the general interest to the public, but as the evening was getting late he would reserve them for another opportunity.

Mr. MECHI considered that we had all seen reason somewhat to modify our views on drainage. It was quite clear that we could not apply one rule to all soils. The hills of Devonshire and Leicestershire, with a frequent out-cropping of springs from silty veins, required a different treatment from the level homogeneous soils of the flat, stiff, clay districts. On a recent visit to Lord Berners, at Keythorpe, near Leicester, he had been much gratified by the complete and economic drainage effected there. His lordship opened a number of deep holes, or graves, in various directions, and thus ascertained the level of the water and direction of the sandy veins intersecting the clay. By carrying a deep drain to one hole, many other distant ones were occasionally laid dry, whilst it sometimes happened that others close at hand required to be immediately connected with the drain. He had, himself, originally commenced with the system of the late Mr. Smith, of Deanston, but had abandoned it for the deeper system of Mr. Josiah Parkes, to whom they were much indebted. Drains could never be too deep in the strongest soils, but we might err in too wide a distance between the drains. He had drained 24, 30, 40, and 50 feet wide, and 5 feet deep, in very strong clays. In all these instances the operation paid; but those drains at the least intervals were the most profitable. Irrigating, as he did, with showers of liquefied manure, he had frequently caused the drains (at 5 feet deep in strong clays) to discharge the coloured liquid—and it must be borne in mind that every foot of earth gained and amended in depth, was 1,200 tons of extra soil per acre given to the roots of plants. In his neighbourhood, where a crop of parsnips were growing on the edge of a clay-pit, the roots were observed to descend 13 feet 6 inches—in fact, the whole depth to which this pit had once been filled up.

LORD BERNERS observed that he felt he owed an apology to the meeting for being so late in his attendance, but as he was obliged to be present at the Smithfield Club dinner, he hoped that circumstance would be accepted as an excuse. He begged to return his sincere thanks to the Council of the Society for their invitation. He was the last person in the community who would wish to put himself forward, or to enter into any public controversy; but he was always ready to impart any knowledge he might possess on this interesting subject. His system was the result of many years' experience. He had tried, during a period of thirty years, on his farms in Norfolk, Suffolk, and Leicester, the most approved methods of drainage then in vogue, and he had expended several thousand pounds without arriving at any successful result. When it came to be discussed at the Royal Agricultural Society, and when

draining assumed more of a science, he took every opportunity of having conversations with gentlemen who were of the greatest note at that time, in reference to draining—Mr. Josiah Parkes, Mr. Smith, of Deanston, Mr. Hewitt Davis, who was present, and many gentlemen of the Agricultural Society. It was then laid down by scientific men, that a certain system was best to be adopted, namely, a drain of a certain depth, one saying 3½ feet, another 4 feet, and so on—and that these drains were all to be carried down to the greatest declivity. He stated at a meeting of the Royal Agricultural Society, that he considered it to be presumption for any person to say he could lay down a rule or system of draining for any farm, much less for any district; for in his practice he had found that he could not lay down a system of draining for any single field. It was recommended to him very strongly that he should drain down the greatest declivity in clays, such as those he held in his hand. He sent a specimen of the clay to a gentleman who was considered to be the greatest authority in the Royal Agricultural Society at that time, from whom he received a letter stating that it was very true that the quality of the clay he had sent was of a most impracticable character; but that if he persevered there was no doubt that the plan would answer as well as it had answered at Pusey. He accordingly tried the various schemes side by side, though with an impression on his own mind that they would not answer. He watched with anxiety for the result, and found that none of them succeeded. He then cut a diagonal drain across, and freed the whole of that table land. He claimed to himself no merit of originality or novelty, or anything but that judgment which every man could exercise in the case of his own farm, by ascertaining whether the system recommended was applicable to it or not. He did not wish to assume that his plan was the best; but he asked every farmer, and every one interested in draining, to go and see his farm, and he would show them 2,000 acres in Leicestershire, effectually drained, at a cost of £1 or £2 per acre. In Suffolk and Norfolk also, in a ten-acre field, he had more effectually drained it, by an additional outlay of £1 to £2 per acre, than by a previous outlay of £10, £15, or £20. He would give them an instance:—He had a very strong retentive clay farm in Norfolk, where he had a very intelligent bailiff, who had been draining under the old system, which he (Lord Berners) did not approve. If he had known then what he knew now, it would have saved him some thousands. He told the bailiff that he was not deep enough, and not draining in the right direction, and he gave him instructions to dig some holes at the end of the field. In about three months afterwards, the man came to him and said that if he would come he would find that the driest part of the field. At the depth of 3½ and 4 feet they came to little fissures or pipes of sand, like a tobacco pipe, though there was no sand within a mile of the place. Mr. Hewitt Davis remarked that the under strata ought to be known before they commenced draining, but that there would be some difficulty in carrying out this practice. There would be no difficulty in carrying out the Keythorpe system—any man of common observation would in a moment tell how to do it. He would first speak of grass land. The object of course in all draining was not only to take away the surface water, but to take away what was sometimes called the deep water, or spring water. He held in his hand a sketch which he had made after receiving the invitation from the Council of the Society, and he also felt it his duty to bring samples of the clay, which were there for the inspection of the meeting. In Leicestershire there were ridges and furrows of various widths, from 4 to 11 yards long, and varying in height

from 1 to 2 feet, and some 3 feet. He mentioned this, as Mr. Trimmer might, when speaking of ridges and furrows, have alluded to the under strata, while he (Lord Berners) alluded to the upper strata. He had laid down a drain in one field in Leicestershire, and after it had been done seven months, the pipe became filled with a hard substance that prevented the water from flowing.

Mr. MECHI—It entered the drain in solution, I suppose.

Lord BERNERS said that such must have been the fact. The drain was laid down in a strong stiff clay, near the conservatory, opposite the drawing-room window, and the result was as he had stated. He had expended several thousands of pounds in trying shallow draining, but his experiments had resulted in failure. In Leicestershire it was said that the proper way to drain was to follow the furrows; but on experience he did not find that system answer. He then tried cross drains; but he was persuaded that the true principle was to take the water from the bottom. If you wanted to empty a cup of water without upsetting it, the proper way would be, not to pierce holes high up in the sides of the vessel, but to make a little hole at once in the bottom, which could not fail to effect the object in view. He had also made experiments with heavy retentive clays, and he had found that if the drains were put as close as they well could be, the water could not percolate. He had tried drains so placed after seven months, eleven months, and two years, and the water had never run out of them. Finding there was no use in draining in that direction, he cut cross-ways wherever he found any porous substance, and then the experiment was successful. In this way he had drained a field of 70 acres, in Norfolk, by a single drain. On one of his farms in Leicestershire, which he had taken into his own occupation at Michaelmas, he found the land so wet and heavy that it could not be crossed by man or horse during the winter, and he found on inspection, that in the intermediate space there were many pounds' worth of tiles which the tenant had put into the strong clay, but which were quite worthless; two feet of water standing in the trial holes, below the pan and the upper surface, wet and undrained.

The CHAIRMAN—What was the depth of the tenant's drainage?

Lord BERNERS—From 22 to 26 inches.

Mr. MECHI—They became what are termed "puddle ponds," did they not?

Lord BERNERS—If drains were put into this description of clay, the water never could percolate through it. He did not assume to himself any credit of originality in the system of drainage he had carried out, and he would put the sections he had made into the hands of the Chairman, who was perfectly welcome to make what use he pleased of them. There was one point more which he wished to mention, and that was the advisability of keeping a record of the exact places where the drains were put down, and also the situation of the out-falls. In his office an account was kept of each drain, showing its direction; but the small drains were only regarded as adjuncts to the others. If any gentleman present would come to Keythorpe, not for a couple of hours, for that was no use, but for a day or so, he would give him a welcome, and would show him over the land, and he (Lord Berners) believed he would find a triumph of draining not to be met with in any other district. By the use of trial holes they would find not only the proper depth it was necessary to lay the drains in each field, but when those holes were

emptied by distant drains, they would see nearer ones were not necessary, and thus the saving of expense effected by the union of porous spots in whatever direction they might occur.

Col. CHALLONER was in hopes that we should have had a little practical information from Mr. Denton, in the course of his paper, upon the method of laying the pipe tiles in drains, because he believed that many of the failures in draining were owing to the imperfect manner in which the pipes were so often laid by the workmen. The great fault was, that they laid in their drains without sufficient attention to the *amount of fall* which they had to dispose of; and very often consumed three-fourths of the fall before they had got half-way to the upper point to which the drain was to be carried. To avoid this, he recommended the use of a common bricklayer's level, with a hinge at one end and a means of fixing it at the other, by which the exact *proportion* of fall might be obtained, and thus the drain be laid in one uniform line from top to bottom. By this means depressions or dips in the drains would be avoided, and the accumulation of sand in the pipes, which was one great cause of failure, would be prevented.

Mr. J. W. BAZALGETTE, the engineer to the Metropolitan Commission of Sewers, stated that he had not come prepared to speak upon the subject, but he should regret to find the discussion resolve itself into an advocacy of either deep or shallow drainage. Undoubtedly the advocates of both systems were to a certain extent right, and it would be impossible to fix upon any depth which could be suitable for all kinds of soil. He (Mr. Bazalgette) agreed with those gentlemen who considered that the natural features of each locality should first be carefully examined, and the drainage works afterwards designed to meet the peculiar requirements of each case. There were a large number of gentlemen present from various parts of the country, each of whom could contribute valuable results, which, when collected, might throw considerable light upon the science of land drainage. It appeared to him that in considering the subject, the first principles to be determined were—First, what is the minimum depth to which the waters should be reduced below the surface, to render the drainage perfect. It might vary considerably in different localities, and for different purposes, and this was a question for the agriculturists to determine. It was then for the land-draining engineer to ascertain at what slope the waters would percolate through various soils with sufficient velocity from this minimum depth below the surface towards his drains; and the relative distance between them and the required depth of the drains themselves would then be resolved into a question of comparative cost, and could be determined upon a sure and safe guiding principle. There were still various other most important questions, such as the sizes of pipes, the necessary inclinations for them, and the best mode of laying them, into the consideration of which he would not at that late period of the evening attempt to enter.

Mr. H. S. THOMPSON had no new principle to introduce, and merely rose to offer an explanation of a singular fact, which had frequently been noticed, but, he believed, had never yet been accounted for. It was known that in certain cases deep drains began to run, after rain, sooner than shallow ones; which fact had been long disputed, and when proved beyond a doubt had puzzled the highest authorities in such matters. He had been present at discussions at which Mr. Parkes and others had offered suggestions to account

for it, which were not satisfactory to him. He had, therefore, had glass tubes made, of different lengths, and filled with soil, and had tested the times at which they began to drip when water was poured on them all at the same moment. If the soil was dry, the short tubes, which represented shallow drains, began to run first; but if water was again poured on the tubes before that previously poured on had all passed through, they began to drip again immediately that the second quantity of water was poured on, and without waiting for the water last used to pass through the soil. This was evidently due to the elasticity of the air confined between the free water at the bottom and that at the top of the column of earth; and in this case all the tubes, of whatever length, began to drip at the same moment. If, however, the tubes, after the first application of water, were allowed to remain some weeks, the short tubes discharged the whole of the free water; but the long ones, representing deep-drained land, still retained a little free water at the bottom of the column of earth, and when water was again poured on at the top, this free water was *immediately* discharged, or the deep drain began to run; whereas the short tube, or shallow drain, having discharged all its free water, did not begin to drip for some time—in fact, not till the water had percolated through the column of soil. He had repeated the experiment in various ways, and always with the same results. This was a small matter; but a fact, however trifling, if rightly explained, sometimes elucidated a great principle; and in this case, by tracing the course of the free water in its passage through long and short columns of soil, he had derived great instruction as to the action of deep and shallow drains, and satisfied himself that there was no fear of making land too dry by deep draining, except in peat soils. The lateness of the hour, however, would not admit of his entering further into the subject on this occasion.

Mr. ROBERT BAKER (of Whittle, Essex) stated that at the late hour at which they had arrived he would not trouble the members with any lengthy discussion; but as Mr. Bailey Denton had made observations upon him in his opening paper, the purport of which he could not clearly understand, he felt called upon not to let them pass entirely unnoticed. He, however, thought that the discussion was not carried out as put down upon the card, as to the results of draining. The discussion, on the contrary, went to the practical portion of draining according as each speaker had considered to be most desirable. As for himself, he had little to offer; but he considered that one principle, in a geological point of view, was applicable to every soil—the relieving it of the superabundance of water it might contain; and as the water was held by the porous portion of a subsoil, he did not see the necessity of penetrating the retentive subsoil below to any greater depth than was sufficient to enable the water to collect in the drain below, and thus to be carried to the out-fall and discharged; and then he subscribed that any fixed depth of four feet or more prescribed for the drains would be totally unnecessary, further than as concerned their durability, and relieving the soil of water to the depth of two feet. It ought to be recollected that, except in cases where the strata had become disrupted suddenly, the dispositions of the substrata were constantly alternating from a porous to a retentive one, and that in almost every case where a porous stratum was found, it would be found resting upon one of an impervious or retentive character, and this invariably occurred; so that throughout the whole disposition of nature, exhibited over large districts, the same law prevailed. Take, for instance, the district upon which his own farms were situated in Essex—the upper-surface strata consisted of beds of

gravel sand, loams of every degree of tenacity resting upon the tenacious London clay, which in many instances rose to the surface abruptly. This clay was found resting upon chalk prevailing at the north-west portion of the county, the chalk also resting upon the tenacious gault clay, that resting upon the green sand, and that, in its turn, resting upon a tenacious clay. Thus the provision of Nature was fulfilled, of supplying spring-water at every point where these various descriptions of strata approached the surface; and he begged to call the attention of drainers to this particular, as essentially necessary to the development of the science. As regarded what had been stated respecting the Keythorpe estate, he was willing and pleased to corroborate all that Mr. Trimmer and Lord Berners had stated upon it; for when he visited the spot in the early portion of last month, it had been raining almost incessantly for nearly sixty hours previously, and when almost every field had become more or less submerged in water, not a drop was observed stagnating upon the drained portions of his lordship's estate. And to such an extent did this prevail, that in a field upwards of twenty ploughs were in motion for a ploughing-match without being in the slightest degree incommoded by any superabundance of water; whilst in the adjoining field, that had not been drained, within 100 yards, a draining match was exhibited; and such was the quantity of water discharged by the drains as they became opened that the drainers were unable to proceed with the work, by reason of the large quantity that followed them during the operation; thus exhibiting, by contrast, one of the greatest triumphs of draining, and showing how mind had been brought successfully to bear upon matter in an astonishing manner. He would not longer trespass upon them, although he could have desired to have said much more upon the subject. He regretted, however, the diversity of opinion that existed between agriculturists not only upon this, but upon other subjects; for it would be generally found, that if ten of them offered an opinion upon subjects of the most ordinary nature, all of them would differ.

The Rev. J. C. CLUTTERBUCK wished to say a few words with reference to the observations made by Mr. Trimmer on the peculiar geological condition of the subterranean surface of clays, with reference to which the Keythorpe system of drainage had been carried out. Referring to a section of a ditch cut into the gault clay, the clay rose in waves, or in ridge and furrow, to within about two feet of the surface, the indentations or furrows being filled with drift, and the whole covered with the cultivated soil. Mr. Clutterbuck had observed this condition of subsoil not only in the gault, but in the kimmeridge and Oxford clays; and it no doubt was the same in the lias at Keythorpe. So far as his observation went, these furrows ran at right angles to the dip of the strata, and had no reference to the inclination of the soil, which might or might not be in the same direction as the geological dip of the stratum, but that in a great measure depended on the depth of the drift overlying the substratum of clay. Draining land, where this condition of subsoil existed, must depend more on the direction of the drains than on their depth. A drain cut transversely through the subterranean furrows would drain the land, by allowing the water in the drift to escape; whereas drains cut along the line of these furrows would not draw the water which was impounded in the next furrow, though at a distance of only a few feet. A remarkable instance of the effect of cutting through one of these subterranean ridges occurred in making a drain at Oxford, known as the Jericho Drain. This drain was cut through the Oxford drift into the Oxford clay beneath; by the section made at the time,

it appeared that the drain did not cut across the subterranean ridges up to a certain point, but at that whence it took another direction. Two of these ridges were cut through, and the consequence was that the wells in that part of Oxford were wholly, or in part, deprived of their water. Had the drain been cut longitudinally to the ridges the probability was that the effect would not have been the same; and it was mainly to the loss of the water from those wells that might be attributed the successful opposition offered by many of the inhabitants of Oxford to the plan of drainage proposed by Sir W. Cubitt, assisted by Mr. Macdougall Smith. Any one might easily be convinced of the existence of this condition of surface in these clays; and wherever it did exist no depth of drain would be efficient, except their direction be studied. Trial holes, as described by Lord Berners, or trenches cut in various directions, would enable the drainer to ascertain the existence and directions of these ridges and furrows; and all drainage, to be effective, must have reference to the condition of the subterranean surface of the clay: by this the direction of the drains must be ruled, otherwise large sums might be expended to no effect. This geological condition seemed to be referable to a recent geological period that was long after the deposition of the strata in which it was found to exist. When the clays were covered with the stratum *in situ*, that was, for instance, where the kimmeridge clay was covered with the superincumbent green sand, these ridges were not seen; but where the clay was only covered by drift, then the wave or ridge-and-furrowed condition was easily traced.

The CHAIRMAN said that, as the hour for adjournment was passed, the discussion must now be brought to a close; at the same time he hoped that another opportunity would be afforded for resuming the discussion, as it was impossible in so limited a time to do even moderate justice to so important and varied a subject. It would be presumptuous in him to make any remarks on the theme submitted for discussion that night; at the same time he would be glad to offer a few observations, in order to arrange the matter which had been set before the meeting, and to state his own views as a conclusion of the debate. In discussing a subject of this nature they must all remember that they were but learners. They could not lay down a rule, but they might lay down a principle; and he thought he was justified in saying that a certain principle had been established. It might be considered as established that under-draining a wet soil gave a rapid descent to the water, and secured the dryness of the subsoil. No one, he thought, would deny that, although shallow drainage might answer locally, the operation of deep drains had been uniformly successful; and that, although shallow drains were often taken up, there was no instance of deep ones being disturbed. No doubt there were peculiar geological formations that enabled the drainer to accomplish his object at a less expense. His own experience led him to suppose that a drain of from three to four feet in depth, at intervals of between six and ten yards, came as nearly as possible within what might be laid down as the best principle. The ancients appeared to have had no defined plans of drainage, as their climate was not so moist as ours; and, therefore, no light was to be gathered from them. But, having seen so many different depths tried, on the whole his own experience was so conflicting, that he could not venture to lay down any rule; at the same time he had seen surprising results follow from the difference in depth between three and four feet. He thought that the Keythorpe system was one in which the science of geology was made to assist

the labours of the drainer, and that a great reduction of expense was effected by its application.

Lord BERNERS said, with respect to depth, one of the great advantages of trial-holes was, that the proper depth could be ascertained. First of all, you must dig to such a depth as that the water will come in freely; a little deeper, then, to see whether the water would accumulate fast, and by that means, if you came to anything like a porous soil, it was deep enough.

Mr. ACLAND stated, as one more fact bearing on the question of the direction of drains, that in Devonshire it was found to be of great importance to lay the drains across the lines of stratification, which generally run from east to west.

The CHAIRMAN trusted the subject would be taken up on another evening, and that as many would attend as possibly could. Although the subject of draining had been really, in some sense, exhausted, still the local peculiarities had to be attended to; and the question would bear much further discussion.

A vote of thanks was then unanimously passed to Mr. Denton for his paper.

Mr. DENTON thanked the meeting for the vote the Chairman had just communicated to him, and said that, as he did not wish them to separate with an impression that he was an advocate of one universal system of draining for all soils, and under all circumstances, he must take that opportunity of repeating that he only acknowledged *one* fixed rule, and that was the *principle of depth*.

In accordance with the suggestion of the Chairman the discussion was resumed on Friday, December 19, when, in the absence of Mr. Wren Hoskyns, Mr. P. L. Simmonds presided.

The SECRETARY stated that he had received communications from Messrs. Arkell, Bazalgette, Beattie, Blamire, and Girdwood, on the subject before the meeting, which it was desirable should be read before the discussion was re-opened.

Mr. THOMAS ARKELL said—

“The principal object I had in view in attending your meeting of the 12th inst., was to assist in correcting two errors in the drainage of land, which I consider to have been attended with the greatest disappointment for several years past, and will continue to be if still persevered in.

“These are—using small pipe tiles as at present made, and not putting the drains in the furrows on arable land, more especially on clay soils. These I consider to be the great evils of the present day, though not so at the time I wrote my ‘Essay on Draining,’ in 1843. The great evil then was the extreme shallowness of the draining, being but 1 foot, 16 inches, 18 inches, and 2 feet deep, seldom more than the latter, that being then considered deep draining. This error has been generally, though not wholly, remedied, and if anything gone too much to the extreme the other way. Still, I do not think the harm has arisen so much from the drains being put in deep, as from using too small pipes.

“Pipe tiles were scarcely known in 1843, except in an isolated district or two, so that I said nothing respecting them; but in the same Journal, Vol. iv., part 2nd, of the Royal Agricultural Society, in which my essay appeared, there is a report of Mr. Parkes’, ‘On Drain Tiles and Drainage.’ It will be seen there that they were originally made 3 inches in diameter, by bending the clay over a round stick, consequently leaving a narrow slit the whole length of the pipe, which

was then thought necessary to admit the water. These were found to act well. He then gives an account of the pipe-tile machine, and of land drained with pipes of one inch diameter, which was said to answer well; and no doubt it did, that being the first winter after its execution. This appears to have been the commencement of draining with pipes of so small a diameter as one inch. The next year, in 1844, the Show of the Agricultural Society was held at Southampton, which I attended, and there saw Clayton’s and other pipe and tile machines at work, and I almost wished I had not been so fast in draining my land, seeing tiles could be made so much cheaper by machinery than I had been having them made by hand. However, in the year 1846, I had drained a few acres with  $1\frac{1}{4}$ -inch pipes, about 3 feet deep, and 21 to 25 feet apart from the furrows; the ridges were not very high; they might be nearly one foot higher than the furrows. The drains acted well, and the land was tolerably dry and healthy for the first few years, but afterwards, in wet seasons, it was very wet, and appeared full of water, like undrained land, although at the same time all the drains were running, but very slowly. The land lying favourably for the purpose, each drain emptied itself into an open ditch, so that I could see each one separately.

“About that time, seeing by the newspapers that other parties who had drained their land with small pipes were suffering in the same way, it was recommended to have air drains at the top, or, open each one to the surface to admit air. I acted on the former plan, and put a much larger pipe, a 2-inch one I think it was, along at the top of the piece, and run every furrow drain into it. This had little if any effect, as in the wet seasons of 1852 and 1853, it was very wet and soft, not in spots, as some of the drains were at fault, but generally over the piece; then, again, in the dry season of 1854 the land was in a very healthy state, thus showing the drains to be sound and in good condition.

“Now, seeing the drains are sound, but that after heavy rain they do not discharge to anything like their full capacity, I should say not above one-eighth at most, and that they continue running a great length of time after the rain has ceased, although it is not springy land, I have come to the conclusion that the water cannot enter at the joints sufficiently fast to keep it from rising above the pipes. And if the rain is of long continuance it fills the soil to the surface, which is for a time as wet as though there were no drains in it; this, of course, on clay soils, forms a mud round the pipes, and the water entering the drains naturally carries the mud with it into the crevices by which the water enters, and stops them up. Such being the case, it must be also plain that the deeper the drains are put in, the more danger in the joints silting up, from the greater amount of pressure against them. The pressure due to a head of water of four or five feet, may be imagined from the force with which water will come through the crevices of a hatch with that depth of water above it. Now there is the same pressure of water to enter the vacuum in the pipe-drain as there is against the hatches, supposing the land to be full to the surface.

“This difficulty of the water entering the pipes in so small a space, was seen by some at the time of their introduction, but the idea was pool-pooled and ridiculed by a few of the clever ones; in fact, some went so far as to say, if there were no joints at all, the pipes would drain the land through their pores; and others said, let anyone try to carry water inside them any distance, and see what difficulty there would be; but carrying water inside is a very different thing, as the pressure would then be reversed, being from the inside. But to return to the hatches or floodgates. What does the miller do

in times of drought, when he is in want of every drop of water for his mill? He does not get below the hatches, and plaster a little clay against the crevices to stop the water; that would be about the same thing as trying to carry water in a pipe-drain with the clay outside to keep it in; but he gets a shovelfull of coal ashes, and puts them in above the hatches to stop the leakage, and this has the desired effect. Now, if coal ashes will stop the water, is it not plain there is danger in clay and sand stopping it under the same pressure, and the smoother and better the pipes are made, and the closer the joints fit, the more likely they will be to get stopped?

“What I should suggest as a remedy, would be to return to the slit in the pipe, say one-eighth of an inch wide, of a dovetail shape, with the widest opening inside the pipe. This would prevent the mud or sediment withstanding the pressure of the water, and would not be wide enough to allow mice to enter; and, in the inch pipes, it would give nearly four times the space for the water to enter that there is at present, and in two-inch pipes it would be twice as much. This opening in the side would not be necessary in the large-sized pipes used for the main drains, but in all those used for the furrows I think it would act beneficially. Of course it is most requisite in the smaller sizes, say all under two inches' diameter.

“The extract of a letter, read by Mr. Denton, from Mr. Macvicar, of Lincolnshire, describes an exactly parallel case to my own, and, I have no doubt, the failure was caused by the inability of the water to enter the drains; for where I have used the horse-shoe tiles (with which the principal part of my drainage is done) they act as well now as when first put in.

“Putting the parallel drains at equal distances apart, regardless of the furrows, I consider a very great evil, especially where the lands or ridges have been gathering up for a great number of years, and are too high to be levelled without injury to the soil, or without going to a considerable expense.

“It will be admitted, I think, on all hands, that at times we have heavy rains, and of such long continuance that clay soils will not admit the rain as fast as it falls, and that this occurs much oftener on land drained with pipe-tiles than on that where the horse-shoe tile is used, so that the rain runs on the surface into the hollows and low places, and if the drains are not placed in the furrows or under these low places, it will lie sufficiently long to kill the wheat, or any other crops that are planted. Putting the drains in the furrows, which are the low places, appears so reasonable, and carries such a common-sense view of the case with it, that to argue in its favour must appear to many altogether unnecessary and absurd, were it not that the contrary is upheld and acted on by many of those who are classed amongst the greatest authorities on draining of the present day. Is it not reasonable and common-sense, that when you want the most water to run off in the shortest time, it should have the least distance to run? Suppose the drain to be only half-way up the side of the ridge (some, of course, would be under the tops of the ridges where they are of irregular widths), but suppose them to be only half-way up the side, in these hasty rains the water would run from the whole side of the ridge to the furrow, and then it would have to filter or percolate back again through the subsoil to the drain; and this is not the worst of the evil—when the land is drained, and the drains act properly, the water table is lowest at the drains, and highest midway between them, and this water table rises and falls between the drains according to the quantity of rain; so that where the land ought to be in the best state to receive the water it is the worst, from the water table being nearest the

surface; and, again, when it is in the worst state to receive water, that is, in very wet times, there is most to receive, when, of course, if there is no outlet or open furrows to take the water from the surface, it stands and makes itself a bed of mud, which will hold it long after the subsoil is dried by the drains.

“Instead of putting the drains in at equal distances, supposing the ridges are too wide for one drain to be sufficient, I should say there are two ways to act—either put one half-way up the side of the ridge as well as one in the furrow, or, which I think better, gather up a rather low narrow ridge in the old furrow, and put a drain on each side of it, in the new-made furrows, keeping the land rather lowest over the drains. I have not mentioned any cases of failure to support my arguments except my own, as it is far from my wish to expose and injure any individual; but if any parties who may read my remarks shall be able to explain any failure in their draining, and profit thereby, I shall be satisfied for the little trouble I have taken in the matter.

“After hearing the discussion of the 12th instant, I would beg to say that my remarks are meant to apply most particularly to the flat uniform clays and limestone soils that are in tillage, as the slow drainage of the pipes on grass lands may be advantageous; and that the opening in the side of the pipes may be objectionable on sandy soils, where they are apt to silt up; but on our Oxford clay, and the calcareous clays of the oolites, I have never had any drains silted up, although they have been laid in from 12 to 15 years.

“With respect to Mr. Trimmer and the Keythorpsystem, where there are subterraneous ridges and furrows, it is obviously right to cut across them, as the result has shown; but I am inclined to think that these are exceptional cases, and that the rule is to keep the greatest descent, and in the surface furrows.

“Mr. Thompson said it had never been satisfactorily explained to him why the deepest drains sometimes ran sooner than the shallow ones, and sometimes not. I can easily account for it to my own satisfaction, but to explain it we must refer to the water table, or, as some people call it, the stagnant water in the soil.

“To hear some people talk on the benefits to be derived from drainage, and the injury to plants where the land is undrained, one would almost suppose the water table was always within a few feet or inches of the surface, but such is not the case. Let any one refer to a little pamphlet by the Rev. J. C. Clutterbuck, on the ‘Drainage and Replenishment of the Subterraneous Reservoir in the Chalk Basin of London,’ and he will there see how the springs and outlets are continually and gradually lowering the water table in the chalk, as soon as the wet season has passed, and although the water table may reach the surface in the height of the rainy season, that for nearly the whole of the vegetating and ripening seasons it is very many feet below. Also on the level clay land, the water table is reduced by evaporation through the spring, summer, and autumn months, probably from 10 to 20 feet below the drains, according to the dryness of the seasons. It may be more or less, but it could easily be ascertained by boring in the autumn. But, for argument sake, I will suppose it falls 10 feet below the surface. The first rains in the fall of the year are taken up by the dried soil and subsoil. It may take, probably, two inches of rain to saturate the land, if it falls steadily, without raising the water table, and consequently not making the drains run. Now, supposing the soil fully saturated down to the water table, the first rain, in excess of this, begins to raise the water. It is possible, I think, for one inch of rain then to raise the water table from 10 to 20 feet, or more, in a clay soil, where the pores are so fine that

the water rises in the subsoil. It, of course, reaches the deep drains first, which begin to run before it touches the shallow ones. Then, supposing after some continuance of rain it ceases, and both deep and shallow drains have lowered the water tables again to their respective depths, as is the case at the present time in Wiltshire, and in the winter season only will it remain at the level of the drains without rain for any length of time, when very little vegetation or evaporation is going on, so that the next rain we have, the drains will immediately run, in consequence of its meeting with the water table, and, if anything, the shallow ones first, but the difference would be scarcely perceptible."

Mr. J. W. BAZALGETTE, engineer-in-chief to the Metropolitan Commission of Sewers, said—

"The discussion on the 12th inst., on Mr. Bailey Denton's able paper, showed very plainly that in spite of all that has been written and spoken on the subject of land-drainage during the last ten years, we still want data for comparing the relative value of pipes at given depths for carrying off rainfall; whereas, upon a number of carefully recorded facts, it would become easy to base sound theories. The terms deep and shallow drainage are vague in the extreme, and we have at present no sufficient information as to the real effect of 3 feet, 4 feet, and 5 feet drainage upon the same and different kinds of soil.

"We want to know, with showers various in density and duration, on different kinds of soil, what proportion of the rain will pass off through the surface channels, and what proportion through the under drains; and whether this latter proportion is greater with deep or shallow drainage. Again we want to know how soon after the rain commences the drains begin to run, and how long they continue to discharge after the shower is over; comparing the results of the 3 feet, 4 feet, 5 feet, and 10 feet drains in this respect.

"I put out of the question the value of drains 4 feet deep and upwards for increasing the temperature of the soil.

"Some of the farms already drained must afford excellent opportunities for such observations, the results of which carefully recorded, and collected, cannot fail to be of national benefit. I would, therefore, suggest to those gentlemen who have the opportunities, and are desirous of advancing this science, that a rain-gauge should be fixed in a convenient position, near to the outfall drains, and the quantities of rain falling noted every five or ten minutes during heavy storms. A thin plate of tin, or iron, with a rectangular opening at the top, should be placed as a dam across the lower half of each outlet, and the depth of the water flowing over these weirs at the same time recorded. During uniform and continuous rains, it may be sufficient to make these observations once in every hour. The operation is so simple, that an intelligent and careful farm foreman could, after a short time, be entrusted with it. The required information might be periodically forwarded to the Society of Arts, in the form of tables, similar to, or modifications of, the following specimen:—

"Locality.

"Description of soil.

"Size, depth, and distance between branch drains, whether laid with collars, or not; and date of construction.

"Number of outfalls, with the diameters and inclinations of each.

"Number of acres drained through each outlet (accompanied by a plan, if possible).

"Length of rectangular opening or weir.

Date.	Rain		Time of noting the depth of rain in the gauge.	Depth of water in the rain-gauge, in inches and decimals.	Period of gauging the discharge at the outfalls, noting the time when it commenced and ceased.	Depth of water at outfall.				General Remarks.	
	Commenced.	Ended.				Number 1.	Number 2.	Number 3.	Number 4.		

"These tables will not only show the quantities of water drained out of the soil, and the rapidity with which it is abstracted from it by drains of different depths, after it enters, but they would also become most useful records respecting the phenomena of rainfalls, and their effects upon agriculture.

"Should my suggestions be acted upon, I shall be most happy, in a future letter (for the benefit of non-professional persons) to publish the rules by which the actual quantities of rain falling, and the proportionate quantities carried off by the surface and subsoil drains, may be calculated; or, so important do I consider the inquiry, I will myself undertake to perform this part of the investigation.

"I may mention, in conclusion, that rain gauges may be had in London for about thirty shillings each, with explanations as to their use."

Mr. JAMES J. BEATTIE (of Aberdeen) said:—

"I have just glanced over the paper in the *Journal* of the 14th, and beg to say that I concur in the views entertained by Mr. Denton. There are several particulars that I should have liked, had time permitted, to lay before the meeting of the 21st, corroborative of the depth of furrow drains not being less than 4 feet, and the effect produced in improving the climate where drainage has been pretty extensively carried out.

"At first (1846) drainage was begun here at shallow depths; but in the course of two years it was gradually carried deeper, until 4 feet was generally adopted at distances apart of 24, 27, and 30 feet, the latter being the greatest distance that I countenanced. I may mention that the sum expended under my directions, arising from loans from Government and private outlays by the owners of land, since 1846, is about £200,000.

"The nature of the ground over this and the adjoining counties is exceedingly variable; indeed, it is not unusual in a drain of 6 or 7 chains long, to pass through three or four different descriptions of subsoil. A great part is difficult to cut, from the number of stones and large boulders imbedded in hard, gravelly clay. The expense, therefore, is much beyond the cost spoken of by Mr. Denton, being here from £6 to £9 per acre. Pipes and collars are now invariably used by the most experienced drainers.

"I have discontinued trench ploughing immediately after drainage. I observe that the soil, when drained, subsides in dry periods and expands during wet seasons, so that an action takes place naturally sufficiently strong to break up even the moorband pan which is so frequently met with in this district. This is more apparent where the drains have been deep and not far apart. I have recommended old grass land that had

become in its wet state tough in the surface, to be left at least two years unbroken up after being drained. The grass improves in quality, and the land, when afterwards ploughed, is friable and mellow, more easily prepared for cropping, and produces better crops. The saving of labour is also very great, particularly when it comes to be prepared for turnips. The green surface is replaced on the drains, and rolled down flat.

"Before adopting 4 feet deep drains, I had much difficulty in dealing with the iron ore, which generally appeared at two to three feet from the surface; but by the extra depth the water filters off to the pipes, free of ore. Occasionally iron ore is found at a greater depth, but the floating substance is then in most cases lighter, and does not adhere to the pipes in the same way as that found near the surface."

Mr. WM. BLAMIRE (of the Inclosure Office) said:

"The Commissioners have no suggestions to offer; but in my private capacity I take the liberty of stating that I do not think the attention of the public has yet been directed to the important results arising from the system of deep drainage in as forcible a manner as it might be."

Mr. JOHN GIRDWOOD, in a letter addressed to the Chairman of the meeting, said that "in order to obtain any practical benefits from such discussions, the subject in hand must be much more closely adhered to, and the discussion confined within the limits which Mr. Bazalgette endeavoured in vain to draw attention to on the last evening." He further suggests—"That some such arrangement as the following would be useful:—1st, What are the aims and objects of land drainage, and what have been its results? This is necessary, as there are some important questions involved, which must guide all our future steps, as, for instance, Is drainage of land to be considered as mere water channelling? or has it other aims affecting the quality of the soil? 2nd, What principles ought to guide us, in fixing the direction of the drain? 3rd, What depths ought to be used, and on what grounds are they to be fixed? &c."

Mr. T. SCOTT, on being called upon by the Chairman, said:—After fifteen years' constant connexion with the execution of extensive works of land drainage, watching the results of our various practices, and reasoning on the principles by which those practices were guided, he thought we had arrived at a sound solution of the problem, as to what constituted thorough and permanent drainage, based on the theory of Mr. Josiah Parkes. Mr. Smith of Deanston's practice had, shortly before Mr. Parkes's time, superseded the wayward operations of local districts to such an extent as to have become almost a national system, causing the expenditure of hundreds of thousands of pounds, not altogether unprofitably, but still without a principle to guide it; for it appeared to him (Mr. Scott) that Mr. Smith never had got hold of one. About ten years ago Mr. Parkes brought reasoning to our aid, and showed how dependent the effectiveness and permanency of drainage (the latter especially) was, upon the application of sound principles in its execution. Smith's teaching ceased to be followed; much drainage executed according to his rule became effete, and was taken up and replaced by deeper drains; time confirmed the practice, and now, when we were settling down to our work with a satisfactory confidence, our equanimity was suddenly disturbed by the rise of the "Keythorpe system" of Lord Berners. He had read Mr. Trimmer's paper on this system in the *Journal of the Royal Agricultural Society*, and had heard Lord Berners's verbal explanations; but he was still at a loss to know if it was of

national application, or simply adapted to the locality in which it was practised. Even there we had not had its application guaranteed to us as a *permanent improvement* by an authoritative report from the Enclosure Commissioners, or, rather, recognized public functionaries. He had never in his practice met with such a geological formation as was said to exist at Keythorpe, except in such large areas as to admit of their being drained in the usual *gridiron*, or parallel fashion. As economy was one of its features, we had every inducement, however, to study its merits, and to avail ourselves of the invitation his lordship has so liberally given us to make a personal inspection. In 1838 he (Mr. Scott) severed his apprenticeship to land draining on the farms of Mr. John Dudgeon, in West Lothian; and in that and the two following years superintended the execution of 140 miles of drainage, executed at Mr. Dudgeon's own expense, as a tenant on the farms of Almondhill and others, on the principle recommended and then practised by his friend Mr. Smith, of Deanston. These drains were dug 27 and 30 inches deep; the conduits being formed by 2½ inch tiles and soles, or 12 inches of stone broken to pass through a 2½ inch ring. The effect of this drainage was wonderful, and repaying at the time; but when he wrote to Mr. Dudgeon, in 1850, just ten years afterwards, to know the result, he learned that, having become alive to the superior advantages of deep drainage, he (Mr. Dudgeon) with the concurrence of the landlord, had terminated his old leases several years before the date of their expiry, that he might have the inducement, which the beginning of a new lease would afford, to take up these very 30-inch drains and re-lay them four feet deep, which he had done. Here was a *material guarantee*, by one of the leading and most acute tenant farmers in Scotland, that deep draining on the stiff and cold subsoils of West Lothian, was the most effective and remunerative drainage. Having gone into Cheshire in 1841, and remained in that county for nearly seven years, he (Mr. Scott) there applied and carried out the system he had learned. He thus drained upwards of 1,000 acres of land, superseding the "fishbone" system, which was the only one then known and practised in the stiff clays in that county, the depth of such drains averaging only 20 inches. For the execution of these works he received a silver medal from the Manchester and Liverpool Agricultural Society in 1843, and again in 1844. The depth, as well as the inclination of this drainage, was ridiculed at the time by his local friends, and the landlord began to doubt the propriety of putting his money into such a *sinking fund*, and the tenants were unwilling to promise a per-centage on the outlay. But what was now the result? Why, the landlord, agent, and tenants, were all superseding these drains, though many of them were 3 feet deep, with deeper ones still; the minimum being 3 feet 6 inches. It was, therefore, with some degree of humility that he held this handsome medal for work now obsolete in principle, and being superseded in practice; but he had rather blush for the past than hold out against reason and experience for the future. The rules of the same society now say, "No drain to be less than 36 inches deep; but the society recommend it still deeper." The drainage he had spoken of was executed on the estates of R. E. E. Warburton, Esq., and the Lord de Tabley. He now came to a happier epoch in his draining experience. In 1850 he went into the county of Wilts, as resident agent to Joseph Neeld, Esq., M.P., and being then fully convinced of the soundness of deep draining, and hoping that his Wiltshire friends might not know how much comparatively shallow draining he had been guilty of, he commenced by draining from 3½ to 5 feet deep, on all soils. Being

a stage in advance of local practice, a war of words ensued with the tenants and neighbours, but he persevered for three years; and until nearly 2,000 acres of land in Wilts and Somerset had been thoroughly drained in this way, being supported by the confidence of the proprietor throughout. At the end of the time mentioned he began to perceive that he was being followed, but still at a respectful distance, by a good many of his early, but thinking and observing, opponents; and his mission ended by a handsome testimonial being presented to him, as an acknowledgment that he had practically exemplified in that district a sound system of land drainage. Three more years had rolled by, and time had so far confirmed the result, that the ordinary farmers in that district were now deep-drainers from experience, if not from principle. He thought that no stronger proof could be adduced than these examples, that 3 feet 6 inches was the minimum depth for drains on the stiffest soil, for permanency and effect; and though such drains might be put too far apart, as Mr. Mechi had recorded from his own experience, all drains sunk to a less depth *must* be too shallow to accomplish these two objects. As a further proof of this, he had evidence that the late Mr. William Smith, of Braydon, near Swindon, in Wiltshire, executed some drainage on his own lands there in 1812, 4 feet deep and 20 feet apart; and though this was the most unporous soil and subsoil, he believed, in the three kingdoms, these drains were still running, and the land was effectually dry. He wished also to record here the result of an experiment which he made in 1851 with Fowler's draining plough, on 150 acres of the Braydon land, and which land Mr. Bravender, of Cirencester, had described in the *Journal of the Royal Agricultural Society* as almost untractable. This drainage was done by contract, 3 feet 3 inches deep, and 16½ feet apart; the main drains being dug by hand and laid with 3 and 4 inch pipes; the outlets having grated pipes built in stone work; and the minor drains being left without pipes, except for about 12 feet in length from the main drains upwards. The economy of this work was great. Sheep were now folded with advantage on the land which was formerly unsafe for cattle, except for about three months in the year; the aquatic grasses had died out, and better herbage had taken their place; and the annual value of about 100 acres of the grass land so drained was doubled. The average cost of this comparatively deep draining on Mr. Neeld's estates did not exceed that of the shallow and temporary operations previously in vogue in this district, namely, £4 an acre, on 1,800 acres of thorough-drained land; labour being then at least 30 per cent. less than it is now. That the drainage was *thorough* he had good reason to believe, from not having heard a single statement to the contrary from any of the thirty or forty occupying tenants over whose farms the drainage extended. An assistant of his (Mr. Seal) who superintended and measured the whole of this drainage, and now occupied one of the drained farms, said:—"In no case have I found the deep drains fail on the most tenacious soils; and the same may be said of those on springy land." Mr. Seal had also given him some interesting facts relative to the supposed impervious soils of Strathfieldsaye, and which he (Mr. Scott) commended to the notice of Mr. Bullock Webster. He said:—"My father, who was land steward on the estate when purchased for the Duke of Wellington, and for many years afterwards, drained the greater part of the park, upwards of 35 years ago, at various depths, in some instances more than four feet deep, using tiles without soles, and covering them with heath—the result was satisfactory. A great part of the Speaker's land which adjoins Strathfieldsaye is also

very stiff, but, notwithstanding, it will draw very well four feet deep." Mr. Easton, the present agent at Strathfieldsaye, confirmed this practice to him by stating—"On the stiff clay lands we put in the drains 3 feet deep, and 15 to 20 feet apart; on the more loamy soils 4 feet deep and 35 to 40 feet apart, and 25 years' experience proves to me that this answers well." If any one was at a loss to discern why 4 feet drains might be placed further apart than 3 feet drains, and still be more effective, he had only to consider that 4 feet drains removed the water 12 inches further from the surface, and left some 1,000 tons more dry soil per acre above the drains. The vacated water tubes in this large mass of soil then became air cells, and rainwater reservoirs in turn, and thus both of these elements were continually imparting to the drained soil ammonia and nitrogen, the most concentrated and essential food of plants, changing and ameliorating the most noxious subsoils to the depth of the drains. Four feet, then, appeared to him to be a settled standard of depth for minor drains on the great majority of soils in this country, and he thought this principle had been so well reasoned by scientific scholars and eminent engineers, and so carefully arrived at by practical men, that it would not now be easily disturbed. The principles then, which were so important, being now settled, mainly by the sound and deep reasoning of Mr. Parkes, and which Mr. Bailey Denton had lent no unimportant testimony to confirm, our next most important study should be the careful execution of the work. Relative to the advantage of draining, it was now too late in the day to speak—no one disputed it—it was an admitted fact, and to dwell upon its sanitary or agricultural benefits would be as unnecessary as to elaborate on the advantage of the sun's rays. The necessity of good pipes, though not yet alluded to in this discussion, was of vital importance. Whatever their shape, they must be well burned, and never less for any drains than 1½ inch in diameter, smooth inside, and well rolled at the ends to prevent their internal capacity being diminished by ragged edges. He had laid on the table a specimen of what a pipe ought to be, and also a new kind of junction pipe to connect the minor with the main drains. When a field had been drained, it should be immediately mapped for reference. He had always practised this, and would just give one illustration of its utility. Professor Simonds, of the Royal Veterinary College, was lately advised by him to take a considerable farm in the neighbourhood of London, part of which he (Mr. Scott) had drained five or six years ago. The ditches round one of these drained fields had been neglected, and some of the drains were stopped up, but the professor did not know where to put his hand upon the evil, and wrote to him. He immediately obtained for him a copy of the drainage map, and he was thus enabled to dig down upon any drain or point of a drain he wished. Another and still more important point to be attended to, when the drainage was finished, especially on large estates where it had been extensively carried out, was to appoint a steady and experienced hand as "drain-mouth inspector," who should be continually going about, seeing that all the outfalls were clear, and all the ditches kept below the level of the drain-mouths. He had always carried this out in his own practice, and found it a great satisfaction, and saving of money in repairs. To prevent the ingress of rabbits, rats, or other vermin, it was advisable always to adopt some kind of grating. His practice was simply to insert a three or four-barred wire or wrought-iron grating between the third and fourth pipes: it was thus secure from injury, and always within the reach of examination. Thus far he had spoken from personal experience alone. If he now looked back to the previous night's discussion, he confessed he was at a loss to say what anyone coming to learn, and intending to drain,

could gain by it. Some seemed to adopt geology as their guide, others abstract principles, while the aids of practice, eyesight, and common sense, were very much overlooked. Now, he thought the latter qualifications had a good deal to do with the practical part of the question. Deep drainage was now the rule, and shallow the exception; but when we took that for granted, we must use the qualifications he had named, to modify it, and suit it to local peculiarities. As far as he could judge, Mr. Denton appeared to him to have adopted correct principles, and to be guided by sound personal discrimination. It was a curious coincidence that Mr. Denton's estimate, in 1855, of the sum required to drain all the wet land in Great Britain, £80,000,000, was the same as that calculated by him (Mr. Scott) in 1850, and recorded in a paper on Land Drainage, read before the Chippenham Farmers' Club, and published in the *Farmer's Magazine* for March, 1851. If both these estimates were correct, it showed that the rise in the value of drainage labour and material since 1850 was equivalent in amount to the whole expenditure in draining between that and the present time, probably £10,000,000. He demurred to Mr. Denton's apparent desire to draw the expenditure of all borrowed capital under the control of public drainage companies. The idea of giving drain-pipes to farm tenants, to bury as they liked, he had seen to be a most impolitic practice; but it would be equally impolitic to bring all the draining in this country into the hands of Act of Parliament companies. For his part, he did not see why they should continue to possess the monopoly they now did, and why entailed proprietors should not be at liberty to borrow on the most advantageous terms from any one, whether a private individual or public body, to drain their lands, and give permanent or terminable charges on their estates, if the work were sanctioned and passed by the Inclosure Commissioners. In Ireland, the Board of Public Works was the great monopolist, preventing all private enterprise from going there, either individually or collectively, to facilitate the drainage of land by loans, and only itself advancing dribbles to private owners, and these under the most embarrassing restrictions. One great good done in Ireland, however, was the opening up of the national arteries of the country. Here, we impeded them by thousands of petty corn mills, and there was no immediate sign of these impediments to land drainage being done away with, although the value of the extra produce that would thus be obtained from the lands at present injured by back water, or altogether excluded from tillage, would probably exceed the money value of such water-power. That Scotland was all but a completely drained country he had often thought, from observation, and we might infer as much from Mr. Denton's figures, for we found that £1,424,682 of a recent public loan had been expended there, with perhaps ten times that amount of private capital, in addition, on an area of 5,000,000 cultivated acres; while England had not expended even so much public money, and probably not more private capital, on an area six times greater. We thus saw the important work that was still before us in England, and had good reason to commend the practice of land drainage to the fostering attention of our great national association, the Royal Agricultural Society.

Mr. BULLOCK WEBSTER was sorry to disagree with so many authorities on the subject before the meeting; but he did differ in opinion materially as to the advantages of a uniform depth of 4 feet in strong clay subsoils not surcharged with under-water. It appeared from Mr. Denton's able paper, that more than two millions of money had been expended on drainage during the last few years, either government loans or borrowed from

companies. Now what had we learned from that large expenditure? He quite agreed with Mr. Denton, that the results of the practice of the last few years had confirmed the principle, that depth might govern distance in soils of an uniformly open and porous nature; that in the denser clay soils this compensating principle was inadmissible, much clay land having been drained imperfectly from having been drained too widely. In lands suffering from springs, or from pressure of water, where each drain should be designed for a special service, there was no dependence of one drain upon another, and, therefore, no rule of distance could apply. He also agreed with Mr. Denton in opinion as to the arrangement of the drains—that the result of the practice of the last few years had shown that the principle of parallel equi-distant uniformity was applicable only where there exist uniform texture of soil, and uniform inclination of surface; that it required modification directly the soil varied, and the surface became irregular, and that the desire for uniformity had led to a waste of money and imperfect work. He did not agree with Mr. Denton, when he said four feet should be the minimum depth for all drains, and “that it is difficult to admit of a compromise of depth under any circumstances whatever.” Experience had shown us that porous subsoils could be drained more effectually and economically with deep drains, and that springs should be cut off in the confined measures at various depths before they had injured the land below them; but he contended that soils resting on retentive clay subsoils not surcharged with under-water (he was not speaking of subsoils with veins of gravel and sand containing water) should be drained not less than three feet deep, but that the depth must be regulated by the extent to which the clay cracks, and to where the water was checked by the retentive nature of the subsoil; for his opinion was, that these particular soils required drainage because the water did not get into the subsoil, not because the subsoil was full of water. Our object, then, was to tempt the water through all the soil we could, and then get rid of it. Effectual three-foot drainage left no water below the drains; they were out of the way of all agricultural implements; roots of plants would as freely go into a four-foot drain as a three-foot one, if they had a tendency to stop up a drain. As to water running clearer out of four-foot drains than three, Professor Way's experiments had proved a much less depth of soil above the drains would extract all valuable matter from rain water or manure. He thought it would be found that the temperature would be quite as high on those lands drained three feet as four feet. He objected to the four-foot drains on these retentive clay subsoils, because you could not get your drains further apart, as Mr. Denton admitted. He objected to them because the extra foot, after three feet, often costs nearly as much as the first three feet. He objected to them on account of the expenses of the outfalls in many cases, and the subsequent annual expense of keeping these outlets open. Let the roots of the crops be kept within the influence of the sun, in eighteen inches of well-manured soil, and he thought it would be found that the produce would be far more than if you tempted them into four feet of clay subsoil, if you could do so. With regard to the deep drainage on the clay at the Duke of Wellington's estate, at Strathfieldsaye, it was tried and given up some years since. He was not aware of what was being done there now. He could show an estate in that neighbourhood where deep drains at wide intervals did so little good, that drains closer together and not so deep had since been put in. With regard to the Keythorpe system, he spent some days there, the end of last October, and although there had been several days' rain, he never saw land in a more perfect state for all agricultural operations; and he did not think it fair of people to say any-

thing against this drainage till they had seen it, and he believed Mr. Denton had not. We often heard of the retentive clay subsoils completely changing their character by the action of four-feet drainage; now he had frequently seen strong clays exposed a whole summer to the sun and rain in brick-yards, year after year, and yet they remained much the same. A soil might be altered by freeing it from water, and admitting air; but beyond the depth to which it was moved no very great change would take place in the dense clay subsoil. He felt confident that many estates in this country would not cost half the money to drain, if all the main outlets were well opened, the springs cut off, and some of the upper lands laid dry, and then left for a year or two before the rest of the drainage was proceeded with.

Mr. G. DONALDSON said, as he had for many years been engaged in works of land drainage, though not of late so employed, he still took much interest in the subject, which was one of the greatest importance, not merely to the agriculturist, but to the community at large. He regarded drainage as merely one step, and that a most important one, in the cultivation of the soil—for on a very large proportion of our lands good cultivation was quite impracticable until the soil was freed from superfluous moisture. It might be regretted that so many conflicting opinions had been upheld by those who had studied and practised draining, as it tended to throw doubt and difficulty in the way of those who wished to ascertain the best method; and possibly it might have led to the expenditure of money in inefficient work in some instances; but as this diversity of opinion and practice tended to excite attention and discussion, and to lead to a record of the effects of each method, it would eventually bring them to a knowledge of the best system for general adoption. Speaking of the results of draining, he would mention a piece of land in Clydesdale, which he drained in 1821-2. The land was previously so wet and boggy that it was unfit for cultivation. It was drained on the Deanston system from three to five feet deep, and the third year after it was drained it produced a crop of wheat of six quarters to the acre, and 64lbs. weight per Winchester bushel, and had ever since been in profitable cultivation. And he might mention another instance—that of a field of nearly 300 acres, on the granitic formation, also in Lanarkshire, which had never previously been cultivated, producing only a mixture of coarse grass and heath of little value; but after being thorough-drained it was ploughed up, and produced a crop of oats which sold by public auction at £9 an acre, and the land was let for a second crop (let for one year only) at £11 per acre. Much had been said as to the proper depth of drains, or what was called deep and shallow draining. Now he believed that no general rule as to depth and distance apart would apply in all cases. What was deep for some lands would be shallow for others, and the most advantageous depth in each case must be decided according to circumstances. Some remarks had been made as to the depth to which the roots of various crops penetrated the soil, and the value of the crop no doubt greatly depended upon the depth of active soil available. Now it was well-known that the roots of plants penetrated the soil only so far as the atmosphere had prepared a way for them, but the atmosphere was inoperative in a soil surcharged with water; hence the utility of drainage. There were, however, two or three kinds of water to be dealt with in draining: first, the surface water from rainfall; then there was deep water which rose from below; and these must be differently dealt with. In most cases a few well-placed drains would suffice to dry many acres of under water, while the removal of upper water required a greater number of drains of less depth. Again, of under water, some was

more hurtful than others; for instance, in the South of Devon, where irrigation with spring water was successfully practised, there were to be found frequently in the same farm what were called cold and warm springs. The water from what was called the warm springs had a singular effect in fertilizing the soil, while with the cold springs it was quite the reverse. Now, in draining the land of under water, wherever it was of the nature of those cold water springs, the deeper it was drained away the better; while removing water of the quality of those so-called warm springs to a great depth was less necessary, as the land was not so benefited thereby. The various qualities of soils should be well understood, and also their capabilities of improvement, in order to their being economically dealt with in draining. The question of depth in drainage ought to be decided by the depth of active soil requisite for profitable cultivation. The best test of efficient drainage was to be found in the temperature of the soil. The superior value of a deep warm soil was well known, and the object of draining was to give depth and warmth to the soil. There were soils—some clay soils, for instance—in which no under water was found, and no great depth of drain was requisite for removing the surface water; but the drains should be deep enough to give such a depth of active soil for cultivation as might be desirable, even though a less depth of drain would carry off all the water. In many instances, great difficulties were experienced in obtaining outfalls, owing to water-rights on the course of rivers, for mill-power, irrigation, &c. It was very desirable that the legislature should devise some means of obviating this, and it was equally so that records should be kept of the action of drainage, by a registry of the rainfall, and the discharges from the outfalls; these records would become of great use as data for calculating what discharges ought to be provided for in future works.

Mr. R. B. GRANTHAM, C.E., wished to remark upon the latter portion of Mr. Bailey Denton's paper, in which he referred to the question of main outfalls for drainage. Some few years since, the Earl of Carlisle had introduced a most valuable Bill into the House of Lords for this purpose; but nothing whatever had since been done towards that most important national object. The measure consisted in forming drainage districts, and appointing trustees to superintend them; and he considered that very great benefits would arise to the country if such a measure were adopted, so as to give power to lower bridges and culverts under public roads, straighten and deepen rivers and streams, and deal with the rights which would be affected by such operations over large tracts of country; but, above all, the removal of mills, dams, and other obstructions in rivers, which in many cases did incalculable injury, many times exceeding the value of the mills, by keeping up the levels of rivers, and rendering it totally impossible to drain the adjoining lands by pipe or any other kind of drainage. He wished to impress it upon those who are interested in the improvement of land by draining, that they should use their influence to procure from the Legislature, next session, such a measure as would enable subsidiary drainage to be more effectually carried out; and he hoped that this Society would also use its influence to promote such an object. He was not advocating any particular plan; but thought that some such provisions as those contained in Lord Carlisle's Bill, under the control of the Inclosure Commissioners, would answer the purpose. He had for some time past paid much attention to some of the suggestions contained in Mr. Bazalgette's communication, and had prepared some tables for his own guidance, by which the sizes of main pipes to drain given areas

could be determined, having especial reference to the discharge of water at certain inclinations, both of the minor pipes and the main pipes, and one with the other, as also the relative widths at which pipes should be laid apart, having reference also to the discharge of water at certain inclinations. He thought that it would be difficult to procure the return in the form which Mr. Bazalgette had pointed out, as many who are really interested in agricultural land drainage would not take so much trouble as it really was when properly undertaken.

Mr. R. F. DAVIS said the matter just stated was so important that he could not refrain from making a few observations relative to it. If they were to go into the Midland districts, they would see great injury done from the damming up the water for mills. In the valley of the Nene they would not see less than a dozen such mills, which threw the water back upon the land. If the farmers of this country had not been indifferent with regard to undrained lands, they would not have seen their canny friends north of the Tweed obtaining so large a portion of the Government loan as they had done. In draining lands, some years ago, he found that 4 ft. 6 in. was the best depth for retentive clay soils. At first he stopped at 3 ft. 6 in., but afterwards found he had to deepen the drains to 4 ft. 6 in. Lincolnshire was an evidence of what might be done by district drainage. From a comparative marsh, it now presented the finest arable land in the country. He was rather astonished to hear the remark that deep drainage was only necessary for a sandy soil, inasmuch as that would not hold the water. What they wanted to do was to draw off the cold water, which was unhealthy to the land, and destroyed its powers of vegetation; and Mr. Parkes had quite settled that deep drainage was the only effectual system. He considered it was the stiff clayey soil that required most draining, and from 4 ft. to 4 ft. 6 in. he thought was about a proper depth. A Lincolnshire farmer, ten years since, who paid £400 a year rent, told him he must give up the farm, or that, if he went on without drainage, he must take off £100 a-year. He replied that he should increase the rent to £450 a-year, and charge 6½ per cent. on the amount expended in draining. The year after the drainage he gave the farmer £25 to spend on oilcake, upon condition that he would spend £50 for a like purpose. This was on a farm of 175 acres, and last year, he was told, upwards of £250 was spent on oilcake, and £500 a-year was readily paid for the farm. The cropping for ten years was—3 crops of wheat, 1 of oats, 1 of barley, 1 of beans, 2 of seeds, 1 of rape, and 1 of turnips. This was working the land, and some persons maintained that there would be a falling off in its value; but where, under the old four-crop system, it would only produce from 4 to 4½ quarters per acre, it now produces 7 quarters. That was the result of drainage. It was too often found, that for the drainage of land, the landlord found the tiles, leaving the farmers to put them in. That plan would never succeed—the work must be done by an engineer. The landlords ought also to see to the outlets being properly kept, for on half the estates in England where £1,000 had been spent in draining, the expenditure had been useless, from the flow of the water having been left to John Smith or Joe Williams, who knew nothing about the subject. It was no use draining land without being provided with a good plan of the drainage. Draining was frequently rendered of little avail from the tiles being put in without any plan by which they could be traced. A tenant farmer once told him that some grass land did not produce so much after draining as before. Probably it did not in the first year; in the second, however, it was better; and

in the third he saw lambs and ewes on it in February; in the fourth and fifth years it was still better, and in the sixth he did not believe it could be surpassed. No doubt it was originally a wet grass, which would not grow in a dry soil, and therefore the difference was not seen at first. The grass upon a dry soil might not appear so luxuriant; but the backs of the beasts would soon tell whether they had been fed on a wet or dry grass. He was anxious to impress upon both landlords and tenant farmers the advantage of drainage. Land should be drained in such a manner as not to put the tenants to any expense. Some landlords found tiles for drainage, but taxed the farmers to find the horses and carts for their conveyance. Why should they do so? By draining, the landlords were adding to the value of their own land, and ought therefore to pay for it. In lands he was connected with, the tenants paid 6½ per cent. on the outlay for drainage; and he found they were benefited to the extent of not less than 10 to 15 per cent., and in some instances even to the extent of 30 per cent. Once more he impressed upon them never to leave the drainage to be carried out by unskilled hands. A man should be no more his own drainer than his own doctor, or make his own will.

Mr. JOHN CLUTTON stated the result of his experience to be, that in the generality of soils, and in clays especially, drains should be laid at a depth of not less than four feet; that in the strong clays of the Wealden district, and in Dorset, &c., experience had proved that pipe drains four feet deep were, if not placed too far apart, more effective in draining land than any of a less depth. When he (Mr. Clutton) began business 30 years since, he found his father making drains three feet deep, of broken stones and chalk; but the whole of the lands so drained had been for some years re-laid with pipes, at a depth of not less than four feet. He (Mr. Clutton) stated he was not aware of a single instance of deep drains having been replaced by shallow ones; but he knew of numerous cases of shallow drains having been replaced by deep ones. It was remarkable, he thought, that there was not an advocate of the shallow system of draining in the room, with the exception of Mr. Webster, whose arguments tended to show that the strong clays were pulverised and ameliorated to the depth of the three-foot drains; but it did not appear to strike him that if the drains were laid at four feet deep, the clays would be converted to that depth into active soil, adapted to the growth of plants. The effect of deep draining on clay soils was not only to alter their texture, but also to change their colour—a yellow clay becoming, in a few years, a good hazel loam. These changes were not effected at once, but were brought about gradually, by the operation of worms, insects, &c., working together to the water level, whereby the atmosphere was more readily admitted with the rain-fall water, which imparted to the soil, to the increased depth, all the advantages so well pointed out by Professor Way, in his recent lectures to the Royal Agricultural Society. He (Mr. Clutton) had had considerable quantities of three-foot drains taken up, as quite ineffectual to dry the land, and the land re-drained at depths of not less than four feet, by which it had been effectually dried. He gave an instance of a dairy farm in Dorsetshire, upon a very stiff blue clay, drained four feet deep, where the stock had been increased at least 25 per cent., and a flock of sheep kept where none could live before; while upon an adjoining farm, on which three-foot drains had been laid, the land was unimproved, and remained nearly as wet as before the drainage. He could not agree with Mr. Denton in recommending that the number of acres draining to one outlet should

never be more than twenty, as he had found by experience that the largest possible amount of interior drainage should be carried into sufficiently large main drains; indeed, as a question of ultimate advantage and economy, he would, if it were possible, take the whole drainage of a farm into one outlet, as few tenants were found who would pay the necessary attention to the mouths of drains; and as the number of mouths was increased, so the danger to drainage, through oversight and neglect, was increased. This last point of outfall brought him to the consideration of the arterial drainage of England, and to the very insufficient power at present existing to enable owners to obtain increased depths for the outfall of drains and water-courses through the lands of adjoining proprietors. The Legislature, from a desire to protect private rights, had not hitherto granted sufficient enabling or compulsory powers for the improvement of the arterial drainage of England; and without controlling and sufficiently compulsory powers many districts in this country could not be beneficially cultivated. The time, he contended, had now arrived when authority should be given to commissioners, or other competent parties, to carry out the works necessary for the proper drainage of the districts requiring it; and he urged the impolicy of landlords entrusting to tenants and others, not qualified by education and experience, the execution of drainage works, and showed the danger of supplying tenants with tiles, and allowing them to put them in, without the supervision necessary to insure the proper formation of the drains. Engineers and others who devoted their time and attention to the subject should be employed to lay out the drainage of land, and see to the proper execution of the works. One-half of the drainage hitherto constructed was inoperative, because the necessary—and he might say the essential—knowledge and experience of scientific draining engineers and surveyors had not been called in to aid the local—and it might be the practical—knowledge of the tenant or bailiff, to whom the works had in too many instances been entrusted. Without intending any reflection upon tenants generally, it must be admitted that they did not appreciate the difficulties attending the proper laying out, be too strongly urged. Without this, drainage works, and the execution of a comprehensive scheme of thorough drainage. The necessity for a correct plan of drainage, executed on a comprehensive scale, could not however well executed, would become deranged—if not destroyed—in a few years, as the direction and outfalls were forgotten; and he would again urge that where the outfalls were numerous, they were the more likely to be forgotten or neglected than if the drainage of large tracts were concentrated and carried into mains of large dimensions, whose magnitude would command attention.

Mr. HEWITT DAVIS said his experience in draining had been so decidedly in favour of what was termed deep draining, that he had long ceased to drain shallower in any soils than four feet, whenever a fall of that depth could be gained; and he gave four feet as a minimum depth, because he was convinced occasionally that there were soils and conditions where it was advisable to go much deeper. The wetness of the surface of land appeared to him to arise from two different conditions of the soil, and that these called for different systems of draining, both as regarded depth and distance. He considered most soils, and more particularly what were called "strong," were made wet by the surface water sinking only a short distance, and accumulating in the pores and fissures of the subsoil until it reached the surface, and it was with this standing water that the drainer usually had to

operate; and he gave four feet as the minimum depth of the drains in these soils, because he had always found that the cracks and fissures formed by the drought and changes of temperature, on the strongest clay, and which made these soils permeable, extended below this depth, and the water from the surface might be made to reach the drains at this distance. He did not advise going deeper when the object was merely to take off the surface water, because the difficulty and expense then too rapidly advanced to admit of doing so with advantage. As these descriptions of soils were made wet by water that soaked perpendicularly, and rested in the soil, and called for draining solely to rid them of water that reached them from the surface, they were only to be laid dry by parallel drains down the fall, at widths regulated by the depth of the drains and the facilities that the openness of the soil offered for the water to draw into the drains. The other description of draining solely applied to land that was made wet by land-springs, or water which reached it from a distance, as well as from its own surface, and was brought to the surface by the cropping out of the impervious strata on which it lay. It was to this description of land that Elkington's system of draining by spring-tapping was applied with so much success a hundred years ago as to gain him a parliamentary grant of £5,000. He found that by cutting up the hill and across the clay into the watery bed upon it, that he frequently succeeded, by means of a single deep drain, in laying a considerable distance dry; but we must not forget that his success lay in dealing with land made wet by water brought to it and oozing on to its surface, and in intercepting it before it came to the surface. Had he (Mr. Davis) heard Lord Berners' description of his soil, and its watery fissures, previous to Mr. Trimmer's account of it, he should have understood that he had dealt with land-springs or water brought from a distance, and that he had succeeded in laying it dry upon Elkington's system of cutting through the side of the strata that basined it in; but this system of draining could be applied only to particular soils and circumstances, and the greater advantages from parallel draining were found to still more narrow the field for its adoption. With respect to Mr. Bullock Webster's remarks, with reference to 4 feet and shallower drains, and his objections to the rule "that depth should govern the distance between the drains," or, in other words, "that increasing the depth in clay to 4 feet extended the distance they drew," he need say little, for every farmer's experience in ditching and water-furrowing was against him; and Lord Lonsdale had well exemplified the effect of depth in drying the land, by saying that he early learnt the greater benefit of depth in his experience in road making, from observing the assistance that deep draining the road-sides gave in laying the ground between the drains solid, and he (Mr. Davis) appealed to Mr. Denton to say whether or not he did not find that the deeper the drains on all soils the wider they drew. He (Mr. Davis) began draining 25 years ago, by laying bushes two feet deep, and a rod apart, but he soon found that by going deeper the drains drew farther and laid the land drier; and for the last 20 years he had never drained less than four-feet deep.

Mr. J. BAILEY DENTON was glad of the opportunity of saying a few words in reply, and they would be addressed rather to what took place on the first evening's discussion than to that which had occurred that night, to which he had very little objection to raise, for every opinion expressed seemed but to confirm the principle of depth for which he contended in his opening paper. They certainly went very far from the

objects of the discussion, when they listened so long to what was said with regard to the Keythorpe system; and he said this because so little was understood in what was stated. Without detaining the meeting on the Keythorpe question, which he hoped to say a few words on presently, he would refer at once to the remarks made by the various speakers at the last meeting. Objections were made to his having omitted certain topics. He believed Mr. Hewitt Davis went so far as to say that he should have gone more at length into the theory of draining: another gentleman said he ought to have discussed more in detail the practice. But he thought the objections made were undeserved, for it was not from underrating the importance of the omitted topics that he left them to be spoken of by other persons, but because he had not time to enter upon them. He thought, as Mr. Scott stated, that we ought, after ten or fifteen years' experience, to have come to some conclusion upon principles which should govern our practice. We ought to be in a condition to confirm those views that practice had shown to be sound, and to reject others, without discussing the first principles of drainage at this period in the progress of the art. On the last occasion there seemed to be altogether wanting a right knowledge and appreciation of the several elements with which we were dealing in draining. The various speakers confined their observations to the one object of discharging injurious water; they disregarded the benefit and influence of air on the soil. Others disregarded the force of gravity in carrying water, which is 815 times heavier than air, through a soil rendered permeable to both by draining to an approximate depth of the drains. Mr. Clutton had shown that evening the effect of air and water admitted by drainage into the subsoil. Lord Berners, on the contrary, stated the other evening that water would not percolate through clay. His lordship stated this without giving any proof of the fact, and left the meeting without explaining where and how he had conducted the experiment upon which the assertion was based. It was a fact, however, that some of the lias clay (to which his lordship particularly alluded) had been effectively drained at a uniform depth of four feet and upwards; and he (Mr. Denton) was prepared to show that such clays were as homogeneous in character as any clays in the country. Lord Berners spoke of the cheapness of his drainage, and to this point he (Mr. Denton) would now refer. He did not propose to touch at all the question as to whether the land at Keythorpe was effectually drained, as far as the mere removal of water went. He did not presume to deny that; for water would run quickly off land with a rapid slope, even with surface gutters; but this he did not regard as answering all the objects of draining. Lord Berners had probably got rid of the water too quickly by his shallow drains, and had lost all the benefit to be derived from air and water passing through an adequate depth of soil. With respect to cost, some evidence was afforded by the plan which Lord Berners laid before a committee of the House of Lords last Session, and which had been appended to the evidence taken before that committee, as a specimen of the description of plan which should accompany all works of drainage, and for that purpose it was unexceptionable. But in the margin his lordship stated that the "cost of draining" 46 acres of land was £79 19s. 7½d.; and this was put in, indirectly, as evidence of the cheapness of the Keythorpe system. Now he (Mr. Denton) found that at least one-tenth of the land was drained only eighteen inches deep; and when this was objected to, the other evening, it was stated that the drains were laid in the furrows, and that a sufficient depth was obtained by throwing the ridges into these furrows, and thus gaining a uniform surface.

This might be very good as an act of after-treatment of any drained land; but if it was positively necessary, to overcome the evil of draining 18 inches deep, the cost of doing it should be added to the cost of draining; but this item was omitted. Then, again, seventy-six loads of stone were charged for, at a cost of £3 10s.—he presumed as the cost of material.

Mr. TRIMMER—That is collecting the stones out of the drain, for which the men were paid extra.

Mr. DENTON—That might be so, but where was the material used for the drains, if this 70s. did not represent its cost. If stones were used and a shilling represented the cost of collecting, where was the cost of breaking them to the proper size? Where was the cost of haulage? Where was the cost of superintendence? All these were items which must be paid for, and which were entirely omitted; so that in fact it was patent on the face of this Parliamentary plan, that the cost of £79 19s. 7½d. represented simply the operation of cutting and the mere collection of stones.

Mr. TRIMMER—The men were paid a certain price for cutting the drains, and extra for sorting the stones.

Mr. DENTON—Just so. He had said enough to draw attention to this paper, which, when regard was had to the character of the work, he pledged himself could not fail to disabuse the public mind on the score of cheapness. For one moment let us go into the question of the subterranean furrows. They were described by Mr. Trimmer as the minor drains of his system, by which water would flow down into certain transverse pipe drains; but, as he had just said, Lord Berners excused the 18-inch drains, on the ground that they were laid in the surface furrows. How were we to reconcile these two facts? Was it possible, by some strange coincidence, that the surface furrows adopted by his lordship as the course of his drains should exactly accord with the drains prescribed by Mr. Trimmer as necessary to draw the water out of the subterranean furrows? or was it not more likely that the surface furrows would agree in their course with the subterranean furrows? An answer was wanted to these questions. Unfortunately, the public mind had been distracted from the main question of permanent drainage—its results and progress—by the proposition of Lord Berners setting forth the cheapness of his system, and the explanation of Mr. Trimmer giving a scientific bearing to it. He said distracted, because we had not got at the real cost nor all the facts of the case, and which we must have before the Keythorpe system could be generally entertained. Mr. Bullock Webster had alluded to his having stated that it required the drains in heavy clay lands to be placed as near to each other whether they were deep or shallow. He had stated that opinion rather more positively perhaps than he ought, but at the same time he must repeat that his experience led him to the conviction that in decided clay soils—homogeneous clay soils—the theory applicable to the more porous lands, that was that depth might govern distance, did not hold good. He could not but repeat also, that with regard to the prevailing mode of carrying out works of drainage, we adhered much too closely to the parallelism of drains, and that, undoubtedly, different descriptions of soil had been drained upon too uniform a system. There was another point upon which he thought we were much in error. He referred to the disregard that was manifested to the influence of hydrostatic pressure. We did not sufficiently attend to the fact that water taken in at a higher level finds its way out through porous strata at a lower level, and with such force as to overcome the gravitation due to drains which would otherwise be effectual. He

was desirous to make himself understood upon this point, because he considered that it was an essential element in securing successful drainage. As pressure of water was always due to height, and not to quantity, we ought to have regard to the source from which the water, finding its way out at the hill sides, flowed. Any person who had but a faint knowledge of geology would be able to follow his remarks. We might frequently observe that water falling on the tops of the hills found its way through the soil, and burst out at the sides, often drowning the lowest lands. Now, he knew from frequent intercourse with landowners and occupiers, that the lands first selected by them to be drained were those which exhibited the greatest amount of wetness, and he had known much discontent follow efforts of draining, because the hill-side lands occasionally showed wetness, and the lowest lands were frequently but slightly benefited. The cause was manifest. The water which had travelled through the porous soil to its lowest vent rose to the surface by those pores and interstices of the soil which were nearest and freest, to the disregard of any drains at a greater distance, and thus the objectionable wet spots in the hill-side lands occasionally occurring in drained land. The lowest lands were even more affected still, for they not only had their own quantum of water to bear, but they received the surplusage of the hills, and until these hills were drained no number of drains, however closely placed, would effectually drain the lowest lands. The remedy was in such a combined system of operations—he did not mean uniform parallel drainage—that the pressure from above should be removed at the same time that the lower lands were being drained. With regard to outfalls, which was the last subject to which he should allude, he was happy to say that he believed there was some prospect of an Outfall Bill being introduced into Parliament during the ensuing session. We were, in truth, approaching the time when the matter must receive attention; for although the quantity of land drained was small in comparison to that which remained to be drained, the water which was discharged by the drainage already effected found its way so rapidly to the outfalls, that the consequences were becoming more and more injurious every day. The millers were now suffering from two causes. At times of excess after a considerable fall of rain, and when the miller was injuriously over-loaded, the excess was increased by the rapidity with which the under drains discharged themselves, and as the quantity of water thus discharged must necessarily lessen the subsequent supply, the period of drought was advanced in a corresponding degree. As the millers already saw this, and were anticipating increasing losses, they would join in finding a substitute for water-power upon fair terms. Although steps should be taken before the evils accumulated too much, it was obvious that every year's progress would make the miller less anxious to retain the water landowners were gradually ridding themselves of; and thus we might hope that the millers would think it their true policy to abstain from opposing the passing of a proper Outfall Bill.

The CHAIRMAN, in summing up the remarks, stated that although practically he could not lay claim to that thorough knowledge of the important subject under discussion evinced by those gentlemen who had spoken on this and the former meeting, yet theoretically he had on frequent occasions been obliged to investigate closely the principles and practice of drainage, especially some years ago, as one of the editors of the *Farmers' Encyclopædia*, and subsequently in different agricultural periodicals with which he was connected. The great

importance of the subject, whether in a national or individual point of view, could scarcely be overrated, and the deep interest taken in thoroughly ventilating the question was well evidenced by the large attendance of agriculturists when Mr. Denton's paper was read. Although they were less fortunate in their audience on this evening, owing to the farmers and others attending the Smithfield Cattle Show having returned to their several districts, yet it was clear that there were many who took a deep interest in listening to the views of those competent to give information, or they would not have quitted their comfortable firesides on a severe winter evening like this, to attend a discussion on drainage. So many vital interests were identified with the correct practice and principles of drainage, and its general adoption in an island like this was so necessary, since much of the land without drainage would be perfectly worthless, that the more generally the subject was discussed the better. It was quite possible by due attention to the nature of the soil, by a proper application of manures, and by a judicious course of cropping, to render ourselves perfectly independent of foreign grain supplies; but this was of course a matter of expense, as to the cost at which food could be raised for our population. It had, however, been shown that drainage, properly and systematically considered, although seemingly alarmingly expensive at first, was in its ultimate results highly remunerative for the outlay. If the exceptional instance mentioned by one of the speakers, of seven quarters to the acre, could be made the average produce, instead of three or four quarters, as at present, our wheat crop would thus be doubled, and we should have enough and to spare, without drawing upon America or the Black Sea provinces. There were other considerations connected with drainage, besides increasing the fertility of the soil, and these were—improving the health of localities by reclaiming swamps, diverting the superabundant waters into proper channels for irrigation, for the supply of mill-streams, and thus furnishing adequate water power for keeping up canal navigation, river-channels, springs, and reservoirs for the supply of towns. Much valuable information, from many practical and experienced men had been elicited by means of Mr. Denton's paper, and the weight of evidence certainly corroborated the value and utility of deep drains as enforced by him. Several very useful suggestions had also been thrown out, which merited attention; especially the more general adoption of plans of the drains on an estate, and the entrusting of the works only to skilled practical engineers, so as to leave the farmer at liberty to attend to his husbandry pursuits, without meddling with the planning or management of the drainage. Not the least important of the recommendations in the communications read that evening was that made by Mr. Bazalgette, of carefully-kept registers of the rainfall in different localities. Without some general knowledge of the quantity of water received on the soil, the mean annual and monthly averages, and the number of days on which rain fell, little could be done to keep the land clear of water, or to regulate the drains and the outfalls. Rain gauges were much too seldom kept in the agricultural districts. This was a matter which he (the chairman) had recently pressed upon public attention, in a paper which he read at the last meeting of the British Association, "On the Rainfall of various Countries," wherein he stated, "We are as yet sadly deficient in accumulated facts from various districts, which shall guide us to a knowledge of the mean average fall of rain in certain periods, the proportionate evaporation, and the alternation of wet and dry seasons. If we could obtain, from a long series of observations in various localities, any data to guide us in arriving at approximative estimates of the fall of

rain, these would prove of great interest to the agriculturist, the engineer, and the physician." Although we were considering this matter specially as it regarded the improvement of the lands of our own island, there was no doubt the benefits would ultimately extend further. Many continental countries took their tone from us, and watched with interest our agricultural improvements, availing themselves of those which they found applicable to their special circumstances and localities. So also with our colonies. There were many low-lying districts in Demerara, in India, and other quarters, where drainage on scientific principles might be beneficially carried out for the advantageous cultivation of staple crops, and the improvement of the

health of the district. There was another portion of the subject which had been touched upon, requiring early attention in the Legislature, namely, the necessity of some enactment for enforcing uniformity of action—for harmonizing and connecting the drainage plans carried out, so as to prevent clashing, and for dealing with many private rights affected by the adoption of an effective and general system of drainage. In the name of the Society, he had now to present their cordial thanks to Mr. Denton, a gentleman whom personally he had long known, and whose scientific researches and practical operations he highly appreciated, for the elaborate and very valuable paper with which he had favoured the members.

## ARTERIAL DRAINAGE.

SIR,—I have from time to time seen several letters and other articles in your journal respecting the necessity and importance of arterial draining, in order to a more complete and effectual *venous* drainage of the lowlands of the United Kingdom. This was especially the case in the winter and spring of 1853, when the land-floods produced so much injury to the crops of corn and hay, from the effects of which we are now suffering. I have, however, hitherto seen no measure proposed by any of your correspondents bold enough to strike at the root of the evil. I therefore take the liberty of stating the view I have taken of the question, and which, under the present critical circumstances of the country, in regard to the supply of wheat and other grain, the Government would be fully justified in adopting.

It is notorious that in every part of the country there is a large portion of land in the vicinity of rivers, which cannot be properly drained, and which, even in ordinary years or seasons, is too much saturated with moisture to grow corn; whilst even the grass it produces is of a rank and inferior description, and when made into hay is only fit for feeding lean cattle. The great, and at present insuperable, obstacle to the draining of this land is the existence of water-mills, which are erected wherever an average fall of six feet of water can be obtained, with a sufficient run of *rapid* water from the tail of one mill to give a more powerful impetus to the fall of the next. It is perfectly obvious that, whilst these mill-races exist, such lands cannot be *properly*, if at all drained. If they belong to the miller, his own interest will prevent him from injuring the fall at his mill-head; and if they belong to other parties, any attempt to drain them, that would in the smallest degree affect the supply of water to the mill, by lowering the head, or drawing off a portion of it which of right belongs to the miller, would involve heavy damages in case of a suit at law, which would inevitably ensue.

It is, therefore, self-evident that the water-mills are the great obstacles to the arterial, and, by consequence, the *venous* drainage of some millions of acres now under grass, as well as corn, and of not more than half the value they would otherwise be to the community;

and I therefore propose that an Act of Parliament be obtained, to authorise Government to purchase the whole of the water-mill property of the kingdom, abolish them, and carry out the system of arterial draining to its fullest extent.

This may appear to be a startling and visionary proposition; but if duly considered in all its bearings, it will be found to be not only practicable, but beneficial to the country, as well as to both the owner and the tenant of the property. To the country, the benefits resulting from the complete draining of the land, which is now impracticable, is so palpable that it requires neither arguments nor statement of facts to prove or recommend it. But the advantage to the miller, from the destruction of his "plant," is less perceptible, and requires a reference both to "facts and figures" to explain it. I shall, therefore, now proceed to show that the water-millers would not only not be injured, but would, in the long run, be greatly benefited by the measure I propose.

In the fifth paper on the Characteristics of Wheat, I have estimated the fixed capital of *all* the flour-milling property of the kingdom—including steam as well as water-mills—at £5,938,000. This embraces the mill-building, machinery, stones, going-gear, &c., with dwelling-house and offices, which I reckoned, in all, at £500 per pair of stones. Now it is evident that the stones of a water-mill, as well as a large portion of the machinery, would still be available, and that the dwelling-house and offices would remain intact and useful as before. The mill building itself, too, would, in almost all cases, be sufficiently commodious to be applied to the new power. Thus there would be only the water-wheel and the value of the water-power for a given number of years to be assessed; the latter to indemnify the tenant or landlord, as the case might be, and enable him to purchase the steam-engine, &c., that is to supersede the water-power. My proposition, therefore, goes to establish, by Act of Parliament, the universal use of steam in the manufacture of flour; and that all the water-mills being abolished, and the power of water as applied to machinery disused, no mill in future should

be allowed to be erected on any stream, so as to impede the free current of water, raise its level, or prevent the proper drainage of the land.

There are two objections to this measure that may probably be urged; first, that the expense will be so great that the Government cannot, in the present financial state of the country, entertain it; and secondly, that it would so interfere with the rights of property as to infringe upon the constitution, whilst it would involve in ruin those who are the holders of water-mills as tenants. I shall consider both these objections.

With regard to the first, we will assume that of the six millions (in round numbers) of fixed capital laid fast in milling, four millions belong to water-mills; of this, but a small portion beyond the value of the water-wheels would be unavailable in the application of the new power. I estimate that half a million would purchase the whole of the machinery rendered useless by this measure; while a million would cover the rights of both owner and tenant of the mill race, seeing that the latter would only require to be indemnified to the amount of the expense of fitting the old apparatus to the steam engine, and the purchase of the engine. And with regard to the owner, if the increased value of the land improved by the removal of the water-wheel, and the consequent reduction of the level above the mill to the average extent of six feet, thus affording him the opportunity of draining effectually every acre of his low lands—be taken into account, so far from having cause to regret, or demand heavy damages for, the change, he would at once feel himself benefited; the only loss to him being that of the mill race, for which he is amply compensated by the improvement of the land. The river, too, would then assume its legitimate use. A celebrated engineer, being once under examination by a committee of the House of Commons, upon the construction of a canal, spoke so disrespectfully of rivers, that the chairman asked him, "Pray Mr. —, what do you suppose rivers were made for?" "To serve as feeders to navigable canals," was the blunt reply. This showed "the ruling passion," which has probably taken a new turn, since canals themselves have been laid dry, and appropriated to a line of railway. But I believe I may with perfect propriety, if the same question were put to me, reply, "Rivers were formed for the purpose of acting as outlets for surplus water." Whilst we had no other motive-power (except the wind and the horse) by which to grind our corn, the water-mills were an indispensable institution, and we were compelled to put up with the inconvenience of floods and other casualties occasioned or aggravated by them; nor was the population then so dense that the land injured by them was required to grow corn. But now that we have a power in many respects superior to that of water, applicable to all times and places, and under all circumstances, and that the land is absolutely wanted to grow corn for our fast-increasing population,\* it behoves the Government to take this matter seriously into consideration. It is impossible to form even a proximate estimate of the extent to which

the low lands will be improved in value by the mere removal of the water-wheels; but if we add to that the opportunity it will afford for arterial draining, by which a still lower level will be obtained, and every acre of land in the kingdom rendered capable of being laid dry, the amount of benefit to the country at large will appear incalculable.

With regard to the exclusive and universal use of steam power in the manufacture of flour, however startling such a proposition would have appeared fifty or even thirty years ago, the transition will now, I have no doubt, meet with calm and candid attention. The great objection to water-mills is, that in summer they can work only half or two-thirds of the time; and this has of late years been the case to a much greater extent than formerly, in consequence of the more general practice of draining, by which the land floods are more rapidly and effectually drawn off, and the land itself no longer constitutes a *reservoir for the mills*, as it formerly did. So much is this the case, and so greatly has it reduced the water-power of the kingdom, that many mills have been altogether stopped, and to a far greater number it has been found necessary to attach steam power for use in the summer months. It is also a fact that the steam millers have a vast advantage over the water millers, in the facility with which they can *at all times* convert their stocks into a saleable shape, and execute their orders, *which is equal to more than a double capital*. This facility amply counterbalances the expense of coal, which is now, indeed, not more than half what it was thirty-five years ago (when steam mills first were used), owing to the improvement of the steam engine.

There is, however, one view of this subject which will induce many persons to exclaim against my proposition as an act of barbarism; and I freely confess, that throughout a protracted life, I have still retained the pleasurable feelings excited nearly seventy years ago by the proximity of a water-mill. Residing in early life on the banks of the Yare, and in constant intercourse with some large water-millers, I acquired a *taste* for the occupation, and a decided attachment to all the accompaniments of a mill, which to my mind possessed a charm of a very soothing character. The brattling of the water, the clicking of the spindle, and the dreamy buzzing of the stones, with a thousand other concomitants familiar to those who have lived at, or in the vicinity of, a water mill, impart an interest to those establishments which I have felt reluctant to dispel by their condemnation to destruction. I have no doubt the proposition will meet with reprobation from a host of others from the same cause.

But a broader view of the matter, involving, as it does, the welfare of society, and of the decided tendencies of our industrial progress, has led me to the conviction that the necessities of the country demand the sacrifice on the one hand, whilst the daily increasing application of steam power to all industrial employments, on the other, renders every new use of it, with all its advantages, more and more familiar to our mind. If not only the distaff, the hand loom, the printing press, and the more obvious operations of manufacturing, but

\* Increasing at the rate of 500,000 per annum.

also the flail, the sickle, the plough, and the spade, are placing themselves under the protection of this monster power, I see no reason whatever why the water flour-mill should stand in the way of an improvement which the state of the country demands, which could be adopted with unusual facility, and which would add so

greatly to the wealth and security of the country at large, whilst the proprietors themselves would derive the greatest share of the advantage.

Yours respectfully,

AN OLD NORFOLK FARMER.

London, Jan. 18.

## STATUTORY SECURITY FOR CAPITAL INVESTED IN LAND; AND AGRICULTURAL STATISTICS.

While we advocate agricultural statistics with all the sincerity and support which their importance demands, we cannot conceal the fact that they only form one moiety of a great reformation in the political economy of English agriculture, which can never work well without the other half—the reformation of the land laws of the country. Capital invested in agriculture, or in the growth of agricultural produce, has its rights, as well as the dependence of the country on foreign corn. That a commercial community, so dependent upon foreign agriculture as Englishmen now are, should have a timely knowledge of this dependence—the amount of imports which the consumption of the country annually requires—is a truism which we presume no one ever denied, not even the greatest opponent to statistics; and that this knowledge is inseparately connected with that of the statistics of home produce is equally true. But to confine ourselves to this view of the subject is to evince a degree of short-sighted partiality unworthy of an intelligent mind; still more so is it to conclude that because certain little arguments (rather prejudices) against statistics are fallacious, that therefore half the great national question at issue should only be solved.

Premature conclusions and half-done work never do well—worse, perhaps, in connection with agriculture than any other branch of national industry. The reason of this, applied to the agricultural statistics of England as part of a great system only, is deserving of more than a mere theoretical consideration at the present period of her history. Let us, therefore, practically investigate the facts of the case for a little.

*The facts of the case* may be thus enumerated in the form of a general proposition: To invest profitably in the soil the greatest amount of capital, so as to procure from it the largest quantity of produce of the best quality. Any system of statistics which has not this for its object must be considered as at variance with public interest; so self-evident is the truth of this, that proof is unnecessary.

The first topic here for consideration, it will be seen, is capital. When a capitalist purchases land, for example, the *first* thing that meets him is the fee simple; the *second*, the subsequent investment required for permanent improvements; *third*, rates and taxes; and *fourth*, his household expenditure and balance going to his banker's account, to provide for the younger members of his family. Such are the statistics on the one side. Now we come to the other—*first*, rent;

*second*, interest of capital, or increase of produce arising from draining, &c., &c.; and *third*, his mansion and home-farm, with the solid satisfaction of being professionally a modern landlord. In renting a farm, again, the first question invariably put to the tenant has reference to capital (Have you £10 per acre?). And now the progress of the times demand the amount of produce he annually procures from the soil by means of such an investment.

Such is the framework of the rural fabric—or rather, perhaps, what it should be in modern times; and when we reflect on the progress which chemistry and mechanics have lately made, and are now making, in connexion with agriculture, with the still greater advances which the exigencies of the times are demanding, and compare such with the statutory state of land, and the feudal customs belonging thereto, are we to conclude that agricultural statistics is the first step to be taken in the great work of reformation at issue? Have we not seen that in practice it is the very last in the category? quantity and quality of produce being the result of both the landlord's and tenant's capital invested in the soil?

It is clear, then, that agricultural statistics is a secondary question in the political economy of land; and that the first includes those means, statutory or otherwise, necessary to increase the productive resources of the country. No doubt it may be said that the two may go hand-and-glove together:—granted; but the practical question raised is, to “put the cart before the horses”? and to the economy of such a course we must respectfully demur.

What injury, it may be asked again, would agricultural statistics incur, were the necessary statutory reformation of our land-laws to follow, affording ample security to capital invested in land? The question is doubtless plausible when superficially viewed; but when examined more closely the obvious answer is, that agricultural statistics would have a tendency to lower the productive resources of the soil, especially in the case of tenancy at will, and towards the expiry of leases for terms of years, until the security proposed was obtained; or rather, perhaps, it would check that tendency to increase the productive resources of the soil, which the exigencies of the country demand, and which statutory security for capital would stimulate, even when accompanied with statistics. No doubt there would be many exceptions from this rule where tenants could and would repose confidence in the honour and

integrity of landlords ; but what right have tenants, as a body, to be called upon to invest their capital in agriculture, for the mutual benefit of themselves and their country, on the mere guarantee of an aristocratic *ipse dixit* ? And, besides this view of the subject, the professional and business character of modern times demands something more scientific and exemplary than the feudal usages of a semi-barbarous age. Moreover, laws are not made for the righteous, but the unjust. Now, granting that ninety-nine out of every hundred landlords were upright men, their duty is to demand law for the rogue. But, righteous or unjust, it would be unreasonable to suppose that even landlords themselves would invest capital as liberally without security as with it. What shall we say, then, of tenants-at-will ?

It may be further said, by way of objection, that to a commercial country like England, with a redundancy of capital and shipping at her command, an increase of produce would be of less importance than the actual amount, the latter being all that the corn trade requires to enable it to import the balance demanded for consumption. This view of the subject, we fear, is but too common. That it is opposed to the best interests of the country, has already been shown ; and that it contemplates the ultimate ruin of the agricultural interest, is beyond doubt. In a word, it is one of those fallacious conclusions of pseudo-economists which will not bear investigation.

The fact of the increase of imports being the strongest argument for statistics, proves that an increase of produce takes the precedence ; because the latter, if equal in amount to the former, would render the collection of

statistics unnecessary—at least, for this purpose. Now, no one practically versed with the permanent improvement of the soil and high farming will deny that England might be made an exporting country instead of importing.

Again, the argument that agricultural statistics alone would benefit the farmer, by enabling him to obtain the highest price for his produce, quoting 1846 as an example, is fallacious ; for the price of that year—and more so every year, now that imports are so greatly increased—depended and depends more upon the statistics of foreign agriculture than home.

The substance of the matter amounts to this. The importance of the statistics of the produce of the country is of a far more elevated character than is involved in the mercenary question of high and low prices. The proceeds of harvest is a great question by itself, involving not merely the result of the labours of the farmer, but the munificence of Him “in whom we live and move, and have our being.” It is both the index of agricultural prosperity for the current year, and the progress of science, compared with the past ; while to the future it serves to guide both the landlord and tenant in the investment of fresh capital. In a word, it is of itself a distinct branch of political economy : to the nation, what every farmer’s books are to himself. If book-keeping has become a necessity in the practice of agriculture, so have statistics. At the same time, the amount of produce must always remain a secondary question, compared with statutory security for the capital invested in procuring that produce from the soil which our growing population demands.

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## THE USE AND ADVANTAGES OF SINGLE HORSE CARTS.

On a former occasion we briefly enumerated the subjects of the principal scientific articles which have appeared, from time to time, in the *Journal of the Royal Agricultural Society*. Let us now advert to a few of the articles on the practice of farming.

The first to which we shall draw attention is that by Mr. Hannam, in the second volume, “On the Reduction of Horse-labour, by the use of Single Horse Carts.” The first remark suggested by the perusal of this paper, is the extreme slowness with which agricultural truth disseminates itself. In the year 1815, the writer of these pages—or rather his father—commenced farming in a district in which three and four horses were used to plough all land, no matter whether sand, loam, or clay. It was *our* land ; and our land always possesses certain peculiarities to justify existing practices, no matter what they may be. We were allowed three years, by those who were deemed the best farmers in the district, before we should be dragging the plough along the surface. The objection,

however, soon assumed another form—we ploughed too deep. The three and four-horse plough still lingers there ; but, at the ploughing matches of the District Farming Society—there were none in our time—there are now prizes given for ploughing with two horses without a driver, and there are a very respectable number of competitors. Three and four horses to a plough involve the necessity of an equal number to a waggon ; and there is always the same excuse alleged for them, in local peculiarities. Go to Kent, where modern improvements or innovations, call them what you will, have made as few inroads upon venerable practices as in any district we know, and you will see the venerable turn-wrest plough in all its glory, ploughing every description of soil within the county ; but not extending its dominion one furlong beyond it, upon similar soils. Talk there of one-horse carts, and the reply is, that on “our” steep hills one-horse carts will not do : the horses are sure to fall under them. It is useless to reply that in the northern counties the hills are as steep, and that

there the only agricultural carriages used upon the farm and the road are one-horse carts.

The arguments which are used by Mr. Hannam, in the paper to which we refer, are by no means new to us; but if some advocate of one-horse carts were to urge their use in Kent and some other over-horsed counties, he would have to go over the same ground again, and to argue established truths as if they were new discoveries.

Mr. Hannam's paper consists of two parts, details of the method he pursued in the introduction of one-horse carts on his farm, and a calculation of the saving effected by the introduction of them. He was led to the consideration of the subject by the general use of single-horse carts for agricultural purposes, both on the road and in the field, in the hilly counties of Cornwall and Westmoreland. He regards these as the original seats of the practice, and considers that it spread thence into the adjoining counties of Scotland. Having then seen the apparent economy of the principle, he determined to try it on a farm of 300 acres, near Burton, considering that a practice which answered on the mountain-sides of Cumberland might not be unsuited to the easy slopes of his own district.

In 1831 he sold the whole of his Berkshire waggons, and three-horse dung carts, having in the meantime purchased a set of carts of the best Cumberland pattern; but, while he was convinced, from long experience, that they are most effective implements for the cartage of heavy materials, he was not satisfied with their native plan of a simple frame, fitted upon them for the carriage of hay and corn from the field. To remedy these inconveniences, he constructed a cart of the length and breadth of a Berkshire waggon, keeping in view the following objects:—1. Lightness suited to one horse; 2. Capacity to carry a weight of light materials; 3. Lowness, for expeditious loading; 4. A long and, consequently, low-seated load, to relieve any undue pressure on the horse's back or breast bone in going down or up hill. Mr. Hannam then illustrated his subject by diagrams and calculations (through which we cannot follow him), showing how he reduced the pressure on the horse on a descent of one to two, which pressure he estimates at 465 lbs. in the cart of the Midland Counties; 401 lbs. in the Cumberland cart, fitted with its frame for harvest work; and 62 lbs. in his own skeleton harvest-cart.

Having constructed a one-horse cart for harvest purposes to his satisfaction, the next object was to bring it into use on his farm. The first step was to part with the sets of harness with which his waggons and three-horse dung-carts had been worked. This he did root and branch, the neces-

sity for which he strongly urges by arguments, to the soundness of which we can bear testimony, from experience in similar cases. One set only were reserved for timber carriage, and they were kept carefully out of the way; for, says Mr. Hannam, much progress cannot be made in the system if opportunities are afforded for occasionally adding a trace-horse. Such pretexts must be firmly resisted, and servants used to large implements have to learn the habit of putting up only such a load as one horse can conveniently draw.

So much for the harvest cart. Mr. Hannam's dung-carts were taken from the improved Cumberland cart, having a capacity of a cubic yard. He had seven dung-carts, and amongst them four pairs with broad wheels. All his axle-trees being of the same stage-coach pattern, the wheels can be shifted as circumstances require. "I market my corn," he says, "according to the northern practice—in the dung-carts. The only objection I have heard the carters make is, that they are singular, and cut a bad figure by the side of a waggon and team of horses." To obviate this objection, he indulged them with a reserve of the best carts, kept well painted, for market, and with harness a little ornamented. Here, after all, often lies the great obstacle to most improvements—the prejudices of the men. These are difficulties, however, which may be overcome by a little conciliation such as that described above; and there are often doors which may be opened by a golden key. The man who does his work with an active two-horse plough and single-horse cart is enabled to participate with his master in the saving, in the form of higher wages than his who struts leisurely by the side of a lumbering team, or follows a still more lumbering plough with an air of importance as if he were doing something great.

With respect to the saving effected by Mr. Hannam, his great object, he tells us, was to reduce the number of horses required for the cultivation of his farm; and in this he succeeded beyond his most sanguine expectation. His farm of 370 acres had been some years before under able management with a strength of twelve horses and six oxen; and just before he took it into his own hands, sixteen horses had been employed on it by another spirited cultivator; while Mr. Hannam tells us that he has gradually, by the joint operation of two-horse ploughs and one-horse carts, reduced his number to eight horses. He estimates the saving by the joint operation of these two improvements at one-fourth of the usual proportion of four horses to 100 acres.

The last subject considered is, the expense of

carrying the practice into effect. With this view, the cost of a full set of implements under the general system of the district for employing the original horse-power on the farm would have involved a necessity for the purchase of six three-horse dung-carts, two Dutch mould-carts, one market-cart, and five waggons—a total expense, at the prices of the day, of £295. The system adopted

as a substitute required six skeleton harvest-carts and eight dung-carts, costing then £228.

The paper concludes with some valuable remarks on the means which the reduction of horse-labour affords for employing additional manual labour, and, we may add, of affording better wages to the number of men employed upon a farm.

### THE DISCUSSION ON DRAINAGE.—MR. DENTON'S PAPER.

Complaints have been made that in the recent discussion on land-drainage at the Society of Arts, the Keythorpe system occupied too prominent a place. This was perhaps the case; but whose fault, we ask, was this? It has been said that the discussion should have taken the turn of describing an extensive experience, or demonstrating a satisfactory theory of the passage of water through the soil. It might be replied that to a certain extent the system referred to fulfils those conditions. Waiving that point, however, we return to the question which we have put already, and ask, whose fault was it that the debate did not take the desired turn? In Mr. Denton's paper, the gauntlet was thrown down to the Keythorpe system, and its advocates took it up. Special invitations, we have heard, were sent to those who had suggested the principles of that system, and to those who had worked them out in practice, and they were invited to take part in the discussion. They accepted the invitation; their system was attacked, and they defended it. Mr. Denton's paper was on the progress of land-drainage; and if the discussion took the turn it did, the result may be attributed to an ambiguity in the expression "progress of land-drainage," which may mean either the progress of improvement in the art and science of land-drainage, or it may mean the progress of the extension of land-drainage, such as it exists at present, over the lands requiring to be drained. Mr. Denton's paper, instead of being confined to one of these aspects, treated of his subject under both, and treated it with the boundaries between them not very clearly defined. The only wonder is, that, seeing how prone all discussions at public meetings, and particularly agricultural discussions, are to diverge in all possible directions, the divergence was not greater. Then, again, there were some speakers who were not satisfied with this double aspect of the subject, but wished to treat of land-drainage in its sanitary as well as in its agricultural relations. If the question is to be discussed in all its complicated bearings, it is very evident that, instead of meeting for one or two evening discus-

sions of three or four hours' duration, the sessions of the Draining Parliament would have need to last as long as the session of the great council of the nation, if not longer.

In justification of these remarks, let us analyze Mr. Denton's very able paper, as given in our last number, and see if it is not pervaded by the ambiguity of which we have spoken. The paper commences with an allusion to the war, and the necessity which it imposes for increasing our home-grown food, together with the effect of the present high prices in relaxing the exertions of landowners in carrying those improvements into effect which the necessities of the country demand. It asserts the drainage of the land to be a duty pertaining to the landlord, and not to the tenant, whose average capital for the ordinary purposes of cultivation would all be absorbed in the work of draining, which the author estimates at between five and six pounds an acre. Till the passing of the act for the advance of public money for draining, in 1846, the prevalence of bush draining in certain counties, at a cost of 30s. to 40s. the acre, rendered land drainage, from the smallness of its amount, a work in which the landlord was not required to participate; but when deeper, more effective, and more permanent methods of drainage were resorted to, the matter assumed another form, and drainage clearly became the duty of the owner of the soil. This is followed by a statement, backed by letters in approval of the principles of drainage inculcated by Mr. Denton, which are stated to be—1, a minimum depth of four feet; 2, as few outfalls as possible; 3, the protection of those outfalls by brickwork and grated iron outlets, with a fall of not less than six feet, if possible, into the open ditch.

We have next a geological classification of the districts requiring to be drained, divided into three areas, namely—1. The western and north-western, or Alpine district, including the primary and transition rocks; 2. The midland, or district of secondary strata, exclusive of and up to the lower margin of the chalk; 3. The eastern and south-eastern

district, comprising the chalk, the wealden, and the tertiary and post-tertiary formations overlying the chalk. The area in each county contained in these districts requiring to be drained is then discussed, and by the help of certain data and certain assumptions, the general result is obtained, that there is a necessity for providing for drainage purposes a sum of very nearly 106 millions from private sources, exclusive of the balance of public moneys appropriated to that purpose. The advantage is pointed out of having recourse to those draining companies which have the power of spreading the rent-charge over the longest term.

The rise and progress of the different draining companies is next detailed, which followed the passing of the act of 1841 for appropriating a certain sum of the public money to the purpose of land drainage. These are described to be—1. The Private Money Drainage Act, the term of repayment being 22 years; 2. The West of England Land Drainage Company, under which a landowner may charge his estate in perpetuity; 3. The General Land Drainage Company, under which the term of repayment may be extended to 50 years; 4. The Lands Improvement Company, whose term for repayment is 25 years. Then follows a dissertation on the several methods of drainage which Mr. Denton considers to have proceeded in direct opposition to a compromise of the principle of depth. These are stated to be, first, the shallow drainage of land, which is described as admitting of the use of pipes instead of bushes; but adheres to drains 1 ft. 6 in. to 2 ft. deep. This was accompanied by a pointed allusion to Mr. Bullock Webster and his paper on the failure of deep drains on certain clay soils, which failure Mr. Denton ascribes to defects of execution. Then follows an enumeration of the advantages of deep draining, which are stated to be—1st, the increased quantity of soil rendered serviceable to vegetation; 2nd, its improved temperature; and, 3rd, the removal of the pipes beyond the reach of the roots of plants. This last advantage, however, is somewhat counteracted by the statements of Mr. Denton, as to the depth to which roots will extend if the depth of soil be increased. Mr. Denton then treated of the Keythorpe system of drainage; and started objections to it, which its advocates were invited to the meeting to answer, and which they did answer, as will be seen by the report, though we have not space to notice either the objections or the replies to them here. From this system we are next brought to the method of draining practised by Lord Wharnclyffe. Then follow some directions for a rough analysis of clay soils, and a table of the cost of draining with drains at different distances, with 7d. per rod for cut-

ting, and 2s. 6d. per thousand for pipes. Next came some observations on the varying amount of rainfall in different districts, as modifying the necessary size of drain pipes—some observations on the necessity of making the direction of the drains coincide with the line of greatest descent, and on the number of acres which should drain into one outfall. It is stated that these should be furnished with iron pipes, set in masonry, and provided with swing gratings, the cost of which is stated at 1s. the acre. The necessity of having a plan or record of the lands drained, and the position of the drains, is insisted on; and in order that such a record may be preserved for future generations, it is proposed that this record should be lodged with the Tithe or Inclosure Commissioners. The paper concludes with a statement of the improvement in field labourers, by the extension of drainage works; some remarks on the necessity of improving the outfalls or main lines of drainage, and a list of the writings in which land drainage is treated of. Such is a very brief abstract of this very able but somewhat discursive paper, which treats the progress of land-drainage under the double aspect we mentioned in the outset, challenges discussion with the advocates of systems of draining different from that followed by the writer, and touches on a variety of questions, each of which might furnish matter for a separate paper and a separate discussion.

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GOOD NEWS FOR THE HUMANE: IMMEDIATE RELIEF TO FALLEN HORSES.—HUNT'S PATENT UNIVERSAL SAFETY HOOK.—We were much pleased

as well as astonished at this simple and most effective invention. It is a hook which can be attached to the traces of a cart or carriage, and possesses this important advantage, that it enables the load to be immediately taken from a fallen horse without cutting the harness. By a simple process, merely untwisting the joint and pressing a spring with the finger and thumb, the parts of the hook become at once detached, and thus releases any thing that is attached to it. This hook possesses the following important advantages, viz.: It is more than double the strength of a common hook of its own size, and will last longer, as they are made of the best Lowmoor iron. The semicircular part, which takes all the wear, can be easily replaced at a very trifling cost. They will more than repay themselves in three months, particularly in winter time, when horses are very frequently falling; the harness being broken or cut, the expense of mending it once will often cost more than two or three pairs of hooks. In saving of time, by avoiding the tying backband and polechain hooks with string or leather, which has frequently to be done several times a day, and at every time a horse is changed from one vehicle to another, it is invaluable. To all parties who have property in draught horses this invention must be inestimable.

## STEAM CULTURE.

## WILLIAMS'S STEAM HAULING APPARATUS.

"Specification of John Allin Williams, Apparatus for Applying Steam Power to Agricultural Machines, No. 1,030, dated the 8th of May, 1855, and sealed the 26th of October, 1855. Price 1s. 4d."

The above specification, with plans, was published last month by Her Majesty's Commissioners of Patents. Mr. Williams' project bears a closer resemblance to McRae's and Osborne's than any other of its predecessors, but differs considerably from either in detail. We shall first give his provisional specification and claims entire, then a short description of his drawings, and conclude with a few observations as to the probable success of his proposition when reduced to practice.

"This invention relates to an improved construction and arrangement of machinery or apparatus whereby a simple and economic mode is effected of drawing or actuating ploughs, and other cultivating implements, by steam power.

"The improvements consist in the employment of a machine fitted with a pair of windlasses or winding drums, which are driven by steam power at a slow speed by an ordinary agricultural engine. The slow motion may be obtained by any suitable arrangement of bevil gearing, such gearing being driven by a driving belt passed round a suitable driving pulley on the engine. The mode I prefer, however, for driving the drums is to fix a bevil pinion on the first motion-shaft of the machine, such shaft having a large driving pulley fastened thereon. This bevil pinion gears into a large bevil wheel fastened on the second motion-shaft, which is thrown in or out of gear alternately with either of the drums, which are placed opposite each end of it by suitable clutch-boxes and levers. The framing carrying the winding mechanism is supported on running wheels, and is firmly secured by shafts to the framing of the engine, so as to render the two perfectly firm and compact. The ploughs, or other implements for cultivating and working the land, are attached to a small carriage, giving them an independent action from the strain of the chain or rope, one end of which is connected to the said carriage, whilst the other is wound round one of the drums; the free end of the other rope or chain on the second drum, when ploughing with one-way ploughs, being attached to an intermediate rope fitted with swivel hooks or eyes; and this rope is connected at its other end to the hauling carriage. The coils of the ropes may be guided on to the drums by means of forked guiding levers working on fixed fulcra, and actuated by the attendant. A fixed table, secured to the side of the machine and engine next the ploughs, contains a row of holes at distances asunder equal to the width of the furrow. In these holes is successively fixed the axis of a moveable guide-pulley, round which

the hauling rope is passed, after having previously passed round suitable fixed guide-pulleys or rollers secured to the framing. A moveable guide-roller is fitted on to the front edge of this table, to prevent the rope from rubbing against the edge thereof, and to guide it on to the pulley of the machine. A somewhat similar table and moveable guide-roller, forming part of a frame-work on travelling-wheels, with small adjustable guide pulleys, are firmly fixed at the opposite end of the field by suitable shores or struts imbedded firmly into the ground. A large fixed horizontal guide-pulley is attached to this last-mentioned table or frame-work, round which pulley is passed the intermediate rope. In ploughing by this machine, one or more furrows may be drawn at once, according to the number of ploughs employed; and the field may be ploughed either in "towards," or in what is termed "one way." Each time the ploughs are drawn across the field, the moveable guide-pulleys on each fixed table or frame-work are advanced a certain number of holes in the tables, according to the number of furrows made at one time; by which means the engine and machine will not be required to move until the whole length of the tables has been traversed or ploughed. When the engine and machine are shifted into the next land, on the ploughs arriving at one end or side of the field—if they are one-way ploughs—the second drum is thrown into gear and draws them back again; while the first drum is thrown out of gear, to allow its rope to be uncoiled, in readiness for another traverse of the ploughs. To prevent the ropes from chafing against the ground, they may rest on suitable carriages, or troughs running on wheels. A bell and signal apparatus is fitted on to the table, or the frame work, at the opposite end of the field from the engine, which signal serves to indicate to the engineer the precise time at which the ploughs arrive at the end of the furrow; whereupon he shuts off the steam and stops the engine, to enable the ploughs to be reversed."

## Claims:—

"First. The general construction, arrangement, and mode of working machinery or apparatus for driving, actuating, or drawing by steam power, ploughs and other implements employed in working and cultivating land, as hereinbefore described and illustrated by my drawings.

"Second. The system or mode of drawing ploughs and other agricultural implements over or across a piece of ground by employing a hauling machine and steam engine combined, working in conjunction with a fixed hauling platform, as hereinbefore described.

"Third. The application and use of the perforated platform (w) and corresponding table (r), with moveable and fixed guide-pulleys, in the manner and for the purpose hereinbefore described.

"Fourth. The peculiar construction, arrangement, and mode of working the hauling machine, as hereinbefore described.

"Fifth. The peculiar construction and arrangement of platform (w), and the application and use of the signal and bell in connection therewith, as hereinbefore described.

"Sixth. The application and use of the small carriage (s) for the purpose of preventing the hauling ropes from rubbing or chafing against the ground, as hereinbefore described.

"Seventh. The application and use of the carriage (M), to which the ploughs or other cultivating implements are attached, for the purpose of taking off the strain of the hauling rope from such implements, and allowing them to have a perfectly free and independent motion of their own."

Such are the provisional specifications and claims of Mr. Williams' patent for steam hauling apparatus. Its chief characteristic is its adaptation to any common farm portable engine used for thrashing. Other inventors have generally constructed their engines for tillage purposes, making provision for thrashing; but in this case an opposite course is followed, the inventor making use of the existing things as part of his project.

In doing so, a hauling machine, or carriage with two vertical drums on a shaft, having the necessary clutch-work for throwing them alternately out of gear, is fixed on to one end of a portable engine; the two, when thus bolted together, being about double its length. To the side framing of both, a platform (called R), having holes for pulley guides, is fixed. On the opposite headland, a carriage supporting a similarly-constructed platform, of equal length (called W), is used. Opposite each drum, two stationary pulleys are placed, for guiding the rope on to them while coiling and uncoiling. The rope from one drum passes out between the last-mentioned two pulleys, turns to the right or left as the case may be, passes over a moveable pulley, then along the field to the opposite headland, and after passing over two pulleys there, one at each end of the platform W, returns to the other drum or platform R. To the former of the two ropes across the field the implement is fixed. One of the drums is then thrown out of gear, and motion communicated to the other by means of bevil gearing, &c., from the engine, when the work of cultivation commences. On the implement arriving at the opposite headland, the guide-pulleys are shifted the breadth of the cultivated land forward, the empty drum is thrown into gear, and the other out, when the implement is drawn back again to the engine, &c. But various other modes of working may be adopted.

Mr. Williams' steam project has several points deserving of the highest commendation. To make a common portable engine, for example, do the work of culture, is to meet the wants of many a farmer who otherwise would be obliged to plod on in the old beaten track of anti-steam times. On the other hand, the greatest drawback to success in the field is likely to be experienced in the number of pulleys over which the wire rope will have to pass. This is accounted for in various ways. First, in consequence of the rigidity and internal friction of the wire rope over so many small pulleys. The internal grinding of the wires of which the rope is made is great, and must require a large consumption of power to effect it. Second, the resultant force at every pulley also absorbs a large amount of power. And third, the tear and wear of the rope, under such circumstances, must greatly exceed what it does in the case of Osborne's, when it goes direct from the drum. The manner of laying down the rope out of the tract of the implement, again, will, we fear, be considered an infringement of Osborne's patent.

STEAM CULTURE.

Tabular list of patents under the old and new statutes bearing upon steam culture, from the records in Her Majesty's Patent Office:—

No.	Date	Patentee.	Title or principle of action
50	1630	David Ramsay	Traction engine
921	1767	} Francis Moore	"
933	1769		
953	1770	R. L. Edgeworth	Endless railway
1,432	1784	James Watt	Traction engine
3,431	1811	John Blenkinsop	Rack and pinion railway
3,632	1812	Messrs. Chapman	Rigger-traction engine
3,973	1816	Joseph Rynolds	Traction engine
4,575	1821	John R. Barrey	Endless railway
5,260	1825	Sir J. Cayley	"
5,267	1825	Josiah Eastou	Rack and pinion railway
5,950	1830	John H. Clive	Traction engine
6,172	1831	Miles Berry	"
6,267	1832	John Heathcoate	Endless railway and rigger traction
6,351	1832	Joseph Saxton	Rigger traction
7,118	1836	Thomas Vaux	Rotary tiller
7,458	1837	John Upton	Traction engine
7,547	1838	Ambroise Ador	"
8,207	1839	Henry Pinkus	" hydrogen gas
8,329	1839	Alexander M'Rae	Endless rope traction between canals
8,331	1840	John Lees Nicolas	Trctn. engine by crutches
8,644	1840	Henry Pinkus	An electric plough
9,402	1842	Joseph Hull	Rotary delving machine
10,135	1844	Stace and Vallance	Locomotive windmill plough
10,578	1845	Teissier and Triat	Trctn. engine by crutches
11,297	1846	Bousser and Pettitt	Screw plough
11,303	1846	Peter Claussen	Rigger traction
11,304	1846	John J. Osborne	Traction — two engines and single rope
11,907	1847	Sir John Scott Lillie	Rectilinear and rotary culture
11,977	1847	Pierre P. C. Barrat	Reciprocating digger
12,710	1849	James Usher	Rotary ploughs
12,860	1849	Calloway and Purkis	Endless-chain tillers
12,930	1850	Henry Cowing	Traction engine
13,159	1850	Paul Rapsey Hodge	Reciprocating digger
13,168	1850	Weston Tuxford	Clod-crusher and presser
13,222	1850	George Thomson	Reciprocating digger
13,564	1851	George Guthrie	"
13,757	1851	David S. Brown	Rotary tiller
13,943	1852	Martyn H. Roberts	"
764	1852	Thomas Chrippes	Tilling by ploughs
949	1852	John Bethell	Rotary digger
965	1852	Denis John Murphy	"
1,151	1853	— Romaine	"
1,899	1853	C. H. Hoskyns	"
2,147	1853	H. Jeanneret	"
2,418	1853	Alexis Dussuc	"
2,530	1853	Joseph Bauer	Reciprocating digger
41	1854	John Henry Johnaon	Rotary digger (Romaine)
260	1854	Thomas Atkins	Traction engine
431	1854	James Boydell	Endless railway
1,293	1854	William Southall	Transverse rotary digger
1,325	1854	John A. Williams	Ploughing machine
1,487	1854	John H. Johnson	Rotary tiller
1,626	1854	Beaumont Cole	"
35	1855	John H. Johnson	" (Romaine)
288	1855	George T. Bousfield	Steam plough
1,030	1855	John A. Williams	Stationary rigger traction
1,177	1855	Baron von Gelgenheimb	(Not specified)
1,343	1855	A. M. Ford	"
1,629	1855	Messrs. Fisken	"
1,642	1855	John H. Johnson	"
1,953	1855	J. Hanson	"
2,224	1855	P. A. Halkett	"
2,551	1855	F. A. Wilson	"
2,766	1855	John A. Williams	"
2,848	1855	O. C. Evans	"

It affords us much pleasure to inform our readers

that Her Majesty's Commissioners of Patents, impressed with the importance of this subject in a national sense, have commenced publishing, in a series, all the specifications under the old statute of patents, for "tilling and preparing land," "ploughs and ploughing," "harrow-

ing, hoeing, and raking," "manuring," and for "sowing, drilling, and planting," which will include the whole of the above list prior to 1852, with any we may have overlooked. Our readers are aware that the specifications are now printed according to the new statute.

## QUALITY OF PRODUCE.

The more dependent England becomes on a supply of foreign agricultural produce, quality increases in importance in her own markets. To our readers the proposition is one of no ordinary interest at the present time: let us view it therefore in one or two aspects.

In the corn and flour trade, fat stock and dead meat markets, provision trade—as butter and cheese, eggs and poultry, hams and salted provisions of every kind—in the commerce of wool, flax, and the like, and again in the vegetable and fruit markets, &c., &c., the foreign farmer is daily becoming a more successful rival. He is so, not only because experience is making him more thoroughly acquainted with our markets, but also because a better knowledge of our wealth and social circumstances (coupled with the progress which he himself is making in the arts and sciences) is enabling him to introduce the products of his own country; thus not only giving a greater variety to our wants, but also reducing the demand for, and even superseding some of the daily necessities of a former age.

"The official returns of the importation of agricultural produce, live stock, &c., &c., into the United Kingdom," which from time to time appear in the columns of the *Mark Lane Express*, afford ample evidence in support of what has just been premised, both as to the quantity and quality of foreign produce, and the increasing intelligence of its grower. No doubt, owing to the variableness of climate and yield of soil (two seasons in succession seldom being equally productive), coupled with the unbounded wealth and speculative character of the British merchant, one season compared with the other may not afford that amount of evidence which in reality exists; but if we compare the returns of two seasons at some distance from each other, or go practically into the consumption of this country, carefully investigating the domestic happiness of her industrious and toil-worn millions struggling to outstrip each other in the march of progress, differences of a magnitude will be found more than sufficient to establish the truth of both.

For the future, the war (or perhaps we should now say effects of the late war) with Russia cannot fail to exercise a favourable influence upon the progress of foreign agriculture. It has, in point of fact, done so already, by stimulating, less or more, the productive resources of almost every corner of the habitable globe (that empire excepted) to supply the deficiency of imports from the Baltic and Black Seas—the immediate theatres of the past two campaigns; while, on the cessation of hostilities, the return of soldiers to their respective homes will disseminate new ideas on the sub-

ject, calling into action the latent energies of their countrymen to respond to the exigencies of the times.

Then we have the position of our immense colonial empire, and the United States of America and our East Indian territory, meriting special notice. From this source, for example, the mother country is now annually receiving no small amount of her daily necessities of life. A moment's reflection will at once convince the mind that there is here a wide and varied field yielding its beneficial harvests, and administering to the domestic happiness of the British people. Engaged in the active pursuits of our respective vocations we are apt to forget what this world of States is contemplating on our behalf, or even what they are already sending us in the shape of food and clothing. To them the blockading of the exporting seaboard of Russia has acted propitiously, giving to their industry an impetus which cannot fail to exercise a favourable influence upon their own resources and our imports for the future.

We must now turn an eye to the home market, and here we are at once brought to the conclusion that *in competition with the world the British farmer can no longer sell at a profit an inferior article, for various well-known reasons*. First, for example, consumers are daily becoming more familiar with the truth of the old proverb, that "The best article is generally the cheapest," and to this also he must respond. No doubt inferior articles are still sold and bought in every corner of the kingdom, and will continue to be so; but not advantageously, and to his balance-sheet the progress of foreign agriculture will compel him to attend. Second, as we advance in the march of improvement, our labours are daily assuming more of a commercial character, arising from the greater amount of capital invested in improved machinery, artificial manures, &c., &c., and the still greater demands which the progress of things is making in this direction. Enter any field upon the farm, or any building appropriated to the rearing or fattening of stock, and the familiar question "Will it pay?" must be solved before anything can be done, and this solution hinges upon the quality and price of foreign agricultural produce. In short, if the home farmer cannot bring to the market a superior article to his rival's, how seldom will it pay!

The progress now being made in opening up the continents of Europe, Asia, and America by railroads, coupled with improved steam transport, is greatly in favour of foreign agriculture improving the quality of our imports. It not only does so; but it allows her farmers, at the same time, to export provisions and vegetables which otherwise they could not do. The money

now annually paid for our total imports of this kind is almost incredible, amounting to no small part of the earnings of our labouring population, and household expenses of the middle and upper classes of society.

But although the foreign farmer is thus enjoying these advantages, the home farmer nevertheless is sure of a good price if he has a superior article; and upon this the success of modern husbandry in no small degree must depend. A bare mediocrity can hardly any longer make money at farming, so great is the difference between it and the top price of the market; and what increases the importance of this difference is the fact that quantity and quality generally go together.

In the vegetable kingdom, draining, deepening, and aerating the soil, changing its character by manuring or admixture, as by laying clay on sand, and sand on clay, &c., &c., are among the means for improving the quality and increasing the quantity of produce. Then follows improved means of harvesting and bringing this produce to market. In each of these cases the details of practice are extremely interesting, affording to both landlord and tenant the broadest and most promising field within the wide domains of British industry, in which to exercise their skill and invest their capital.

In the animal kingdom, again, a higher degree of skill is perhaps necessary to improve quality and increase quantity than in the vegetable, owing to the more artificial state of animals, both when rearing and fattening, and also of the butcher-meat after they are slaughtered. At the same time more art is being here displayed, not only in the improvement of live stock, but also in the preservation and marketing of the dead meat afterwards. Now in both these departments the English farmer has much reason at present to double his industry and be upon his guard; for in them the foreign farmer is making rapid progress, while over his rival he possesses a wider field and many other natural advantages. In this coun-

try, England more especially we fear, there is too much fat, and too little lean—a growing evil among almost all our improved breeds both of oxen and sheep. Quality is thus sacrificed to early maturity, or to a greater weight. No doubt this extra weight does more than balance the account with quality at home; but the question is, does it do so in competition with the foreign farmer? In other words, are we carrying this adipose disposition of fat stock to too high a degree, producing a description of butcher-meat not so healthy nor so fit for human food?

In dairying, again, and the management of poultry, is not the foreign farmer more than a match already for us? There is in this department of the farm a wider field for improvement on the part of the English farmer than perhaps in any other of it, generally speaking.

From these facts, therefore, it would be an easy matter presenting to our readers a very interesting picture of the present position of British agriculture in comparison with her foreign rivals—the United States of America, proverbially acknowledged as “a world of farmers,” with our other colonies and East Indian empire. How industriously are they striving, not only to outstrip the mother country in the quality of agricultural produce, but also in the manufacture of that produce ready for our tables, converting the grass of their boundless savannas into butcher-meat—that butcher-meat into preserved dishes—“beef bread,” &c., &c.—their corn into flour, bread, crumpets, crackers, &c., as if our home provinces were to be turned into so many deer-parks, according to the corn-law theories of pseudo-economists! The progress of things on the continents of Europe, Asia, and Africa, again, indicate in equally explicit terms the course which the British farmer is at present called upon to pursue, and that course is obviously to double his diligence in every department of his profession.

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## THE MEANS AVAILABLE FOR THE IMPROVEMENT OF LAND.

The subject of land drainage has lately excited considerable interest, and drawn such attention to the drainage question, as bids fair to cause some modification of existing practice. In our observations, a week or two ago, on the paper which gave rise to that discussion, we alluded to the evidence given before the Committee of the House of Lords on the improvement of land; that evidence and their report are now before us, and it may not be amiss to make our readers acquainted with an outline of their contents.

The Committee were appointed to inquire and report whether it would not be advisable that the powers now invested in the companies for the improvement of land should be made the subject of general legislation. The Committee consisted of the following noblemen:—the Earl of Salisbury,

Earl Delaware, Earl Ducie, Viscount Sidmouth, Lord Berners, Lord Redesdale, Lord Ardrossan, and Lord Portman. Their Lordships met twice, and examined the following witnesses:—Henry Charles Miles, Esq., William Blamire, Esq., the Hon. Wm. Napier, and George Darby, Esq.—that is to say three of the Tithe and Inclosure Commissioners, and the manager of one of the companies for the Improvement of Land. The result of this investigation was that the Committee reported as follows:—

1. That it would be desirable that the powers now vested in the companies for the improvement of land should be made the subject of general legislation.
2. That some of the powers granted, in various private acts, to companies, established with a view

to advance moneys to the owners of limited estates for the improvement thereof, are likely to be dangerous to the interests of reversioners.

3. That the charges are permitted to be created under the powers of these acts, either as annuities terminable at the end of long periods, or mortgages in fee.

4. That the acts do not always secure that sufficient notice shall be given, either to the reversioners or to the mortgagees, owners of other estates, who may be injured, and may be entitled to compensation.

5. That the necessity of obtaining the certificates of the Inclosure Commissioners is not in all cases co-extensive with the other powers given by the acts.

6. That it is desirable that a General Act should be passed without delay, determining under what provisions landowners of limited and settled estates shall be permitted to obtain advances of money for their improvement from the before-mentioned companies, or from other sources, particularly insuring the redemption of the charges to be created, within a term not exceeding twenty-five years, for any species of improvement, and preventing any charge upon the estate of the reversioner without the order of the Inclosure Commissioners.

Such was the constitution of the Committee, the conclusions at which they arrived, and such were the witnesses whom they examined. Let us now look a little into the evidence. The first witness examined was Mr. Mules, one of the Inclosure Commissioners.

This gentleman enumerated the different companies empowered to advance money for the improvement of land, and make it a charge on the estate. We described them on a former occasion, and need not now repeat the description. He then detailed the mode of proceeding, when a landowner wishes to borrow money of the General Land Draining Company and the Lands Improvement Company. The proceedings under both these Companies, when a landowner wishes to borrow money for purposes of improvement and to make it a charge on the estate, are exactly analogous to those prescribed by the Public Money Drainage Act and the Private Money Drainage Acts. A provisional contract is first made between the company and the landowner. Notice of the contract is given in a local paper for two weeks. Dissent may be given by any person entitled to an estate in, or having any charge upon the property, within two months from the last advertisement. Dissents have to be dealt with, under the act, by the Court of Chancery. The draft contract or the provisional contract is submitted to the Inclosure Commissioners, who send one of their inspectors to report upon the works generally, and the probable im-

provement which will be effected by them; they either approve of the original contract, or direct it to be altered in such particulars as they think right. If they are satisfied with the proposed works, an original order is issued, which has the effect of making the contract binding upon all parties. Upon the works being executed, an inspection is made by the Commissioners' own surveyor, and if he reports that they have been executed in accordance with the contract, and upon terms approved of by the Commissioners, an absolute order is issued, which has the effect of creating a rent-charge upon the property in favour of the Company for the amount expended, with interest. For buildings, under the General Land Drainage Company, the rent-charge is for 30 years; and for drainage and other works for a period not exceeding 50 years, for repayment of principal and interest. The rent-charge for the 30 years have varied from 6 to 7 per cent., according to the value of money, and for the 50 years from £4 13s. 1d. to £5 2s. 10d. The whole of the works under this Company are planned by their own surveyor, and executed under his direction. In all the contracts there are provisions that the works shall be kept in repair by the landowner during the continuance of the charge, and buildings must be insured.

The Lands Improvement Companies Act extends to Scotland, the other two Acts are confined to England and Wales. By this Act a declaration is required of the landowner as to the remaindermen and incumbrances, who are to be served, and notice is also twice to be given in the local papers. The same time is allowed for dissent as in the Act of the other Company, and dissents are to be dealt with by the Court of Chancery in England, and by the Court of Session in Scotland. This company have the power of charging the property for 25 years with a rent-charge in liquidation of principal and interest. The rate charged has been from £6 10s. to £6 15s., the latter being the present rate for 25 years. In these two Companies not more than two years' arrears can be recovered against the remainder-man.

There is this peculiarity with respect to the Act of this Company—that it empowers them, with the consent of the Inclosure Commissioners, to issue mortgage debentures founded upon the securities created by the order of the Commissioners. These mortgage debentures are payable 14 days before the securities become due, with a view to enable the party holding the mortgage debentures to take steps to appoint a receiver, or any other step he may find necessary, in the event of its not being paid; so that the receiver would have time to give notice to the landowner to pay the rent-charge before it became due. The commission charged by this

Company is 5 per cent. upon the outlay, and by the General Land Drainage Company the charge is 11s. 6d. the acre, and  $7\frac{1}{2}$  per cent. upon the buildings. The General Land Drainage Company's works are planned by the Company's surveyor and executed

under his superintendence: the Lands Improvement Company do no works, they simply negotiate terms for the carrying of them out; they employ no staff of surveyors or other persons to make plans.

### THE POOR MAN'S BANE.

The English labourer, or "the poor man," as he is distinguished, is generally a proud man. He has an instinctive horror of having his privacy invaded, and his hardships patronized. Silently and sullenly though he bear with the constant repetition of these Lord and Lady Bountiful visits, he feels acutely the spirit in which they are paid. None discriminate more readily. Easily enough will he distinguish between the officious vanity of so-called charity, and the earnest sympathy of those who really wish to befriend him. From the influence of the one, he becomes only the more disheartened and degraded; while of the other he will learn the great secrets of self-reliance and independence.

It is extraordinary with how little judgment the wants of the poor are supplied. It would seem, indeed, that too commonly these wants are but little understood. Occasional alms-giving, routine visiting, and as methodical a distribution of coals, blankets, and tracts, are commonly accepted as the chief duties of the higher classes to the lower. There is but too often one grand want on the other side, and that is a heart to feel with, and a power to understand those we now offer such supercilious succour. It is a very old story, but it is a very true one. If we have only our pence to give to those who importune the loudest for them, we shall not do much good. The first lesson for the labourer, is that to the boy trying to swim—confidence, and the use of his own powers. If we teach him to depend only on belts and bladders, he will sink the moment he loses their support.

It is gratifying to see a nobleman, in his endeavour to serve those beneath him, going far beyond the conventional claims on his "station"—not wholly satisfied with what the clergyman may do on his behalf in the parish, or the steward on the estate. One who has applied himself rather to practically understand the people, and by continual intercommunication with them to find not only what they may require from others but what they can and should do for themselves. The task is not altogether an easy one. It demands tact, earnestness, and true sympathy of feeling with his condition, to tell a man not so much what you are going to do for him, but what he ought to do for

himself. To declare to him that certain coarse indulgences to which he has been taught to look forward as only his right and due are totally unworthy of him, and that until he renounces them few can acknowledge him. To see the rich man, we say, thus directly attacking the long-cherished habits of the poor one, is to watch a work likely to be fraught with some risk and much unthankfulness.

It has been attempted, however; and not attempted in vain. The bane of the poor man is still drink: the height of his ambition, in the rural districts at least, is *beer*. For beer he will do almost anything: without a grand libation of beer no great or good work can be complete. In an age when almost every other class has, or is gradually escaping from the hold of such a vice, the labourer is yet firm in its grasp. The three-bottle gentleman is no longer a hero; the farmer "fresh" on market-day no longer a fact. Our youngsters are taught to avoid drinking, instead of being gradually "seasoned" to it. The only exception is the working-man—young or old, he still "drinks as he oughtn't to drink." When he takes his wages—when he finishes at harvest—when he goes to fair or market—when even he goes to put by his savings—he has everywhere the too ready opportunity for drink. Judges denounce the practice from the bench, clergymen from the pulpit, statesmen from their places in the House; but yet has the custom continued. Employers appeared hopelessly to submit; the men would not work without it, and as they must have it, they do.

To the Earl of Albemarle is due the great credit of gradually rescuing the poor man from this abominable control. There can be no doubt that he is doing so. Any one of course, preach as we will, can deliberately go to "the drink," should he so choose; our aim must be not to force the drink upon him—not, in other words, to further uphold his getting drunk by custom. This is the aim of Lord Albemarle. Few of our readers will require to be reminded of the effect he produced only last autumn on the celebration of Harvest Homes, or how certain the abuses he then attacked are now to give way. His lordship, however, is too energetic a reformer to be satisfied with one effort, or

even with the victory that follows it. More recently, as chairman of an agricultural society, in distributing prizes to the best workmen, he again reverted to the evil. As we do not think these remarks were so generally reported, and as they are equally applicable to the master as well as the man, we may quote from them here with advantage:—

“The point upon which I dwelt when I last spoke upon this subject was the connection between drunkenness and crime; and you will find that I quoted six judges of the land, to show the effect which was produced by drink—amongst the rest, the dying words of Mr. Justice Talfourd; and if I now mention his words again, it is not with reference so much to the labouring classes as to the rest of the community. Mr. Justice Talfourd accused others besides the labouring classes: he distinctly accused the class to which I myself belong, and with which I am immediately in connexion. He says: ‘I cannot help thinking that this drunkenness may be in no small degree attributable to the separation between class and class which is the curse of British society, and for which we are all, in our respective spheres, in some degree responsible. I am afraid that we all of us keep too much aloof from those beneath us, whom we thus encourage to look upon us with suspicion and dislike.’ And in another part of his charge, ‘This feeling, arising from that kind of reserve peculiar to the British character, does, I think, greatly tend to prevent that mingling of class with class, that reciprocation of kind words and friendly offices, which tend to the culture of the affections of the heart, and the elevation of the character of those to whom they are addressed.’ I believe the judge to be right: I hope he is. I for one shall take upon myself the responsibility of my class, and endeavour, as far as my small influence will go, to promote that good feeling. Every one here present may in some way be useful. Every one who better the condition of the poor is helping to put down that degrading vice of drunkenness, which arises, I believe, very much from the want of that expression of sympathy and those alternations of friendly offices between one class and the other of which Mr. Justice Talfourd speaks. There is another class connected with the land, to whom I would address myself more affectionately and more respectfully—I mean the occupiers of the soil; and it is in their collective capacity that I speak to the farmers. I am not now alluding particularly to this county, but I say that the farmers ought not to treat the labouring man as a mere machine, out of which a certain quantity of work is to be obtained, but that he should remember that the power he naturally has, as an employer of labour, is a trust to be exercised for the benefit of those whom Providence has consigned to his sympathy and protection. My friends, labouring men, if we tender to you the hand of good fellowship, have we not a right to ask something on your parts in return? What do we ask of you? Do we ask for any favour? No; we ask you not to injure yourselves—to abstain from drink—not to do that which injures your health, ruins your family, blasts your character, and leads you to the perpetration of crimes. We ask you not to squander that which would improve your household comforts and raise you in the scale of society. I wish to see the labouring men in this country a little more like free-born Englishmen: I wish to see the labourer raised in every possible way. Do not imagine that I want to strike at your amusements. I was at a great tea meeting the other day, and you may some of you think I wish to drench you with tea. But when I spoke against the abominable system

of largess—I am happy to see a tenant-farmer in another part of the county calling it the diabolical system of largess—I did not speak against the harvest dinner, but against the abuse of it, its drunkenness, and its system of going begging from door to door. I spoke against that, and I implore every labouring man to set his face against it when harvest-time next comes round. I wish to see your amusement of a better kind. I wish to see the manly sports of our country, such as cricket and quoits, more generally practised; I should even like to see them taught at schools.”

We make no apology for so long an extract; it cannot be in too conspicuous a place, as it cannot have too much attention. But Lord Albemarle has not yet done. It is only a few days since that he addressed the labourers of his own district on the subject of Benefit Clubs. Many will already have seen the purport of this speech; but we give it in another column. And what did his Lordship find here again? Why, in the very conduct of these societies, established to promote frugality, independence, and provision for the future, he also found a provision for drinking and debauchery! A kind of monthly harvest home, only celebrated entirely at the labourer's own expense. How strangely it sounds, and yet how strong the force of habit here, once more! A sober industrious man cannot even invest his savings without being absolutely driven to the public-house to do so! The temptations of Saint Antony himself are nothing to those of honest Giles. They beset him at every turn and in every form. If he is a good steady workman, he is taught to look upon beer as his great reward. If he be a prudent man, he is told to prove it by his regular visits to the beer-house; and if he is inclined to be idle or dishonest, there are few things he can poach or steal but what the beer-shop will turn into beer for him.

As Lord Albemarle says, we can all of us do something to destroy so monstrous a *system*. And, in doing so, we shall benefit not merely the poor man and his family, but almost equally ourselves. In this country we have every authority to assure us that the great incentive to all evil is drink; the great criminal expenses we have to defray are traceable chiefly to drink; the injuries inflicted on our property come as clearly from the same cause. We cannot certainly tell a man he shall not drink, but we can surely endeavour to tempt him from it rather than to it. This is what Lord Albemarle is now doing, and doing so effectually. May the example he offers us not be offered in vain!

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#### THE EARL OF ALBEMARLE ON BENEFIT CLUBS.

A few evenings ago the Earl of Albemarle met the agricultural labourers of his district in the National School-room at East Harling, and addressed them at great length on the

subject of benefit clubs. Benefit clubs, his Lordship observed, were common things. He wished they were more common; for nothing was more creditable to the labourer than that, while God gave him health and strength, he should lay aside a portion of his earnings to provide against any emergency of sickness or accident, and to secure an honourable independence in his old age. As far as the principle of benefit clubs was concerned, there could not be a dissentient voice; but they were very difficult things to understand rightly. There were 33,232 benefit societies in England; the number of contributors was 3,032,000; the capital was £11,360,000; and the annual income derived from contributions and interest was £4,980,000. In order, however, to realize the expectations fairly entertained by persons belonging to benefit clubs, certain essential conditions must be complied with. Nothing could be more clear than that, in an institution having for its object the laying by of money, it was essentially important that there should be no inducement to spend money unnecessarily. He objected, therefore, to the system of meeting at public-houses. It was quite impossible that the ruinous percentage on the savings which was laid out by compulsion for beer could be otherwise than highly disadvantageous to the labouring man. The monthly meetings of benefit clubs were now too often scenes of riot and debauchery, and entailed terror and misery upon the wife and family of the clubman; and it would be very desirable if the meetings could be conducted as they were in France, where labouring men could take their families to witness them. There were more parties concerned in the question than the labouring classes, and he hoped that the time would come when the gentry, the occupying tenants, and the clergy, would take a part in it. In the parish in which he was the principal landed proprietor the clergyman had set an excellent example by attending the festival of the club of the district. A main defect in the majority of the present clubs was that they were all based upon a uniform scale of payment, and every member paid the same whatever his age might be. This was decidedly wrong, for increased age brought increased sickness, and the young man

who was paying the same as his senior was carrying on an unequal struggle. In fact, clubs founded upon a system of uniform payment were mere lotteries, in which those who were sick the soonest and died the youngest got all the prizes, while those who lived the longest and had the strongest claim upon the funds got all the blanks. He recommended benefit societies not to undertake to provide for sickness beyond the age of 65; for at that age the vast majority of men were past their work, and it was very difficult to decide what sickness really was. Sickness ought only to be provided for, so as to make up the defects in a workman's time when he was ill and under the care of the doctor for a specific time. When chronic ailments were dealt with, the solvency of societies was endangered, without any proportionate benefit being obtained. An act of Parliament, the 16th and 17th of Victoria, chap. 45, made ample provision for every kind of superannuation allowances or allowances after death, and, in fact, appeared to meet every case of provision for the old age of the labouring man, although previous acts of Parliament on the subject of benefit societies had only had a mischievous tendency. The Government annuities granted under the 16th and 17th of Victoria, chap. 45, were more expensive to the subscribing members than the allowances promised in benefit clubs; but if a man was unable to keep up his subscription to a Government annuity the amount he had deposited would be returned to him, whereas it would be all lost in a benefit club. The general conclusions at which the noble Earl arrived were, that benefit societies should not meet at public houses; that they should have a graduated scale of payment; that they should not insure superannuation allowances or deferred annuities, but that their committees should assist the members in obtaining Government annuities, which could be purchased on safer and more advantageous terms. He concluded, amid loud cheers, by expressing his hope that the labouring classes would consider the subject dispassionately and calmly, and remember the homely proverb—that if they did not listen to Reason she was very likely to give them a rap on the knuckles.

## THE DECIMAL SYSTEM OF MONEY.

There are a number of questions of improvement which appear to require the lifetime of one generation for the establishment of the principles on which they depend, and for the carrying of them into practice. Among these questions may be enumerated, as we have before remarked, the education question; that of the application of the refuse of towns in the liquid form; the question of land drainage, together with the improvement of outfalls; and the question of a decimal system of money, of accounts, and of weights and measures.

It is to the last of these of slow progress that we shall here address ourselves. And first as to the meaning of a decimal system. Many persons connect with their idea of the term that of decimal fractions, or something which they deem to be very abstruse; whereas it means, in point of fact, merely a system of division by ten, the easiest and simplest division of all. It is the natural method of numbers. The untutored savage reckons by the number of fingers

on his two hands. If our language admitted of our expressing a division by ten by some such English word as a tenly division, or tennish system, the question of a decimal system would be stripped of much of the abstruseness with which a name of later derivation, and the connection of the term with decimal fractions, have invested it in some minds. Of decimal fractions—which are, after all, easier than vulgar fractions—we hear much, but of decimal numbers we hear little. We never, however, use any but decimal numbers, though we use other than decimal fractions.

Simple arithmetic is purely a decimal or tennish system—that is to say, the value increases from right to left by tens; we always carry ten from column to column. But while our simple arithmetic follows a decimal division, all that relates to money, and weights, and measures, follows a much more difficult and complex system. Every school-boy knows the difficulty of the transition from

simple to compound arithmetic, as it is called. This merely arises from the former, or that which relates to numbers, following a system of division by tens; while in all that relates to money and to weights and measures—that is, to numbers reduced to practice—we follow a different and more complex method.

Take, for instance, our money—and in using the term money we must distinguish between money of account and money of coinage. Our money of account consists of pounds, shillings, pence, and farthings. Our money of coinage consists of pounds, shillings, sixpences, half-crowns, ten-shilling and five-shilling pieces, &c.; but none except those we have previously mentioned constitute moneys of account.

Let us suppose our moneys of account consist of pounds, tenths of pounds, hundredths of pounds, and thousandths of pounds; and let these bear the respective names of pounds, florins, cents, and mils. They might be any others which might be deemed more appropriate, provided only the new divisions do not bear old names; but, for our present purpose, we will suppose the tenth of a pound to be called a florin, which we have already as a money of circulation, the hundredth part of a pound to be called a cent, and the thousandth part to be called a mil. The value of that important unit both of money of coinage and money of account, the pound, would remain unaltered. The only change of value would be in the unimportant mil: this would represent our present farthing, of which there would be 1000 in the pound sterling instead of 960, being a reduction in the value of this small coin equal to 4 per cent.; that reduction of value would not affect, as we have already said, the value of the higher denominations. But see how this division of our money of account would facilitate calculation, and the solution of such questions as the following.

Question the first.—If 1 yard cost 7 florins 9 cents 3 mils, how much will 438 yards cost?—Again, if one pound make a profit of 7 florins 9 cents 3 mils, what will £4 3 florins 8 cents make?—Again, if a bankrupt's estate pay 4 fl. 8 cts. 3 m. in the pound, what will be the dividend on £79 3 fl.?—All these questions, which are taken from a publication on the Decimal Society, require for their solution only the following simple process of multiplication:—

793
438
-----
6344
2379
3172
-----
347334

And give the following answers:—The 438 yards

will cost £347 3 flo. 3 cents 4 mils. The profit on £4 3 flo. 8 cents will be £3 4 flo. 7 cents 3 mils and 34-100ths of a mil, which, of course, would be disregarded, just as in accounts now most people, and partners in particular, disregard anything below a penny. The bankrupt's estate will pay on a debt of £79 3 flo., a dividend of £34 7 flo. 3 cents 3 mils (and 4-10ths of a mil). All these would be worked out with the above figures.

In the existing system of moneys of account, the corresponding questions would not only require more figures to be written down, but more difficult mental operations, which are not written down. To enter similar sums in our account-books, we should only require one ruled line, to the left of which the pounds would be written, while the tenths, hundredths, and thousandth parts of a pound, or the florins, cents, and mils, would be written to the right of it. Thus:—

£347	334
3	473
34	733
-----	-----
£385	540

and these sums would cast as above—£385.540, and might be read £385 540-thousandth parts of a £; or, which is the same thing, £385 3 flo. 8 cents 5 mils. In the process of casting we should always carry ten.

The following may be considered the two most important points in the question of a decimal system:—1st. That an entirely decimal system of *accounts* should be introduced, in combination with such an alteration of the *coinage* as will be most adapted to, and will most certainly be the means of introducing, such a system of accounts. 2ndly. That the pound sterling should remain, as it now is, the highest and principal unit of account. We have already spoken of money of account as a different thing from money of coinage, and pointed out in what the difference between them consists; but as the two are frequently confounded, it may be as well to enlarge somewhat more upon the subject.

A coin is a stamped piece of metal, which has, or nearly has, the value for which it is a legal tender. Moneys of account may exist without a coin, as for a long time during the last war we had nothing to represent a pound except a piece of paper promising to pay you a pound, and when it was presented to the issuer he was enabled by an act of parliament, called the Bank Restriction Act, to pay it by another promise-to-pay a pound which it was not intended he should pay. On the other hand, coins may exist which are not moneys of account; examples of which we have already cited. The decimal system is required, not for paying money, but for facilitating calculation of the sums to be paid.

We know a gentleman, who is writing down the Newtonian or Copernican system of astronomy, and has jumbled the planets and fixed stars together in most glorious confusion, contending that they are all stars. He wants us to keep to what he calls the astronomy of the Bible, contending that the sun goes round the earth; and because Sir John Herschel says, in one of his popular works (in the section on sidereal astronomy) that we know nothing of the motion of the stars, *i. e.*, those which we call the fixed stars, whether, though they have a proper motion in space, that motion is in a straight line or part of an immense circle, our friend cites Sir John in confirmation of his own astronomical views! Just so the late Master of the Mint is quoted by the opponents of the decimal system, as having said that it would take twenty years to introduce *a decimal system of accounts*; whereas all he said was, that twenty years would elapse before those coins—the half-crowns, for instance—which are not suited to a decimal system, could all be withdrawn from circulation. Sir John, however, was in favour of making the transition to a decimal system almost immediately.

In the examples we give above of calculations

under a decimal system of moneys of account, the figures are the same; but the value of the different sums depends on the position of the decimal point which is represented in our example of a ruled account-book by the column to the left of which the pounds are to be placed, and the errors which may arise from mistakes in placing this point are sometimes urged as an argument against a decimal system. This is the only difficulty in a decimal system, but these are very-easily-remembered rules for ascertaining its proper position in processes of multiplication and division, and all the difficulties connected with it vanish with practice. They only exist now because in the common business of accounts we are unaccustomed to a decimal system of notation.

Here, for the present, we stop. On a future occasion the other systems will be considered which have been proposed for decimalizing our accounts and coinage, and their inferiority pointed out to that which we have advocated, which is that recommended by the great majority of all the witnesses political, of business, and scientific, who were examined before the Committee of the House of Commons on the decimal system.

## CULTIVATION BY STEAM: ITS PAST HISTORY AND PROBABLE PROSPECTS.

The fate of Genius is but too proverbial—to labour and strive against difficulty and discouragement of every kind, and often to enjoy no better reward. By the time every obstacle has been met, and the realization of the idea is close at hand, the bold spirit droops, the last shilling is spent, and the master-mind is forced from the contemplation of its own work. History will point to us in every page how commonly this has been the lot of him who in his endeavour would serve his fellows far more than himself. The greater, too, his aim, proportionately greater are the impediments in his way. The sacrifice of a life and a fortune are not rarely the more immediate results where one sows that all else may reap. Like another Curtius, he courts certain destruction, and throws himself into the gulph, intent only on his country's good.

Still is there no end to this? Are we not day by day supposed to be becoming more practical and less romantic? If so—if we encourage the enthusiast, and bid invention never despair in its efforts, let us take care that our assurance be something more than mere words. Let us not only listen, watch, or even approve; but help also. This or that great good must come, sooner or later; so grand a conception is certain, some time or

other, to be realized—surely the sooner the better. Instead, then, of standing idly by, to see another hero self-sacrificed, should we not all lend a hand to fill up the gulph, and so save one we feel can do so much for us?

Agriculture has just now such a question to put to her people. The sacrifice is being gradually proceeded with. Talent, study, time and money are all being spent, still without the prospect of any immediate or adequate return. That success will be the ultimate effect no one doubts; but that this will be achieved even by the immolation of any one man is by no means so apparent. We want the pull altogether; and until we agree to it, even steam stands unable to take her set of ploughs from one side of a field to the other. The practical, moreover, has at length out-argued the romantic. Genius has happily gone into partnership with Prudence, and the firm can no longer be made answerable for any extravagances. They are willing to make a contract with the nation, where each may bear its fair share of the risk and labour; or, if not, the works will be discontinued.

The members of the Society of Arts, in the exercise of a very significant discretion, decline to close their discussion meetings with any definite resolu-

tions. If, however, the meeting on Wednesday, Jan. 23, did point to any one conclusion as the result of the debate, it was to what we have hinted at. We subjoin the full report on "Cultivation by Steam, its History and Prospects." With its history the majority of our regular subscribers will be tolerably well acquainted. Mr. Fowler, indeed, it will be seen, acknowledged the assistance he had received from a gentleman on our staff who has already gone over much of the same ground in the *Mark Lane Express*. The report generally we can leave to the individual attention of our readers. What, though, we would dwell upon here, is not so much either the past history or even probable prospects of cultivation by steam, as its actual position at present. The whole discussion turns directly to this point. Mr. Fowler himself—the most successful man, be it remembered, that has yet brought the principle to practice—concludes thus:

"I feel confident that a few well-directed experiments in either or all of these directions would bring out good practical results in the course of a few years: but I would ask you whether it is right that the carrying out of these experiments should be left to chance; whether, when so important a matter is involved as the rapid development of steam cultivation, it would not be wise to enlist the public in the endeavour to bring them to some practical solution. *If left in private hands it may, and probably will, take many years to arrive at any real results,* and at the cost of loss and disappointment to many a deserving but unfortunate class of men; whereas I feel confident that, with public assistance, a short time would enable us to solve not only the three questions that at present seem most to claim attention, but others that might arise in prosecuting these inquiries."

Mr. Garrett, sanguine though he evidently is as to the ultimate success of the scheme, as the representative of, we may say, a celebrated "manufacturing firm does not contemplate such an undertaking. He would be pleased, indeed, to see it taken up at once in earnest *by those who have more courage and means to carry it out to perfection.*" Mr. Atkins, more sanguine still, a thorough enthusiast indeed in the good work, has suffered accordingly. With but limited capital, "he had devoted more than £1,000, and many years' labour, to bring out the idea, and he thought it was to be seriously regretted that the engineers of this country had not paid more attention to this important subject. He would be glad to co-operate with any party who might feel desirous to make a bold effort to solve the problem. He felt certain that, should a committee be formed, and an appeal made to the British public, it would be attended with every success. For his own part, he would only say he

would be quite happy to co-operate with such a committee, and endeavour to bring this subject to a practical realisation. If a subscription should be opened, he would be glad to contribute his quota, as *he was only waiting for some effective steps to be taken.*"

Mr. Scott, feeling for those who have thus far laboured so unprofitably for themselves, believed "their ideas were often matured when their mechanical embodiment was still in embryo, and their means gone. Would it not, therefore, be politic that we should have a national experimental farm, under two or three highly competent commissioners, to put all such inventions to the test, and report upon them? Such an institution was suggested to the Highland Society of Scotland twenty years ago, by a practical farmer, and not unfavourably received. As he saw Mr. Fisher Hobbs present, he would ask him, as one of the Council of the Royal Agricultural Society of England, if he thought such an institution would trench on the domain of that Society."

Mr. Hobbs, in answer to this, cited the five hundred pounds premium now offered by the Society, as some evidence of the desire of that body to promote the development of the invention; while "he thought that even if the Government or Parliament would not take up the subject, the public might subscribe such a sum as would assist agricultural engineers and others in making experiments to bring steam cultivation to perfection."

Mr. Allen Ransome, a most fitting chairman for such an occasion, concluded the discussion in these few emphatic sentences:—"He did not believe in any engineering difficulty, *except the lack of funds, and that was the great difficulty in the present case.* The cost of bringing new inventions to bear was at any time great, but especially great when the introduction of the invention involved, as did that, the accompanying introduction of a new system. It was too costly an experiment, and the beneficial return for that certain cost was too uncertain and too remote for unassisted private enterprise. There was no doubt but that steam cultivation might be brought to bear, but *it could only be developed by large and costly experiments, and these could only be successfully carried out by some general fund,* as they could not be accomplished by individuals excepting at a severe loss, and, in many cases, ultimate ruin."

We have preferred confining ourselves to this, the really great difficulty in the way of steam cultivation, rather than to entering on any of the detail of what has been or may be accomplished. On a great deal of the latter our readers are already informed, while we may next week give a paper on Mr. Smith's proceedings, the only novel feature in

the discussion. The now momentous question is, "What are we to do?" With all respect to the Royal Agricultural Society, it is scarcely necessary to say that their premium can only be the confirmation of a man's success. What we want is some present help to encourage his endeavours and develop his abilities. Will the Government afford it—a Board of Agriculture, a Model Farm, and so on? If not, will the public? We confess we look with more confidence to the latter. And if it is to the public we are to look, will the Royal Agricultural Society take the initiative? Will they hold up what Mr. Fowler calls their "little finger," and with one magic wave signal the steam-plough on its course?

Mr. Fisher Hobbs, we were glad to hear, "would be happy to bring the subject before the Council." The country will look with some interest to its reception.

## CULTIVATION BY STEAM.

BY JOHN FOWLER, JUN. (OF BRISTOL).

The importance of the subject we have met this evening to consider, is now almost universally acknowledged; it is a question affecting an expenditure of at least fifty millions sterling annually, the cost of horse-labour in agriculture; and its progress is anxiously watched by men who, even three years ago, would have been sceptical of its ever attaining any practical value. Not long since it was the common remark among both engineers and agriculturists, that, though steam cultivation was probably practicable, yet the cost of ploughing by horse-power was not sufficient to render it remunerative or likely to be generally adopted; but the experience of the last few years, and the advantages that have accrued from the more rapid and perfect execution of barn work by steam-power, have tended to lead the agriculturists to set a different value upon it; and I believe that that body are now quite prepared to give a warm welcome to any means that will give them greater power over the material with which they have to deal, and that will enable them to cultivate the soil more expeditiously and thoroughly, even should there be but little economy over the present plans. In an uncertain climate like our own, time is more essentially money in dealing with the soils than in almost any other operation we can name; and, if that axiom is found universally to hold good in its application to every other sphere of human industry, it must be doubly applicable to the cultivation of the soil, where the loss of a week is often a serious injury to a crop. Of course economy would be a great desideratum, and I hope to be able to show that cultivation by steam-power may be performed at a little over half the cost of horse labour; but I do not think that this is absolutely essential to its extended adoption.

The change in public opinion to which I have

alluded, and which I think I may safely reckon upon, will render it unnecessary for me to endeavour to show its importance, or to do more than allude to one or two matters that may give a more pointed direction to our inquiries.

The work of a farm may be divided into two classes—field operations; and the cartage of corn, manure, &c. Steam, in its present state, may be easily applied to the former of these; but its application to the latter is still surrounded more, I believe, with the mist of inexperience than with mechanical difficulty. The horses required upon a farm may be materially reduced by the assistance of steam in field operations, and those operations may be, as before stated, more rapidly and thoroughly performed; yet, until steam is also available for carting, it can only be regarded as an important auxiliary; and, though the half-loaf may be better than no bread, yet the possession of the first half only renders the other half still more valuable and necessary.

Thus we have to seek the solution of two mechanical problems—first, the application of steam to field operations; second, to the carting and harvest operations of a farm. The harvest operations may possibly be brought under the head of field operations, and executed by the same machinery; if so, we shall unquestionably have gained the largest half of our loaf.

Having thus referred to the points that seem most to require our present attention, I will now ask you to follow me through the past history of our subject—a history that bears an exact resemblance to that of all the great mechanical realities of our age—the steamboat, the railway, and even the steam-engine itself; except in the fact that the greater talents, means, and energies that have been devoted to those subjects have succeeded in more rapidly developing them into great facts. Time will not allow me to trace the resemblance as accurately as I should like. I think it would encourage us to look forward with perfect confidence to a similar reward to our labours in this direction, and one not less important than the best of them; but I must content myself with remarking that its birth was coeval with theirs: like them, two hundred years ago it commenced in the minds of those who are more poets than mechanics, who overleap all practical difficulties, and to whom thoughts are realities.

Every new mind gave greater tangibility to the crudeness of the first conception, until, in our own time, every possible idea seems again and again to have been remodelled and served up with some new lights; but, unlike them, no master-spirit has as yet taken this undigested mass and given tangible shape and practical value to their *ideas*. Accompanying this is an abstract of all the patents that have yet been taken out, bearing on the question of steam cultivation, with a short notice of their peculiarities, for which I am indebted to Mr. Burness, of the *Mark Lane Express*, and to this I must refer you for detailed information.

There are fifty-five here enumerated, which may be all classed under the following heads:—

1st. Locomotive engines used for drawing agricultural implements; motion given by driving the wheels, by

winding along a chain or rope, by rack railway, and by thrusting on crutches.

2nd. Locomotive engines working rotary cultivators.

3rd. Rotary cultivators to be driven by steam, mode of working not specified.

4th. Portable engines, used to wind up ropes.

5th. Portable engines, driving endless ropes, working windlasses.

6th. Portable engines, driving endless ropes, working rotary cultivators.

As early as 1630, David Ramsey took out a patent for making the earth more fertile, &c.

Mr. Ramsey seems to have had an idea that the fire-engine then known could be employed for cultivating the earth; there is no specification of this patent, and he, in common with many of his successors, imagined that any new power must be equally applicable to agriculture as to other purposes. The next patent was by Mr. F. Moore, in 1767, nearly 140 years later. This patentee's idea assumed a more definite shape on the subject, and, as far as can be judged from the specification, he imagined that steam-power could be applied to agriculture by a carriage travelling over the land, driven by steam, and used for traction. So confident were the patentee and his friends of his success, that they sold all their horses to avoid loss by their reduction in value.

Then follow Edgworth, 1770; James Watt, 1784, who appears only to have specified to prevent piracy, as he considered the boilers were unfit to bear the requisite pressure of steam; Pratt, 1810; Blenkinsop, 1811; Chapman, 1812; Reynolds, 1816; Barry, 1821; Cayley, 1825; Easton, 1825; Clive, 1830. Up to this date the only ideas of applying steam to agriculture, that I can find any record of, with the exception of Major Pratt's, were to travel the locomotives over the land, and draw any given implement in their wake; this they proposed to accomplish in a variety of ways, but in 1832 two patents were taken out by Heathcote and Saxton, the former for traction by a direct pull on a rope from a stationary engine, and the latter by driving an endless rope, and with this rope giving motion to a windlass, to which the implements were to be attached. Heathcote's patent was, I believe, carried out by Mr. Parkes. After this date, various schemes follow, similar to those before mentioned, interspersed with schemes for giving motion to agricultural implements by hydrogen gas, by compressed air, by electricity, and even by a portable windmill. In 1836, Vaux, followed by Hall in 1842, and Bonser in 1846, took out patents for revolving cultivators or harrows, though not specifying the way in which they were to be driven by steam-power, and this is the first record in the Patent Office of any such implement, though I believe the Norwegian harrow must have been known before that date.

Following these, we have an endless variety of modifications of the previous plans, presenting no marked novelty, but interspersed with some improvements in details, which rendered them more practical — as Claussen's, in 1846, for an arrangement of pulleys for conveying power to a long distance by an endless rope, for agricultural and other purposes (though agricultural

purposes seem to have been second in importance to the propulsion of boats); Osborne, also, for two engines travelling along each headland, winding-up chain or rope, as carried out by Lord Willoughby D'Eresby. In 1847 appears the first plan for a locomotive engine working a rotary cultivator, which Usher and Talpa have since rendered so familiar to us, and for which an endless variety of patents have since been taken out, interspersed with engines working hoes, spades, &c., but which, I fear, will exhaust strength and ingenuity that might be more profitably applied in a more practical direction.

The six classes previously named include all the schemes of which we find any record in the Patent Office, and I have been unable to obtain any other information, though I have no doubt many plans and schemes may be found scattered through the periodicals of the last fifty years, but as far as any practical purpose is concerned, this is, I think, all that we can require to elucidate the subject.

The present position of steam cultivation may be considered as having been fully represented at the Carlisle meeting of the Royal Agricultural Society, in July last, by the machines exhibited there in competition for the Society's prize, and by the plans so spiritedly carried out by Lord Willoughby D'Eresby and Mr. Mechi. Four out of the six classes were represented at Carlisle:—No. 1. By Mr. Boydell's steam horse, that attracted so much attention from its elephantine movements, and which, though I believe useless as a mere means of traction to agricultural implements, yet may in time help up materially to a solution of the difficulty involved in performing the cartage of a farm.—No. 2. By Usher's; for though many of the schemes for locomotive-engine-worked rotary cultivators vary considerably in detail, yet they all agree in the main principle of a rotary barrel driven by the engine, to which, of course, different kinds of forks, spades, &c., varying with the nature of and condition of the soil, may be attached. I do not think attaching ploughs to the barrel, as in Usher's, is likely to be the best mode of using the power.

No. 4 may be considered to have been represented by the draining plough; for though draining is a much heavier and more difficult operation than ploughing, and more power being required in one spot, may be thought better adapted to steam power than the ordinary field operations, yet a trial that has taken place during the last two months has proved its much more easy adaptability to the lighter work.

Class No. 5 was well represented by the Messrs. Fiskens' plan, which for light field operations was the only machine that approached a practical result.

Class No. 4 can hardly be said to belong to steam cultivation, as the mode of applying steam to them was yet to be devised.

Class No. 6 was not represented at Carlisle at all, and is only an idea (I believe a very valuable one) thrown out by Mr. Atkins, of Oxford; and, though provisionally protected, was not specified, but allowed to drop, and is, therefore, now open to the public.

I shall now beg to call your attention to that branch of our subject relating to field operations, and, as the locomotive solely used for traction belongs more properly to the carting of a farm, shall dismiss that for the present.

There are various schemes patented in the last few years for rotary cultivators worked by locomotive engines, all varying only in detail; and it has been the favourite subject of many of our agricultural writers; but I believe a little consideration would have spared them all much pains and expense, as, if there is one point more difficult than another from which to approach our subject, it is in this direction. The enormous weight of engines required in which an ordinary farm pressure of steam is used, and the weight necessary to give sufficient strength to the drums and frames; the difficulty of steering such a great load to the nicety required for field operations; the yet unknown difficulties that may meet the rotary cultivator, though at first sight, I confess, it appears well adapted to the work, to say nothing of the power wasted in moving such a weight over arable land, and up ever so slight an incline, might well deter the most sanguine from any attempt of this kind; but it seems, from the Records of the Patent Office, such a monomania at the present moment, that I do not think it will be waste of time to endeavour to direct the energies of my brother inventors to a different channel. Were I to undertake to make one of these engines, I should first endeavour to make a simple engine, to be used for the cartage of a farm, making it as light as possible, by the use of high-pressure steam, and rendering it perfectly manageable for carting manure, corn, harvesting, &c.; overcoming all the practical difficulties resulting from vibration, &c.; and, at the same time, I should test the value of the rotary tillage, by driving a rotary cultivator from a stationary engine, by the use of endless ropes, as proposed by Mr. Atkins, and exemplified by Messrs. Fiskin, of Carlisle. Then, should the combination of the two appear desirable, which is very doubtful, it might be accomplished with some chance of success. At present it will only bring with it bitter disappointment and wasted energies.

Of course, with these views, I consider the drawing an agricultural implement by employing a locomotive for direct traction a still more roundabout and ridiculous plan.

For field operations we have, then, but two plans that can be considered as coming into competition, both of which have, in common, the important consideration of proposing to use any ordinary portable farm engine; both propose to drag any given field implement that may be attached to them, such as a combination of ploughs, harrows, drills, &c.; but they differ in the means by which they accomplish the end in this respect: the one draws the implement by the direct traction of a wire rope, and the other by conveying the power from the engine to a windlass by an endless rope, the windlass winding itself up and down the field by winding up and paying off from two drums a wire rope, anchored at each

end, or winding along a wire rope, as may be found best. I must premise my remarks on the merits of these plans by saying that I am myself a patentee of one of them, and had I not thought mine the best I should not have entered on the competition; and I must leave you to judge of their respective merits, after giving you the reasons that led me to that preference. We will first consider the plan of travelling the windlass up and down the field. A small hemp rope is passed round the fly-wheel of a portable engine, placed in one corner of the field, one end being carried round a pulley at the opposite end of the same headland, and again round a pulley at the top of the furrow to be ploughed. It is then taken to the bottom of the field round another pulley at the bottom end of the same furrow, and again brought up the field to the top of the furrow, where, passing round another pulley, it is attached to the other end of the rope, passing round the fly-wheel in its passage up or down the field; it conveys power to a windlass by its friction on a pulley or series of pulleys mounted upon it; and being set in motion, turns one or two drums mounted on the windlass, and either winds up or pays off two wire ropes, or winds up and pays off a single rope, winding along that rope by friction. The rope that conveys the power is supported at intervals by carriages; and in order to convey the necessary power must be made of hemp, and from its great length, and the difficulty of supporting it, requires to be very small. As lightness is necessary, speed is also a requisite. It will have to travel at least one-third of a mile per minute to convey seven-horse power to the windlass; but, circumstances being favourable, almost the whole of the power is conveyed to the windlass, the loss by friction being very slight indeed. Any derangement of the pulleys, however, would, of course, at that high speed, consume any amount of power. The windlass, if made strong enough to wear well, with the drums and gear necessary to reduce the speed, cannot weigh less than 30 cwt., and the power required to draw that weight over the land cannot be less than one horse draught; assuming the friction of engine, pulleys, and windlass at half-horse power, we have one-and-a-half horse power consumed in keeping the machine in motion. Some experiments I have lately made on the friction of wire rope on the land show that rather less than two-horse power is required to drive engine, windlass, and wire rope enough to work twenty acres of land (nearly a mile in length), the rope travelling at two-and-a-half miles per hour, and being strong enough to pull up a ten-horse engine at that speed. Thus we see that the advantage as respects friction is not greatly in favour of the former *plan*. The disadvantage of the windlass travelling up and down the field is very great, though the plough may be attached to either end of it, and ploughing may be thus very easily performed; yet, if you wish to pull any other farm machine when you get to the headland, you have no means of getting the implement to the opposite side of the windlass, and going back, except by the assistance of horse-power, and this, as will be seen, does not apply to the simple rope by which the implement can be easily turned. I

think, with these disadvantages, the plan of traction by winding up a wire rope is greatly preferable, as it is much simpler, having fewer wearing parts, is less liable to derangement, and more easily managed. The wear and tear on a hemp rope at such a speed, and exposed to all sorts of weather, is a point on which I am not competent to form an opinion; but former experience would lead to considerable doubt on this point. Before proceeding to describe the two plans for traction, to which I shall call your attention, it will be well to consider what have been the causes of failure in the previous attempts of Heathcote, in 1837, followed by Osborne and Lord Willoughby D'Eresby. In the experiments that Mr. Parkes, the well-known draining engineer, tried for Mr. Heathcote, the difficulty experienced was to procure any material that would convey the requisite power without entailing too much weight and consequent friction on the land; and I understand that the material he found best adapted to the purpose, were steel-bands riveted together at the ends. Lord Willoughby D'Eresby, in the use of chain for that purpose, effectually prevented the possibility of success in his efforts, as the friction of chain on the ground is so great that it would consume almost more power than it is capable of bearing, when of any great length. The present perfection to which the manufacture of wire-rope has attained has, however, entirely overcome the difficulties that beset *them*; and in Mr. Williams's and my own plan, wire-rope is the only material with which we propose working. Mr. Williams proposes to mount an ordinary portable engine on a frame, on one end of which two barrels are fixed, turned by the engine, by one of which a wire rope is wound up, and passed off by the other; one end of this wire rope passes straight down the field, and the other passing along the frame at right angles to the drum for some distance, and then down the field again, running along the frame anchored at the bottom, and meeting the other rope. The implement to be drawn is fixed between the ropes, and alternately pulled backwards and forwards by these ropes, the two frames being moved along the headlands as the work progresses. My own plan is to mount two drums on a frame, fixing them in one corner of the field, the portable engine being set so as to drive them with a short rope or chain working in pulleys. The ropes are led off the drums to opposite corners of the field, and there passed round pulleys, anchored on a chain stretched between two posts or anchors; and the drums being alternately set in motion, wind the wire rope backwards and forwards between the two pulleys, which are moved up the field by being allowed to slip along a chain stretched between two posts or anchors as the work progresses, the engine and windlass remaining stationary until the whole field is completed.

My reason for preferring this plan is that I consider the number of pulleys in Mr. Williams's unnecessary, and injurious to the rope, as well as consuming power; and the fixing the windlass and engine on one frame, and moving them along the headland is unnecessary, expensive for first cost, and extremely cumbrous. To

these remarks I may be allowed to add that one of my windlasses has been at work for the last six weeks at Mr. Smith's, of Woolston, near Fenny Stratford, who will be able to give you the results of his experience. I believe either of the above three plans is capable of solving the problem of the application of steam to field operations; and Mr. Smith's experience would fully justify me in saying that it may be done at a saving of 40 per cent. over horse labour. Mr. Smith's calculations are as follows:—"Four men and a boy will plough an acre in  $2\frac{1}{2}$  hours, or four acres a-day. Thus, only the same number of men are required as for horse labour; consequently we have all the horse labour saved, from which deduct the cost of 7 cwt. of coal, gives a saving of nearly half, as the wear and tear will hardly exceed the wear and tear of eight horses. Another advantage he considers must not be lost sight of, is that the land is not injured by the treading of the horses in wet weather, and, consequently, he can work it when he otherwise should be at a stand-still."

Having thus, I think, arrived at the conclusion that any given implement may be drawn over the land by an ordinary portable engine, it will be necessary to consider what implements are likely to be best adapted to be used with this tackle, so as practically to make it most serviceable. Ploughing, of course, is the ordinary operation of a farm, and a series of four or five ploughs, fixed in a frame, will at any rate best meet the present wants and prejudices of the farmer. Mr. Williams has invented a series of ploughs that have very considerable merit, and I have no doubt that but little difficulty will be found in adapting ploughs to meet the requirements of the farmer. I think there is every probability that some other implement will, to a great extent, supersede the plough; and to this attention ought now to be turned. Mr. Smith is now, and has been for some years, moving with horse-power a sort of grubber, instead of the plough, and with, I hear, the best results. But I must confess I see no way of effectually and thoroughly turning over the soil, which is often necessary, both to expose it to the air and bury the stubble and weeds, but by the use of the plough. Still this operation can hardly be necessary very often in a year, and, I believe, a machine may be made which will take the soil up on a platform to a certain height, then, passing it through revolving harrows, leave it at once in a perfect tilth, and which may be worked by traction. This would offer great advantages, as the soil is often, when broken up, in a fit state to pulverise; but, after the sun's rays have heated it for a few days, it is quite impossible to break it. The sets of implements that may be found best for different soils and circumstances, to be worked by steam-power, will be numbered by hundreds; and it is impossible for me to estimate the changes to which the application of steam may give rise, nor will my limits permit me to dwell longer upon it. It is worthy of serious and careful attention, and, I think, deserves at once to be the subject of extended experiments.

I have now to notice the working of a revolving cultivator by an endless rope, and, should experience prove

that a rope used in this way is sufficiently durable for the purpose, I should think most highly of this plan. If ever rotary cultivation is brought to bear, I feel sure it will be in this way, and with the former proviso. I have no doubt experiments in this direction may lead to practical results of great value. It is simple in working; the experiments need not be expensive, and they have a fair prospect of success.

Having thus drawn your attention to what appear to me to be all the most practicable schemes and experiments for performing field operations by steam, I now have to refer to the other branch of our subject, the cartage of material to and fro on a farm. A large team of horses will still be required on a farm, to do the necessary carting, going to market, &c.; but during harvest every available horse is often required, especially on large light-land farms. Can our windlasses be made available for harvest work; if so, the number of horses might safely be reduced two-thirds. The practice of ricking in the field is now common, and where this is the case, there can be no difficulty in using the windlass to bring the corn to one spot. You might fix the windlass in the morning, and clear a 20-acre field with it in a short time; it can be removed and fixed again with ease in two hours. The windlass could be also used for carting turnips; but, if a traction locomotive could be made available, it would be far better suited to the work. A tramway down the centre of the farm, using the windlasses to the right and left to bring material to the tram, would reduce the horse work to a minimum; but whether the locomotive could not be made to do the carting work of a farm is well worthy of attention. I am assured by Mr. Worby, who made experiments some thirty years back on the subject, that it is perfectly practicable. He has had forty years' experience in the various farm implements with which we are acquainted, as manager for Messrs. Ransome, and may be assumed to know what practical difficulties are likely to lie in the way. The great difficulty met with by Hancock and others, on common roads, was the speed at which they travelled; but for this purpose, three miles an hour will be a sufficient speed. I believe that a few experiments would lead to a successful solution of this problem. One essential to its success is, however, the use of very high pressure steam, so as greatly to reduce the weight of the engine, and the consumption of as little water as possible. This has been pretty much reduced to practice lately, at a mill at Navestock, belonging to Mr. Hall, and in a portable engine which he is using, in both which engines steam of nearly 300 lbs. pressure is used. These machines were made by his son-in-law, Mr. Charlton, and have been in work during two years. One difficulty that has beset this subject, the impossibility of driving two wheels, is now overcome by a very simple contrivance, which I am not at liberty to describe to you; and this is a great step in the right direction. Boydell's wheels, also, may form an important auxiliary in certain states of the weather, though I think they would hardly do in constant wear. Were I to attempt the solution of this question, I should use wheels to which Boydell's rail could be attached

whenever the state of the weather demanded. Thus there are three directions in which, in my judgment, it would be well to make some experiments: 1st, in implements adapted to be worked with the steam windlasses; 2nd, in a rotary cultivator, worked by a portable engine, with endless band; 3rd, in a locomotive used for traction to do the cartage of a farm.

I feel confident that a few well-directed experiments in either or all of these directions would bring out good practical results in the course of a few years; but I would ask you whether it is right that the carrying out of these experiments should be left to chance; whether, when so important a matter is involved as the rapid development of steam cultivation, it would not be wise to enlist the public in the endeavour to bring them to some practical solution. If left in private hands, it may, and probably will, take many years to arrive at any real results, and at the cost of loss and disappointment to many of a deserving but unfortunate class of men; whereas I feel confident that, with public assistance, a short time would enable us to solve both the three questions that at present seem most to claim attention, and others that no doubt would arise in the course of prosecuting these inquiries.

#### APPENDIX.

AN ABBREVIATION OF PATENTS, FROM THE RECORDS OF HER MAJESTY'S PATENT OFFICE, FROM 1630 UP TO THE PRESENT TIME.

No. 50. Date, 1630.

DAVID RAMSEY, Patentee—Short title, "Making the earth more fertile." Object of the patent—to raise water from low pits (as coal-mines) by fire; to make barges go against wind and tide; and to make the earth more fertile. No specification of this patent being enrolled, we are left to guess the mechanism at issue. At this period, steam-engines were termed "fire-engines"; and Mr. Ramsey's ideas appear to have been to communicate rotary motion to carriage-wheels, and by such means propel the carriage and engine forward, dragging after it ploughs and other cultivating implements of the period.

Nos. 921 and 923. Dates, 1767 and 1769.

FRANCIS MOORE, Patentee.—"Fire-engine to supplant horses, &c." No specification of either of these patents is enrolled, the only information we can give being the following, abridged from the "Mechanic's Magazine," vol. 16, page 135: "A correspondent writes that Mr. Moore's new invented machine, to go without horses, for which he has obtained a patent, is not only adapted for wheel-carriages in general—such as coaches, chaises, waggons, &c.—but to ploughing, harrowing, and every other branch of industry. Also to all other machines and engines now in use in the kingdom, in the various branches of manufactures where horses are required. The patentee and his friends were so confident that horses were doomed, and about to be superseded as a motive power, that they sold their teams in order to avoid loss, convinced that they (the horses) would soon be reduced to one-fourth their value."

No. 953. Date, 1770.

RICHARD LOVELL EDGORTH, Patentee.—"Endless Railway." No plans were given with the specification of this invention, and the inventor rather leaves us to guess at mechanical details. We are informed, however, that the railway consists

of planks of wood on the periphery of cart or waggon-wheels. That the wheel, in rolling to the extremity of one plank, lays down another in front, while it lifts a third behind—that the rails or planks on the opposite sides of the wheel would thus balance each other, so as to reduce the additional draught on the horses to a minimum; and that the advantages on rough roads and soft ground would be incalculable, not only to the agricultural interest, but all who used carts and horses. The specification is only to be seen in the Roll's Chapel.

No. 1,432. Date, 1784.

JAMES WATT, Patentee.—“Steam Carriage.” In his specifications Mr. Watt states, “the propulsion of land carriages”—a specification sufficiently comprehensive to include agricultural implements, as ploughs, sowing-machines, harrows, &c. The patentee, however, never built a steam carriage, for reasons which he himself thus states:—“I soon relinquished the idea of constructing an engine on this principle (high steam), from being sensible it would be liable to some of the objections against Savory's engine, viz., the danger of bursting the boiler (constructed of wooden staves), and also that a great part of the power of the steam would be lost, because no vacuum was formed to assist the descent of the piston.”—*Watt's Narrative*. For the purpose of ploughing, the engine would have drawn the ploughs behind it on the traction principle, as exhibited at Carlisle, by Mr. Boydell.

No. 3,309. Date, 1810.

Patentee, MAJOR PRATT.—This is an extensive project, and, from the specification being only to be seen in the Roll's Office, it appears to have escaped general notice. Cultivation of land is performed in several ways. 1. A series of ploughs revolve horizontally on a vertical axis, the ploughs being raised over the ploughed land. 2. Harrows are worked in a similar manner. 3. Land is cultivated by means of chains, having tines or grubbers fixed in them, working longitudinally over two vertical pulleys, one at each end of the machine; and 4, by means of an endless chain passing over horizontal pulleys or carriages placed along the field, one pulley being on each carriage. To one side of the endless chain a plough is attached, and works alternately between two carriages, the carriages being moved forward as the work proceeds. Thus, a carriage on four wheels, one at each end or side of the field, and a locomotive or portable engine in the centre, with endless chain and two ploughs, would form the details of the project for ploughing a field of land.

No. 3,431. Date, 1811.

JOHN BLENKINSOP, Patentee.—“Certain mechanical means, by which the conveyance of coals, minerals, and other articles, is facilitated, and the expense attending the same rendered less than heretofore.” The specification of this patent informs us that it consists of the application of a rack or toothed rail laid down on one side of the roading from end to end. Into this rack a toothed wheel is worked by the steam-engine, the revolution of which wheel produces the necessary motion, without being liable to slip in descending a steep inclined plane.” Mr. Blenkinsop, in reply to queries put to him by Sir John Sinclair, stated that his “patent locomotive engine, with two eight-inch cylinders, weighs five tons; consumes two-thirds of a hundred-weight of coals and fifty gallons of water per hour; draws twenty-seven waggons, weighing 94 tons, on a dead level, at three and a-half miles per hour; or 15 tons up an ascent of 2 inches in the yard; when lightly loaded, it travels ten miles per hour, does the work of sixteen horses, and costs £400.”—*Engineers' and Mechanics' Encyclopædia*. For field purposes a portable rack railway was proposed.

No. 3,632. Date, 1812.

Patentees—The Messrs. WILLIAM CHAPMAN, Durham, and E. W. CHAPMAN, of Wallsend, Northumberland. A “Steam carriage, with a rigger working on a stretched chain or rope, secured at both ends by anchors.” It was worked for some time on a railway, but was obliged to be given up, it is said, owing to “the waste of power arising from the excessive friction of the chain or rope.” Several propositions have been enumerated, of rigger traction for actuating ploughs, &c., in the field, on the principle adopted in this patent.

No. 3,973. Date, 1816.

JOSEPH RYNOLDS, Patentee.—“Steam carriage for ploughing, carting, rolling, drilling, threshing, &c.”; the former being on the traction principle. There are some good points about this machine deserving of notice, such as the reverse action of the wheels, enabling the carriage to turn on an *area of its own length*. The broad roller wheels, again, to prevent them sinking in the soil, have since been adopted by several patentees. It is only to be seen in the Roll's Chapel.

No. 4,575. Date, 1821.

JOHN RICHARD BARRY, Patentee.—“Endless railways.” The principle carried out in this project is that of a heavy body moving on rollers. A series of wheels and axles working in plummer blocks, fixed in two endless chains, one at each side of the carriage frame, pass over four chain pulleys, two on each side. Each axle has four wheels, two at each side, the one being less than the other. The largest two act as wheels for supporting the carriage on the ground; and the smaller two for rollers under the frame of the carriage. When the ground wheels come to an obstacle, they remain stationary, the carriage rolling over the other two, setting down two wheels in front of the carriage over the front two chain pulleys, and taking up two wheels behind for each of the two purposes involved; the ground wheels, and roller wheels, the axles, wheels, and chains in which they work passing over the chain pulleys.

No. 5,260. Date, 1825.

SIR GEORGE CAYLEY, of Brompton, Yorkshire, Patentee.—“Endless railway.” This project is nearly the same in principle as Mr. Barry's above, but differs considerably in mechanical details. It has less merit, indeed is hardly worthy of further notice.

No. 5,267. Date, 1825.

JOSIAH EASTON, Patentee.—“A rack and pinion railway.” This is a similar project to that of Mr. Blenkinsop's already noticed, the difference being that, Mr. Easton places the rail in the centre of the roadway, whereas his predecessor had it at one side. The advantage of this is the obviating the strain experienced in Mr. Blenkinsop's case from the rack being at one side only.

No. 5,950. Date, 1830.

JOHN HENRY CLINE, Chelt-house, Staffordshire, Patentee.—“Certain improvements in the construction of, and machinery for, locomotive ploughs, harrows, and other machines and carriages.” The improvements here consist principally (1) in the enlargement of the carriage wheels for supporting the engine, (2) attachment of a crank pin to one of the spokes with a greater crank radius than ordinary, and (3) in using a broad roller wheel under the centre of the carriage for driving and steering.

No. 6,172. Date, 1831.

MILES BERRY, Patentee.—The improvements contemplated by this invention have principally reference to engines and boilers of stationary or portable engines for agricultural purposes.

No. 6,267. Date, 1832.

JOAN HEATHCOAT, Tiverton, Devon, Patentee.—“Certain new or improved methods of draining and cultivating land; and new or improved machinery and apparatus applicable thereto; which machinery and apparatus may be applied to divers other useful purposes.” This machine is principally for cultivating soft mossy lands. It consists of a broad endless strap or floor, passing over two large pulleys, one at each end of the steam carriage, and four intermediate small pulleys, each pulley consisting of three discs or wheels; the endless floor forming a railway, and the pulleys the wheels of the carriage six on each side. Between the two endless railways, the boiler and engine are placed. For ploughing, one end of a drag rope is fixed on to a long drum, situate longitudinally over the boiler, and a length equal to the length of the field coiled upon it. The rope then passes to the opposite headland round a large pulley there of an auxiliary carriage, which serves for an anchor. The rope then returns, and is fixed to the opposite end of the long drum. To one side of this rope the plough carriage is fixed. The drum is then set in motion, when it coils up the one end of the rope as it gives off the other, the engine carriage and auxiliary carriage, moving along opposite headlands as the work of ploughing advances.

No. 6,531. Date, 1832.

JOSEPH SAXTON, London, Patentee.—“Differential pulleys.” This is a rigger motion and traction machine. The parts claiming notice consist of two riggers or pulleys of different diameters on one axle, situated vertically in the centre of front part of the carriage or locomotive. An endless rope passing over two anchored pulleys takes a turn, the one side round the larger pulley of the carriage, and the other side round the lesser one. To gain a high velocity, motion is communicated to the small rigger, and *vice versa*, to the large; this, however, is only one way, out of several proposed, of putting the rope or ropes on the riggers; a second plan was to have a single rope taking one turn round the rigger of the carriage, the two ends being alternately wound upon two anchored drums at opposite headlands; and a third plan was to have a single traction rope, as in the case of Chapman's patent, and an endless or single rope for driving, the traction rope taking a turn round the small rigger of the carriage; for slow motion, the driving rope working on the other, and the reverse for quick motion. Several very ingenious plans were adopted to obviate the cutting action of the ropes where they pass each other on the riggers, as a slight divergence from a right angle with the axis, pulley, guides, &c. The project was reduced to practice, and tried on a piece of railway near Regent's-park, but did not answer. The principle of mechanism involved, as applicable to agricultural purposes, is that of a travelling windlass, and gave rise to numerous suggestions of improvements at the time, as the cart wheel subsequently noticed.

No. 7,118. Date, 1836.

THOS. VAUX, Land-surveyor, Essex, Patentee.—“A revolving harrow.” Strictly speaking, this machine has no connexion with steam, but as it has on several occasions been quoted in opposition to patents for rotary steam cultivators, as Hoskyns's, and may be wrought by that power, we give it. The same patentee holds patents Nos. 7,446, 7,624, and 7,905, all in connexion with the culture and fertilisation of land.

No. 7,458. Date, 1837.

JOHN UPTON, Engineer, Surrey, Patentee.—“Steam boilers applicable to agricultural purposes,” or “an improved method or methods of generating steam power, and applying the same to ploughing, harrowing, and other agricultural purposes, which method or methods is

or are also applicable to other purposes, to which the power of steam is or may be applied.” Mr. Upton's engines are on the rotary principle. There are two of them, one on each side; on the shafts of which are two small pinions, one on each. These gear in the top of two spur wheels on the axle of the running wheels of the carriage, similar in principle to what has been adopted by Mr. Boydell. The specification of this patent has been printed, and to it we refer for details.

No. 7,547. Date, 1838.

AMBROSE ADOR, of Leicester-square, London, Patentee.—Improvements in obtaining motive power for various purposes, including the propelling of land carriages by means of ignited hydrogen gas in chambers at the extremity of revolving arms, on a common spindle, something on the principle of Barker's mill. If this gas is poured into a chamber by means of a valve in the centre of the arm, this valve closed, another opened at the side, and the gas at this vent ignited, the recoil action will force round the arm of the mill, and thus communicate motion to machinery.

No. 8,207. Date, 1839.

HENRY PINKUS, of the Old Slaughter Coffee House, St. Martin's-lane, Patentee.—A stationary engine forces compressed air or gas through main pipes in the ground supplying the engine of a locomotive ploughing apparatus, &c., by means of vertical pipes at certain distances, and an elastic tube communicating between the two. As the locomotive advances, this elastic tubing is unwound from a drum, and in returning is wound upon the same. The inventor assumes that an estate of 16 miles might be laid down with main pipes, and cultivated with one engine in a central position.

No. 8,329. Date, 1839.

ALEXANDER McRAE, of British Guiana, took out a patent for steam culture by means of a portable engine, endless rope, the necessary anchorage, and two series of ploughs in a carriage or frame on wheels, one for ploughing up land, and the other down. The invention was principally intended for the low level lands of Guiana, intersected at short distances with a net-work of canals. Accordingly, the steam-engine was placed in a punt or barge at one side of the field, and the anchor, so to speak, with its pulley, in another at the opposite side, the two sailing up or down as the work of ploughing or harrowing progressed.

No. 8,331. Date, 1840.

JOHN LEE NICOLAS, Clifton, Bristol, Patentee.—“Certain improvements in the method of constructing and propelling carriages on common roads and through fields for agricultural purposes.” Claims the method of propelling carriages or ploughs by means of crutches or legs, and working them by means of arms mounted on a shaft, and actuated by motive-power. Vibrating levers are weighted at one end, the other having a joint with a pending lever or leg with a shoe. As the arms revolve, the shoes or feet of the legs press against the soil, forcing the carriage forward.

No. 8,644. Date, 1840.

HENRY PINKUS, St. Martin's-lane, Patentee.—“Improvements in the methods of applying motive-power to railway carriages, canal boats, and agricultural machines.” As to the latter, in a given area of land a central station is erected, in which is here placed an electric battery or batteries, having wells and tanks placed in the same. From the station, main pipes are laid down, having, at intervals of 200 yards or so, short, vertical, supply branches, terminating in a box with a moveable lid. In the main pipes wires are laid, connected with the positive and negative poles of the bat-

tery, thus constituting electric circuits. In the locomotive engine an electric magnetic engine is applied; and in order to set the former in motion, chemical action is induced in the batteries at the station tanks, and electrical influence being thus generated, the force of which acting through the metallic circuit, the wires passing round a small drum will put the impelling engine in motion.

No. 9,402. Date, 1842.

JOSEPH HALL, Cambridge.—“Certain improvements in machinery for tilling land.” This is a rotary cultivator, and, like Mr. Vaux's, is not a steam one. It involves principles, however, to which reference has also been made in taking out patents for rotary steam cultivators, and therefore we quote it. In it the rotary “delving machine” moves at right angles, or an angle from the line of progression of the carriage, so that the velocity of the latter does not interfere with that of the former, beyond giving it a diagonal direction, *i. e.*, if the diggers rotate at right angles from the line of progression, the spit or furrow which they cut will be in a diagonal direction from it.

No. 10,135. Date, 1844.

WM. STACE, of Berwick, Farmer, and PHILIP VALANCE.—“Improvements in applying power for draining or working ploughs, and other instruments used for agricultural purposes.” This is no less than a locomotive windmill for ploughing land, &c. Two long poles are anchored, one at each end of the field; to each of these two pulleys are fixed. At the opposite ends of the two poles a frame is anchored, containing three more pulleys. An endless rope passes over the whole of these, a double rope stretching along the field. On each rope a plough is fixed, the ploughs being at opposite ends, worked by two ploughmen. A portable windmill sets the whole in motion, and the ploughmen can stop their ploughs at pleasure without stopping the windmill.

No. 10,578. Date, 1845.

JOHN BAPTISTE SIMSON TEISSIER, Engineer, and ANTOINE HIPPOLYTE TRIAT, Professor of Gymnastics, Paris, Patentees.—“Propelling vessels, carriages, and agricultural machines.” The specification of this patent is printed; and to it we refer for details. The method of propulsion is by crutches (or propellers, as the patentees term them). A series of these, operating by a crank shaft below the engine, forces the carriage forward as the cranks revolve, by catching hold of the ground. The drawing represents a series of spade-shaped cultivators, following in a second tire across the path of the carriage, forcing themselves into the ground by their own weight, and tearing up the soil on the principle of action exemplified by the old Roman plough.

No. 11,297. Date, 1846.

THOMAS BONSER, of Merton, Surrey; and WM. PETTITT, Lambeth, Patentees.—“Certain improvements in machinery for tilling land.” This has been termed a “screw plough.” It consists of a shaft or drum, with radial cutters, or prongs, or tines, either straight or curved, attached thereto, and arranged around it spiralwise; and is proposed to be actuated either by horse or steam-power.

No. 11,303. Date, 1846.

PETER CLAUSSEN, of Leicester-square, London, Patentee.—This is a large project, under the title of “Improvements in methods of—and apparatus for—propelling, and exhausting, and compressing air and aëriiform bodies.” The specification is printed, and comprises nine pages of letter-press and six large drawings; and to these we must refer for details. The

method of working ploughs is by rigger traction; but the plan of tackling the riggers adopted by Mr. Clausen is different from that of his predecessors, Chapman and Saxton.

No. 11,304. Date, 1846.

JOHN TULLOCH OSBORNE, Esq., of Demerara, Patentee.—“System of steam ploughing.” According to this plan, two portable engines are used—one for pulling the one way, and the other the opposite. Each engine has two drums, the one giving off rope to the opposite engine, and the other taking in rope. Portable railways, or tramways, are placed about 100 to 200 yards asunder; and on these the engines travel across the field, ploughing the land between them into ridges. Two plough-carriages, on wheels, are used, having one-way ploughs; one being drawn the one way, ploughing the one side of the ridge, while the other is being drawn the opposite way, ploughing the other side of the ridge, or the corresponding side of a second ridge, according as the ploughs are made; so that both engines are always kept in use. At the headlands, the ploughs are shifted from the one side to the other, as in ploughing with horses. Each plough-carriage, as it advances, lays down the return rope. In level land, intersected by rivers, canals, or ditches, provision is made for placing the locomotives, one at each side of the field, so as to admit of the lands between them being ploughed.

No. 11,907. Date, 1847.

Sir JOHN SCOTT LILLIE, of Fuiham, Patentee.—“Improvements in machinery for tillage, &c.” The specification of this patent is printed; and we shall again refer to it for details. It is hardly possible to give, in a few words, an intelligible description of Sir John's project. The carriage has two sets of wheels, one for running from headland to headland, and the other transverse-ways, across the field. The former have endless railways, consisting of jointed rails passing over skeleton rails, one at each end of the carriage, for each endless chain of rails, passing under and over these wheels on each side. Either ploughs or rotary tillers are used, or both. A rope is stretched along the field, and anchored at each end by “grapnels” in the ditch. This rope takes a turn round a rigger, or “whelp-wheel,” on the locomotive. Motion is given to this wheel by the engine, with the necessary intermediate gearing, when the whelp-wheel winds its way along the rope, ploughing or digging, as the case may be, or both, at one operation. In cutting corn, the machine moves sideways on the transverse wheels, cutting its own length as it proceeds. To effect this, two drums are placed, one at each end of the long carriage. Over these, endless straps or chains work, having scythes fixed at short intervals in them, and set at an angle for cutting. On motion being given to the drums, the chains and scythes revolve at a rapid pace, cutting the corn as they proceed. We cannot conclude by saying there is much appearance of successful practice in this project.

No. 11,977. Date, 1847.

PIERRE PHILIPPE CELESTIN BARRAT, of Paris, Patentee.—“Improvements in machinery for tilling and working land.” This machine cultivates the ground with mattocks; the object of the invention, as he tells us, being to imitate the action of such a tool when worked by man. For this purpose, or to accomplish this, a frame is placed behind the engine, about three feet from the ground. In this frame is a transverse shaft, in which are sockets for receiving the handles of the mattocks. This frame and shaft have a longitudinal reciprocating motion. The handles are raised by stud pins in rollers, and when up to their proper height, are relieved by means of springs, when they

fall to the ground, and thus, by the three movements, progressive, transverse, and vertical, penetrate the soil and turn it over. The patentee claims, 1st. The arrangement of two rows of mattocks, to which, on the one hand, an alternate rotary movement is given; and on the other hand, a "to-and-fro movement," in such a manner as to imitate as much as possible the working of a mattock by the hand. 2nd. The mode of giving increased power to the instruments as they fall into or enter the ground. 3rd. The means for regulating the height of the frame and mattocks from the ground. 4th. The means of regulating the speed of the carriage when at work. 5. The means of regulating the speed of the carriage when travelling from field to field. 6th. "Combining wheel," for changing the speed of working, and for stopping, &c.; and 7th. Arrangement of machinery to securing an equilibrium, notwithstanding inequalities of soil.

No. 12,710. Date, 1849.

JAMES USHER, Edinburgh, Patentee.—"Improvements in machinery for tilling land." This rotary steam-plough is too well known to require description.

No. 12,860. Date, 1849.

GEORGE GALLOWAY and ROBERT ALLEE PURKIS, Patentees.—"Apparatus for ploughing land." This machine consists of a triangular frame, connected with a locomotive engine. At each angle of this frame are three chain pulleys on one shaft. Over these, three endless chains, carrying coulters or other tilling apparatus, work; so that with the progressive motion of the frame and transverse motion of the chains and tilling apparatus, a furrow is made diagonally, the one tiller following the other, so as to cultivate the whole of the land regularly.

No. 12,930. Date, 1850.

HENRY COWING, Blackfriars, London.—"Improvements in obtaining motive power, and in steam and other ploughs, in land carriages, in fire-engines, in raising water for draining and other agricultural purposes." No specification enrolled.

No. 13,159. Date, 1850.

PAUL RAPSEY HODGE, Adam-street, Adelphi, London, Patentee.—"Improvements in certain descriptions of steam-engines, and in their apparatus and management for cultivating and manuring the soil, and treating the produce thereof." This is an improved steam digging machine for cultivating the land, and mixing the manure spread upon it. It consists of two series of spades on two crank shafts at the back part of the machine. The handles of the spades work in slide-sockets, from which they are expelled by a spring for the purpose of throwing off the spit.

No. 13,168. Date, 1850.

WESTON TUXFORD, Boston, Patentee.—"Improvements in machinery for crushing and pressing land, to be wrought either by horse or steam-power."

No. 13,222. Date, 1850.

GEORGE THOMSON, Regent's-park, Patentee.—"Certain improvements in machinery and apparatus for cutting, digging, or turning up earth, applicable to agricultural purposes." A crank-shaft digging machine, with apparatus for turning off the spadefuls of earth when lifted by the diggers. The machine may be actuated either by a stationary engine in any part of the field, or by one attached to it.

No. 13,564. Date, 1851.

GEORGE GUTHERIE, Chamberlain to the Right Honourable the Earl of Stair, Wigton, Patentee.—"Improvements in machinery for digging, tilling, and

working land." A forking machine. Claims—1, general arrangement of forks; 2, mode of turning them by a screw travelling slide; 3, use of guides for directing the forks; and 4, system of digging and turning the forks.

No. 13,757. Date, 1851.

DAVID STEPHEN BROWN, Old Kent-road, Surrey, Patentee.—"An improved agricultural implement." This machine is on the rotary principle, and consists of blades or cutters fixed on spindles, of which two are used, one in advance of the other—the front cutters being smaller than those behind. The bearings supporting the spindles have a vertical motion, on a joint, to permit of their being raised so as to take the blades out of the ground. The machinery may be either wrought by horse or steam-power.

No. 13,943. Date, 1852.

MARTYN JOHN ROBERTS, Gerard's-cross, Bucks. Patentee.—"Improvements in agricultural implements." This is another machine on the rotary principle. A series of discs revolve on a shaft, carrying rocking-bars towards their circumference, armed with tines or riggers. These bars, working by means of eccentrics on the axis of the discs and connecting rods, give to the tines a reciprocating motion, independent of the rotary, the object of which is to make them enter the ground in the easiest manner, and loosen the soil so as to make the best work. This mechanism is very complicated.

The following are under the new statute, and hence are printed. We shall merely give the number, date, name of patentees and title, referring to the printed specifications for the rest.

No. 764. Date, 1852.

THOMAS CHRIPPES, Land Agent, Petworth, Sussex, Patentee.—"Tilling land."

No. 949. Date, 1852.

JOHN BETHELL, Westminster, Patentee.—"Apparatus for digging and cultivating land."

No. 965. Date, 1852.

DENIS JOHN MURPHY, Cork.—"Machine for cutting, turning-up, and pulverising land."

No. 1,151. Date, 1853.

JOHN HENRY JOHNSON (pro ROMAINE, Canada).—"Machinery for effecting agricultural operations."

No. 1,899. Date, 1853.

CHANDOS WREN HOSKYNES, Esq., Wraxhall, Warwick.—"Application of steam-power to cultivation of the soil by means of rotary tilling machines."

No. 2,147. Date, 1853.

HENRY JEANNERET, M.D., London.—"Machinery or digging and tilling land."

No. 2,418. Date, 1853.

ALEXIS DUSSUC, Brompton.—"Machine for digging and cultivating land."

No. 2,530. Date, 1853.

JOSEPH BAUER, Vienna.—"Machine for digging and harrowing by means of steam-power."

No. 41. Date, 1854.

JOHN HENRY JOHNSON.—Machinery and rotary engines for effecting agricultural operations.

No. 260. Date, 1854.

THOS. ATKINS, Civil Engineer, Oxford.—Apparatus for transmitting power to agricultural machines.

No. 431. Date, 1854.

JAMES BOYDELL, Camden-town.—Endless railway.

No. 1,293. Date, 1854.

WILLIAM SOUTHALL, London.—Machinery for breaking up or pulverizing land.

No. 1,325. Date, 1854.

JOHN ALLEN WILLIAMS, Wilts.—Machinery for ploughing and cultivating land.

No. 1,487. Date, 1854.

JOHN HENRY JOHNSON.—Agricultural machines, &c.

No. 1,696. Date, 1854.

BEAUMONT COLE, Hertford.—Agricultural machines.

No. 35. Date, 1855.

JOHN HENRY JOHNSON (*pro* ROMAINE, Canada).—Digging machines.

No. 288. Date, 1855.

GEORGE TOMLINSON BOUSFIELD, Brixton.—Steam-ploughs.

No. 1,030. Date, 1855.

JOHN ALLEN WILLIAMS, Wilts.—Apparatus for applying steam-power to agricultural machines.

*Patents not Specified for 1855.*

1,177. May 24.—Baron VON GELGENHEMB.

1,343. June 12.—A. W. FORD.

1,629. July 19.—Messrs. FISKEN.

1,642. July 20.—JOHN HENRY JOHNSON, Patent Agent.

1,953. August 29.—J. HANSON.

2,224. October 5.—P. A. HALKETT.

2,551. November 13.—F. A. WILSON.

2,766. December 7.—J. A. WILLIAMS.

2,848. December 17.—O. C. EVANS.

It has been proposed to dig land on the principle of the steam-hammer. Suppose a series of oscillating cylinders, constructed on the principle of the steam-hammer; but, instead of the hammer, a large fork, with a swivel action on the piston-rod, for turning off the spit. You will readily perceive that it would not take a vast amount of engineering to make the steam drive the forks into the ground, lift them out by one crankshaft motion, turn the fork by a second on its swivel, advance another step by intermittent progression, and so on. All this is plain sailing, at least on paper.

### DISCUSSION.

The Secretary stated that he had received several communications in reference to Mr. Fowler's paper, which with the permission of the meeting he would now proceed to read, taking them in alphabetical order:—

Mr. W. BRIDGES ADAMS says:—"As surely as steam-power has become the substitute for wind, water, and animals, in the processes of grinding, beating, pumping, lifting, and propelling, in mills, on farms, in mines, and on land, river, and sea, so surely will it be the means of performing like operations on farms, in ploughing, harrowing, and transport, and yet other things, till such time as a new motor shall be discovered, combining equal power with diminished weight of machine.

"In the application of steam to its yet desirable purposes, we should first define what those purposes are. The first is, to break up the ground to give access to air, and give, or get rid of, moisture. The second is, to impregnate the ground with the various chemical materials known under the general name of manure. The third is transport, to bring the mechanism and materials of produce on to the ground, and to carry the produce off the ground.

"In breaking up the ground, the mode of working must be determined by the quality of the ground. If homogeneous, as clay, or loam, rapid rotary action will be found the most desirable; if stony, and especially if the stones be of various sizes, the ploughing or grooving action will be the best. Whether the cutting of the ground be produced by a locomotive engine directly, or by a fixed engine through the agency of ropes, it is desirable that the engine should be as light as possible; and to possess lightness together with great

power, steam must be used of the utmost possible pressure. A small boiler is essential for lightness; and with a small boiler, fortunately, the strength of resistance increases. But after a certain point the radiation of heat becomes excessive, though the pressure remains the same; and for the sake of economy in fuel, the means of confining the heat must be very different from what we at present employ.

"If the locomotive engine be used for motive power, we must use rails; and then the question arises whether we are to use the portable rail laid in short lengths round the wheels, or portable rails of another class which we may call moveable, or rails laid down as a fixture. The wheel-rail, or, as we may designate it, the ground-shoe, is not all advantage. It is an additional weight constantly moving about; and extra force is required to move that weight, and overcome the adhesion to the ground. Fixed rails would be too costly, and would involve the levelling of the ground in plateaux, and many other arrangements; and we may therefore dismiss them, and consider the subject of portable or moveable rails.

"Whether they are to be used for a locomotive engine, or merely for waggons, must determine the question of position, strength, and the amount of bearing surface requisite to prevent their sinking into the ground; but, in any case, the attachment of the rail-bars to each other must be such as to constitute them a continuous bar of sufficient strength for the object, and without any surplus weight; and for this purpose they must be wholly of iron, and not involving the use of timber, increasing the bulk and weight. If the connexion of the bars be perfect, a much lighter rail will suffice, on the well-understood principle that a beam with fixed ends will bear one-half more load than one with the ends loose, the relative strengths being the same. A good form for the rail is a bar of  $\perp$  section with the vertical rib above the flat base. A better form would be a cruciform section, giving greater vertical depth. A model is laid on the table of a  $\perp$  rail of 28lbs. per yard, connected by a joint, rendering it a continuous bar. The wheel to run on this rail should be a double-flanged sheeve, taking a vertical pressure, and not tending to thrust the rails out like an ordinary coned wheel; and the wheels should be arranged to revolve independently on their axle, while the axle also revolves in the ordinary bearings.

"If it be desired to run a locomotive on a light rail, it would be a very practicable thing to use Mr. Boydell's wheel shoes for slow rates of speed. In this mode, the bearing of the wheel being extended, the rail would not be damaged by the increased weight, and the adhesion would be increased so as to prevent slip on inclines; and the disadvantage of lifting masses of mud in wet weather would be avoided.

"With the rail-bars firmly and efficiently connected together, it would be very practicable, by means of Mr. Boydell's engine arrangement, to slew the rails laterally by applying force at the end, and thus changing the course of the line when required. Something similar to this is done in Wales, for the purpose of delivering and stacking slate from the quarries.

"The mode of applying the force of the pistons to the peripheries of the wheels, in order to make the portable farm-engine locomotive, is exceedingly useful. It is the converse of the plan of Mr. Whitworth for a street-sweeping machine, where the wheels moved by the horse give motion to the machinery, instead of the machinery to the wheels, as in Mr. Boydell's engine.

"The shoes, as applied to the engine, appear clumsy, and are rather adapted to make the engine locomotive, with a view to its own transit, than for the purposes of haulage. But this is a most valuable application, and

when applied on a light rail, to enable it to do the work of a heavy one, the disadvantages are lessened, as compared with the ground surface, and especially if a ploughed field, where the poaching would be very like that of horses' feet. Altogether, this simple arrangement of Mr. Boydell is a great move in advance towards steam farming.

"Thus far we have a portable engine adapted for all the uses of machinery as a fixed motor, and also as a tool of transit; but this is not all the purposes it may be made to serve. There are purposes other, and quite as important, to which it has not yet been applied.

"The process of manuring land is tedious and costly. In the ordinary methods a large mass of material has to be carted on to the field, much of which goes into the atmosphere. In improved methods, chemistry reduces the bulk of the manure, and in modern practice dilution with water is superadded. But in all these cases a considerable bulk and weight has to be transported.

"It is mostly considered heretical to bring novel theories before an audience, and the more especially if they be untried. But there are some processes that would not exist at all unless they began as theories, and the only hope of their becoming practice is to promulgate them. It is in the hope that some one may be induced experimentally to solve the question, that the writer puts forth his problem.

"In the production of vegetation three conditions are essential: First—the chemical constituents of the plant; secondly—moisture, to dissolve those ingredients; thirdly—warmth, to assimilate them. Some of the constituents are gaseous in form, and are easily evaporated. It would, therefore, be desirable to dispose them as low as convenient under ground, in order that as they ascend they may encounter and be absorbed by the roots.

"We drain our land artificially, and the land thereby becomes warmer, and a more generous kind of vegetation grows on it. Manuring land without draining it would be of little use; but there are times when wetting or moistening the land is also required. The problem, then, is how to manure, water, and warm at the same time, and apply these three ingredients of gases, warmth, and moisture in contiguity, to the roots of plants, in such a position below them that they may ascend.

"This is a practicable matter in several modes. Suppose a series of earthen pipes, analogous to the drain pipes, to be laid at a small distance above them. We may imagine them a continuous pipe in a serpentine form, with a large pipe at the entrance, and a large pipe at the exit. The entrance-pipe we may suppose analogous to the fire-box of a locomotive boiler, the exit analogous to the smoke-box. The intermediate serpentine pipe would then represent the tubes. A steam boiler, which may be the boiler of our farm engine, is then connected by a pipe to the entrance of the underground system. In that boiler are placed the materials of carbon, ammonia, and other gases, all at high pressure. The valve being opened, the steam and gases will sink through the underground pipes and saturate the ground, depositing therein heat, moisture, and chemical material. At first the steam will condense near the entrance; as the ground warms it will go further, and so on till it reaches the extremity, and the heat and the steam will ascend, carrying with them the gases: and neither heat nor gases can escape, save upwards, if the exit and entrance be stopped, and in their passage upwards the rootlets will absorb them.

"Probably smoke from a close furnace might thus be injected, being connected to the entrance-pipe, and a blower for the purpose of exhaust, worked by the engine, being placed at the other end. Whether the dry gaseous heat or smoke, or the moist gaseous steam, would be the best, would be a subject for experiment. But if the

process of manuring could be performed by gases, it is obvious that an enormous cost in transit of bulky and heavy manure would be avoided.

"One condition of health in human beings is said to be, to keep the head cool and the feet warm. Bottom heat is a favourite heat of the gardeners; and the reduction of heat in the greenhouse and hothouse, at times, is an absolute condition of the health of plants therein. In truth, plants like to keep their feet warm and heads cool, as well as we do ourselves. If a warm steam pipe or flue pipe be anywhere underground near a grape vine, the roots will infallibly find their way to it, and cling round it affectionately.

"We want, then, to prove, practically and experimentally, what would be the results of the products of combustion, heat inclusive, of a ton of coals deposited underground, and to what extent of area it would be beneficially available in aid of production.

"That it would be of large benefit, we have no reason to doubt. In Saxony, and elsewhere, the effect of burning coal-pits under ground are evident enough by the green grassy sward, which contrasts so beautifully with the surrounding country when—

'The long dull wolds are ribbed with snow.'

"It would be a very delicious thing to keep our gardens green throughout the winter by this process, and with dry warm walks. But there is yet more than the gratification of the eyesight.

"Vegetables not required to ripen do not need much sun, as celery, which we use in the winter, though sun is most important in the ripening process. It might, therefore, be possible to grow vegetables for green use throughout the whole winter, upon the same principle that Indian corn or maize, which cannot find in England sufficient sun to ripen it, will yet serve as a very delicious green vegetable.

"It would add very materially to London comforts if the sloping banks of railways looking south could be thus cropped for winter use. There is also another consideration. We break up the surface of the ground to let in air, moisture, and gases from above. It is just possible that the steam process may fissure the ground more advantageously from below, and thus the cost of digging and ploughing be saved in peculiar positions.

"It may be objected that quickening vegetation under ground would the more expose it to be nipped by frost. Possibly; but possibly also vegetables could be acclimated to this, just as trees, animals, and human beings change their character. 'There are more things in heaven and earth than are dreamed of in our [existing] philosophy;' and it were well to find them out, or disprove them practically. Gaseous food might prove to be to plants what hot coffee or nourishing food is to ourselves; and it would be a useful discovery to find that the engine power of Sydenham might be turned to account to keep the gardens green at the season when fountains are too chilly to be pleasant.

"In all processes for farm improvement, it will be well to recollect that the essential element, the basis of everything, is coal; and for the transit of coal there is no cheap method but railways. Farming improvement, therefore, means the gradual introduction into farms and villages of a cheap class of railways and locomotive engines, worked economically at low speeds. And the same engines will ultimately draw trains, pump water, thrash corn, cut hay, plough the land, and inject it with its vital fluid—steam—as well as perform many more mechanical operations than are as yet marked out for it.

"These suggestions are given in the hope that those who have leisure and opportunity, and appliances, will, after they have done laughing at what doubtless will at first be considered as wild theories, try to prove or dis-

prove them practically. I believe it will turn out they are all of them simply new forms of doing old things, doing by art what has hitherto been done by nature, and all capable of verification analogically. Stirring the earth has hitherto been a process all moulded on the anatomical structure of a horse; the horse being invented first, the plough followed. But in cotton, iron, and machinery are to be found abundant processes applicable to the cutting and carving of earth for agricultural purposes. The imagination of the poet is not needed for this, but only the perception of the analytic discoverer.

"In September, 1845, the writer promulgated these ideas in an article in the *Westminster Review*, entitled 'Railway Improvement.' This is a second attempt to draw public attention to it."

Mr. R. GARRETT, of Leiston Works, Saxmundham, says—"I have tried portable engines to draw by wind ropes and drawing endless ropes for ploughing, and, as far as my experience has gone, the result has not been favourable. The friction of the length of rope which is necessary for field cultivation on lands not level, and its coming in contact with the surface, added to that of the loss consequent on the friction rollers, and other guide and winding pulleys, absorbed in my experiments so much of the motive power as to leave the power given off by the engine, to be exerted upon the work done, so reduced as to render the advantage of steam over horse power of small moment as compared with the outlay. I also found some considerable difficulty in sufficiently simplifying the arrangement of such ropes, whether made of wire or hemp, for management by farm labourers, or for the ordinary shape of fields as now cultivated. I witnessed some experiments of Lord Willoughby D'Ereshy's with much interest, some few years since, and was there equally disappointed, through the same cause; and I think the results of his Lordship's valuable experiments would lead him to the same conclusion as myself with regard to the loss of power by the rope over the surface of the land. If I mistake not, in the experiments I allude to, at Stratford, the power given off a 10-horse engine was barely able to draw two furrow ploughs, thus losing six out of ten horse power in a small field. I have seen some experiments in ploughing with Boydell's traction engine, and the result was certainly more advantageous, and the machinery less difficult to adjust and manage, than with a rope over a portable engine stationed. On the occasion to which I allude there was no steam indicator on the boiler, but we were informed that the engine was only working up to 12-horse power, and it drew ploughs turning four good furrows, on land which, I was informed by disinterested farmers on the spot, would have required three good horses to turn each furrow as well as this engine performed the four at one time. As all new inventions require perseverance to perfect, I am of opinion that a great deal of good is to be got out of Boydell's engine for field cultivation, as well as for other means of traction. I apprehend it does not lose so much power by its own locomotion, even upon soft and uneven ground, in large fields, as a rope does for such traction. I am aware of the immense advantages of steam over horse power in this country, and no one is more sanguine than myself of the practicability of the former for the cultivation of the land. It has been ascertained that the horses employed in agriculture consume one-fifth of the whole produce of the land of this country; therefore their displacement by steam is very desirable, and every effort should be encouraged tending in this direction. I am of opinion that many of us may yet live to see it effectually carried out. The greatest difficulty is, that the number of patents taken out under the present patent laws (good as they are) has a tendency to clog inventors. As an individual, or a single manufacturing firm, I do

not contemplate such an undertaking. I should be pleased, indeed, to see it at once taken up in earnest by those who have more courage and means to carry it out to perfection. I will use no disguise or secrecy as to my ideas of the means to be pursued to the attainment of this object; I will only trouble you with a very brief outline of my ideas as to the difficulties we have to encounter, and the remedies I would suggest:—

"1st. The difficulty we have at present to contend with is, to apply our steam-power to our present means of turning the soil, either with a plough or any other effective tool; because we find that a plough is not adapted to a steam-engine any more than a spade is to a horse; and a rotary motion does not appear to me to be effectual at all times, or on all soils.

"2nd. That the weight of the engine to travel over the land is a difficulty as well as a disadvantage; and although it may be done by a rope, it must be admitted that the rope has its disadvantages.

"Let us therefore turn our attention to the construction of a tool that will effect its work on all lands in seasonable weather, and capable of being adapted to the power of a steam-engine. This, I believe, may be done by constructing a number of spades that will turn the soil as near as possible like the hand-spade; then place an engine upon these spades sufficient to work them; and, thus connected with its work, its weight, instead of being a hindrance, will be a decided advantage; and by such weight, in connexion with the ordinary action of the piston of the engine, the means of propelling and turning the soil will be more effectually obtained than with any horse-propelling implement. I do not think that it is difficult to give the action of the hand-spade through the motion of a common portable steam-engine. Its travelling-wheels should be hung on crank-axes, or by some contrivance to raise or lower the depth of cutting and of the spade, and to regulate the same. It should, however, only partially rest on its wheels when at work, to regulate the depth of cutting, but entirely when required to raise its diggers out of the ground, or in travelling.

"If these brief remarks should lead any inventors to the prosecution of the object before us, my earnest desire is that they may go on and prosper."

Mr. ROBERT ROGER says:—"A few of the disadvantages of the fixed windlass system of tillage of land are as follows:—

"1st. The remoteness of the motive power and means of stopping, when any obstruction occurs to make this necessary, either in the course of working or at the headlands, and the great liability to serious breakage from the carelessness or ignorance of attendants, or the derangements of signals.

"2nd. The great amount of wear and tear on wire rope, from trailing on the ground, in addition to the friction from winding and unwinding on the drums.

"3rd. The liability to saw itself into the soil on hills, and to derange the working of implements by pulling straight across hollows, thus making it difficult to cultivate undulating surfaces.

"4th. Considerable delay must be necessary at each furrow or bout, from the stopping, reversing, and again getting away with the engine.

"5th. A much greater strength of wire rope is necessary, from having the entire weight of itself to haul, the whole length of the field, in addition to the implements, thus requiring additional strength of windlass machinery and anchorage to meet this; in fact, in the plans proposed, I see no advantage whatever over that abandoned by the Marquis of Tweeddale some years ago; I believe, principally, on account of the wear and tear of wire ropes; the friction of the wire rope working

light, being no criterion for the friction when the drag of an implement is on it.

"6th. With the wire rope travelling as proposed by Messrs. Fowler and Williams, there is no provision for turning any implement about, so as to be hauled back in the opposite position—I mean such implement as a grubber or scarifier; neither is there any possible means of communicating a rotary motion to any other implement, should this, as I think highly probable, be found advantageous for summer tillage. The plough will long, I think, be found best for turning over the soils.

"I now beg leave to point out a few of the leading advantages of the Fiskens' patent mode of tillage:—

"1st. The power required to overcome the resistance due to the driving cordage is extremely minute; I have seen a man set above a thousand yards in addition to the engine a-going with one hand, and with more apparent ease than he could move the engine in any other way. This Mr. Fowler admits 'is very slight indeed.'

"2nd. The weight of the travelling windlass and ploughs combined, capable of turning two furrows at once, ten inches deep, does not exceed sixteen cwt. Have Messrs. Fowler or Williams succeeded in making one to carry the ploughs with less weight?

"3rd. The complete control the attendant has over the windlass, so as instantly to stop or reverse its motion. This is of immense value in the case of roots of trees, stones, as well as at the headlands, or in hilly ground, where the plough may be out of sight of the engine-man, thus avoiding any possibility of its being hauled to the sheaves at the headlands; as it might be where the motor is a distant power and under distant control.

"4th. The small liability to wear and tear of the wire rope. It being subject to no action but that of winding and unwinding from the drums, not even having to bear the strain of dragging itself about, it may be made so much lighter.

"5th. The facility of applying any rotary action or mode of operating that may be found advisable. Suppose, even for removing or raising large stones or tree roots, the whole power of the engine may be devoted to that purpose.

"6th. The simple, yet perfect mode of anchorage, enabling the attendant to apply the power of the engine to shift the anchor when not required for the tillage implement, at the same time giving a powerful windlass, available for placing any other implement, such as a drag or scarifier, behind the travelling windlass, thus obviating the necessity for horse or manual labour for that purpose.

"7th. The effective steering apparatus for placing the ploughs in position for new furrows, or turning the travelling windlass in front of any other implement.

"In conclusion, I am sorry my experiments have been so limited, from being entirely dependent upon others for motive power. In a few days I shall have an engine completed, when I shall make a series of experiments with the dynamometer and pressure gauge. If it is thought worth while, I shall be most happy to answer any queries on the subject you may think desirable. I may just state, in the mean time, that with an inferior four-horse engine and two men we have ploughed to an average depth of eight inches at the rate of six acres in ten hours; this is, I think, fully equal to the work of twelve horses and six men, for an actual cost of from 15s. to 20s. per day."

Mr. J. R. WILLIAMS says: "Having about four years ago purchased a portable steam-engine, threshing-machine, mill, and other machinery, it was not long before I was struck with the thought that it would

be perfectly practicable to cultivate the soil by steam power, and that it would be done to great advantage, as the great reduction of speed from the engine to the ploughs would give a power for the draught of the latter, the cost of which, as compared with that of horses, would be an immense saving. From that time to the present I have given the subject all the time I could spare from my other occupations, and have at last succeeded in bringing out a machine, simple in its construction, and practicable in its results.

"The first thing that I did was to consider the nature of the work to be performed, and the best and simplest mode of applying the power to execute the same. It was evident, that, taking the soil of the kingdom generally, a very large proportion of it (say three-fourths at least) was more or less undulating, and I was soon perfectly satisfied that this difficulty, together with the loss of power requisite to propel an engine as a locomotive; the adhesion of the soil from her weight, and the further power required for cultivation from this cause, completely settled the question as far as regarded the employment of a locomotive engine for the purpose.

"Considering the subject further, I felt convinced that we ought to make use of the ordinary farm engines, from 4 to 6-horse power, which were coming into such general use, so that when a farmer had got an engine and had not half sufficient work for her, by adding a ploughing machine to his stock of implements he could find full employment for her by cultivating his land. Again, it would be advantageous to those who let out engines and threshing-machines to hire, if a machine could be constructed whereby he could find full employment by taking work by the piece of those farmers who had no engines of their own, at such times when two days' work are wanted to be done in one; and at all times, if it could be done at a price far below what the cost and maintenance of horses will allow their labour to be put at.

"Having condemned, in my own mind, the system of locomotion, I had to consider the best method by traction. Of the power possessed in an ordinary farm engine I had no doubt; but the difficulty seemed to be, the mode of applying the power, so as to draw the cultivating implement as evenly over the soil as a piece of ruled paper. I at last concluded that, as far as possible, the engine and machine should be stationary whilst doing as much of the work at one time as it could; there were two modes of doing this; the one to remain at one corner of the field until it was completed, the other (the one which I have adopted) by fixing the engine to the machine by a pair of shafts, similar to a horse in a waggon, and connecting to both a long table, punctured at every nine inches to admit the pin or shaft of a guide pulley and roller, so that each of the implements serves as a purchase for the strain necessary to propel the cultivators; and by these means I can plough the width of 40 feet without moving, when the engine will propel herself and the machine forward the required distance for continuing the work. In looking at the advantage and disadvantage of both these systems, the former seemed greatly in favour of the continued fixed engine; but considering that the field to be ploughed may be 20, 30, 50, or even more, acres—for, if we bring this system practically to bear, hedges and trees must come down, and pits must be filled in, to make way for us—the additional length of rope which would be required to traverse the headland, before it turned at right angles into its work, and the distance the work would be from the power (a great consideration when limited to a 6-horse engine), I decided in favour of the one to move along the headlands as required, but which was always close to its work. Again, I con-

sidered between the two systems, the friction or loss of power I should sustain by the number of pulleys requisite to work each. In the one I have chosen, I cannot (except when the line of draught is opposite the drum) do with less than two to each rope; one to turn the rope on to the table, the other a shifting guide pulley to direct the rope into the field, and which is simply and easily shifted the number of furrows required, when the ploughs arrive at the end of the field. In the other, that of remaining at one end of the field until it was finished, I found I could, in drawing the implements towards the engine, do with only one pulley, and that one of much larger diameter; but with respect to the back draught, it could not be done without two, if not three; and, taking into consideration the cost of the additional length of rope required, the wear and tear of it, the loss of power to a certain extent, besides its weight to handle and transport, I decided for myself to keep close to the work. The system which I propose to adopt with respect to working a field, those who have seen my drawings for the patent, or the working model which I exhibited at the Farmers' Club House, in December last, will be fully acquainted with. To those who have not seen either, suffice it to say, that when drawing a cultivator, or any implement other than the plough, I propose to pull both ways, to and from the engine; to accomplish this, it is necessary to have some purchase on the opposite side; for which I have constructed a carriage on wheels, with one large pulley wheel fixed, and a moveable guide pulley, as at the engine; the frame is likewise punctured at every nine inches for the same purpose; a bell and signal, similar to a railway one, is attached to this frame, and travels with it. This is its use—I was for a long time puzzled to know how the engineer was to ascertain when to shut off the steam on the arrival of the ploughs, &c., at the opposite end of the field, more especially if, from the undulating position of the land, the said headland should be out of sight. At last I thought of a bell and signal, which acts as follows:—On the conductor getting near the platform, he leaves his charge, and rings the bell which is to call the attention of the engineer to the signal; the engineer then lays hold of the handle of the throttle valve, and looks to the signal, which is turned off from him, and as soon as the conductor gets his ploughs, &c., sufficiently close, he turns the signal, and the engineer shuts off the steam. I find that even at present, without much practice, I can stop within a yard of the place required.

“This system I shall invariably adopt when using a scarifier, or cultivator, of any description; but with the ploughs there is a difference, and until a perfect one-way plough can be obtained, there must always be a hindrance at each lands-end of shifting the plough from the right-hand side of the land to the left, and the next trial which I intend having will be on a totally different plan, but before I describe it, it will be necessary for me to digress from this hauling subject, and consider another connected with it, but still of a different nature.

“Amongst the thousand questions I have had put to me with respect to ploughing by steam, one was, ‘What will you do when you come against a great stone?’ My answer at first was, ‘I must do as I can; either the stone must give way to the plough, or the plough must give way to the stone;’ but it made me think whether an implement could not be constructed which would adapt itself to this difficulty, and I set about my object with the aid of the village carpenter and blacksmith. I took an old drill which I had, crooked the axle, and formed it into a square head. I then formed a rectangular frame, sufficiently long to carry three ploughs. I felt that to make them independent of each other it would be necessary that they should slip up and down

vertical standards, and likewise they should move in a lever the same as a drill, that they might act for themselves when coming in contact with a stone. It struck me likewise that the machine must be self-acting, that it must *hold its own ploughs*. This I accomplished by placing vertical standards in the rear, which, working in a slot at the end of the beam, gives the ploughs a perfect independent vertical action, without allowing them to move to the right or the left. Suffice it to say, that after I had completed my implement, I found I had discovered a *perfectly new principle*—that amongst all our farm implements there was none of a *combined nature* that I had ever seen or heard of, *which was perfectly independent of the frame, or each other*, but were all more or less connected by a horizontal bar, and thus preventing their freedom. Those who saw the two implements which I exhibited at the Smithfield Show in December last, viz., the three-furrow plough and the cultivator, will probably remember the principle on which they were constructed; and I am pleased to remark, that on trying the same three-furrow plough subsequent to the Show, in a field with two single ploughs, three horses in each of the single ones, and five only in the three-furrow one, and testing them with the dynamometer, that the draught on the three was considerably lighter, being upwards of 1 cwt., than three of the single ones, at the rate the two were drawing, and had there been six horses attached to the machine, they would not have drawn harder than the six drawing the two ploughs.

“Such are the implements with which I intend making my next trial, and I have four of them now nearly ready. I am going into the field without the back-hauling platform, with the engine and machine only. I shall have four three-furrow ploughs, and draw two at a time, with the assistance of two horses if required; so that, by employing four horses, two to each set of ploughs, I shall always have two plough frames, with the spare rope at the far end in readiness, that by throwing the drum just wound up out of gear, and the other in, to go on again without any loss of time or steam.

“At the time the engine begins drawing the plough at the far ends, the two horses next the machine are going back empty with the two ploughs which came up last, and drawing the next or its own rope out with it to be in readiness for the engine when the other traverse is completed. Thus I see no reason why any loss of time should occur, except whilst turning at the end, and shifting the pulley (which is instantly done) to draw up the second plough frame, and to take out the rope for the next pull. Under this plan it might be said that it is not altogether steam ploughing; but that does not matter, as at present we have the horses, and the two working with the engine need not draw if not required; but where the power is limited, as I propose, for the sake of expense and weight, it is of consequence to employ all that power in the hauling alone; and it may be satisfactory to those farmers who still wish to stick by their horses, to see them still at work, and their own steam-engine (to use a common term in these parts) *pulling tag*. There will be another advantage in using horses: the sudden strains on the rope, when the power of the engine is exerted on the cultivators, can be taken off by the horses being made to exert themselves at the time the rope begins to strain tight; and again, they are ready without hindrance to turn the ploughs and take them back. With respect to the number of hands required in the field, as the ploughs require no holding, one man with each is sufficient. Whether they can drive the horses at the same time remains to be seen, and proved by practice; but I feel

confident that it will, ere long, be completed as a system with despatch and economy."

Mr. MECCHI said he had received a note from Mr. Usher, regretting his inability to attend, and stating that he was still continuing his experiments with the steam plough, and which were certainly not unsuccessful. The conclusion which he (Mr. Mechi) had come to was, that the moving of a heavy body over the land was a very desirable thing, but was not very likely to be accomplished by the method he had, in conjunction with Mr. Romaine, tried. However, they ought not to despair, for the horse was about the worse machine they could use in respect of cost. A horse weighed about 15 cwt., and 13 cwt. out of that had to be employed in propelling himself, 2 cwt. only, therefore, was profitably employed by the farmer, as shown by the dynamometer attached to the plough. He considered that some encouragement ought to be given to the inventors of steam cultivators, because from what he had seen he believed that however much agricultural locomotives were found fault with, they would not in the end be the cause of so much disappointment as was supposed by some persons. They were all perfectly agreed that a great deal of money might be advantageously spent for so desirable an end as cultivation by steam, especially when they considered that every horse consumed as much as eight human beings. If there were only a million of horses employed in agriculture, they consumed the food of eight millions of people. He ought to say that Mr. Atkins (the contributor of several drawings illustrative of the subject under discussion displayed in the room), in whom he had great faith as a mechanic of a superior order, exhibited the same drawing at his (Mr. Mechi's) annual gathering two years ago, though not under such favourable circumstances as the present. He quite agreed that if they could have steam applied to field cultivation, they must work at very high pressure. Allusion had been made to Mr. Collinson Hall; that gentleman knew a great deal about steam power, and was now working at the high pressure of 200 lbs. to the inch, and that favourably. He hoped we should not much longer see that extraordinary anomaly, that while locomotive engines are conveying us at express speed to all parts, at a pressure of 90 lbs. to 140 lbs. to the inch, the Royal Agricultural Society should tie down steam engines to a pressure of 45 lbs. to the inch. With regard to the form of the cultivator, the plough was not the best tool that could be employed for steam engines. In using Mr. Garrett's horse-hoe—ten or a dozen steel table knives with the handles bent up—a pair of horses could positively cut seven feet of ground to a considerable depth; whereas, with a plough, they could not plough more than nine inches. Mr. Romaine still continued his trials with his engine, and had got another patent. Notwithstanding the great difficulty in getting money advanced for experimental purposes, he hoped there would always be experimentalists, and that the benefits of those experiments would yet be fully experienced. The Society of Arts was doing an immense amount of good by raising the question then under discussion. The papers which had been read had suggested several new ideas and in this great country, where everything was done by steam, he hoped they would soon see it brought to bear for the production of cheaper and more abundant food for the people.

Mr. SMITH (who exhibited a model of a new plough for steam cultivation, just invented and patented by himself,) said, the model he produced was that of an implement with which he had been making experiments for the last month. He had worked it with a seven-horse power engine, constructed by Messrs. Ransome, and a

windlass constructed by the same firm under the direction of Mr. Fowler. The engine was stationary. By planting the engine in the centre of a 40-acre field, he found that by running out sufficient rope to do one part of that, he required 15 lbs. of steam from the engine to put the rope in motion, without moving the instrument. The power was conveyed from the engine by an endless rope by means of a windlass, to which, by two pulleys, a backward and forward motion could be given. The rope was supported from the ground on rollers, and when drawing the plough was quite above the ground. The engine, when working at 45 lbs. pressure, indicated seven-horse power. Working at a pressure of 35 lbs., it would cut a piece of ground 30 inches wide and 7 inches deep. He did 23 acres with that implement during the last month, and found that he could do 10 acres to the right and 10 to the left with only one shift of the tackle; and 40 acres could be done with only one move of the engine. The plough could be varied; they could go any depth upon that principle; it being only a question of a little coal and a little higher pressure—they had no extra labour. He could do an acre in about  $2\frac{1}{2}$  hours. The rope travelled at the rate of about  $1\frac{1}{2}$  or 2 miles an hour. The cost per acre, allowing for wear and tear, was 8s. 4d. Four acres could be done within ten hours, at an actual cost of about 25s.; but if he allowed one-fourth for wear and tear, the cost per acre would be 8s. 4d., as previously stated. That was the result of the experiments he had made with his instrument; and it remained only for him to add, that a man could manage it without his (Mr. Smith's) assistance after the first two days, as well as he could manage a team of horses. The time lost in turning the plough was thirty seconds—sometimes, indeed, only fifteen seconds.

Mr. ATKINS begged to thank the Society for the kind invitation to be present at that important meeting. Having devoted many years to the subject, and been at considerable expense in developing a plan, he thought he should be seriously neglecting his duty were he to fail in giving the public the little knowledge he had acquired in that direction. In 1843, he entered upon this investigation, with the determination, if possible, to solve the problem of steam cultivation. After more than two years' efforts, he succeeded in bringing out a model, worked under a patent taken by J. A. Atzlar, of America, which consisted of a process of transmitting power with ropes. The apparatus being complete, he took it to Shrewsbury, in 1845; and, being too late to get it introduced into the Royal Agricultural Society's show-yard, he took Mr. King's auction-room, and well posted the town and district, inviting the public to attend a lecture, and examine the model. He must confess he was somewhat astonished in the evening, as he had only two Russian gentlemen to attend the lecture. However, having already commenced the construction of a full-sized machine, he had the same completed forthwith. He put it in practical operation at Blackthorn, near Bicester, in Oxfordshire. The principle of transmitting power being established, it only became a question of time when the application of steam to cultivation should be worked out into practical reality; and having watched its progress to the present day, he must confess he saw no difficulty in its immediate introduction to the public. The diagrams on the wall illustrated his ideas in the simplest form. They would perceive that the arrangement was carried on by an endless rope; and the rope-carriers enabled the ropes to adjust themselves, on level or hilly land, by the balance-weight in the centre. The engine and the rope-carriers might be moved on their own wheels by a temporary wooden railway. The space between the carriers and the engine might vary from 50 to 1,500 yards, thus enabling the

machine or rotary cultivator to work up and down the land without any obstruction. He believed, on examination, this arrangement would be found of a most simple and inexpensive character; and as 1,000 yards of land might be cultivated with 10 cwt. of rope, with a 20 or 25-horse-power engine, he could not understand why a subject so simple might not be put into practical operation. He had devoted more than £1,000, and from two to three years' labour, to bring out the idea; and he thought it was to be seriously regretted that the engineers of this country had not paid more attention to this important subject. He would be glad to co-operate with any party who might feel desirous to make a bold effort to solve the problem. He felt certain that, should a committee be formed, and an appeal made to the British public, it would be attended with every success. For his own part, he would be quite happy to co-operate with such a committee, and endeavour to bring this subject to a practical realization. If a subscription should be opened, he would be glad to contribute his quota, as he was only waiting for some effective steps to be taken.

Mr. J. M. BLASHFIELD remarked, that the letter written by Mr. Adams, which had been read by the Secretary, referred to some of the main points of difficulty to be overcome in the first stage of proceedings to plough by steam. One of these difficulties was to provide a shoe, or rail, upon which the engine should traverse, so as to prevent the wheels of the locomotive from sinking into the soil. At present, all the steam-engines used for agricultural purposes, and engines of the same class used for railway making and dock works, are constantly sticking fast from the sinking into the soil of the wheels which carry them. The ploughing engine should be a perfect locomotive, and move itself as well as plough the soil. To do this effectually, a rail and sleeper should be brought beneath the wheel of the engine—that is, the engine should lay down, for itself to run upon, a sleeper and rail, and at the same time take it up as it performed its duty. This might be effected by an endless chain of sleeper and rail constructed from the axes of the driving wheels of the locomotive, or working by a ratchet or other contrivance attached at right angles to the inner side of the periphery of the driving wheel of the engine. Such a mechanical arrangement of sleeper and rail might possibly be devised as to work obliquely by an oblate movement rotating on friction balls or rollers. He (Mr. Blashfield) remembered having seen, somewhere in the North of England, a truck, of the sack-barrow character, having a shoe like the folds of revolving shutters for the wheels to run upon on loose ground. These folds of iron revolved with the wheel, and were attached to the axis of the wheel. Locomotive engines of a portable character had been long used for railway, dock, and canal making, but were, for the duty they had to perform, stationary; the defect of proper means to move them from one spot to another had always been felt by contractors, as the wheels readily buried themselves in loose soil. He (Mr. Blashfield) had witnessed the experiment with the American machine for excavating ground, which had been tried on the Great Northern Railway, and the difficulty of bringing it to its point of attack or place of work, and the joy and exultation expressed by the navigators upon this difficulty. He was convinced that no operation of steam ploughing would be perfect until the engine should make its own roadway, as well as perform its agricultural labour. The same machine that did this would be of great value in forming railway levels, docks, canals, &c.

Mr. T. SCOTT said, it appeared remarkable to him, and was creditable to the disinterestedness of Mr. Fow-

ler, that he had touched so slightly on the merits of his own invention, although there was little doubt but that it was the wonder of the day, and would in after years be considered *the* invention of the age in connection with agriculture. It appeared to him unquestionably to have given us the basis of steam cultivation, for it had settled the principle and cost of an adequate motive power, that being a stationary portable engine, a few simply arranged and easily adjusted blocks, a windlass, and a wire rope. A ten-horse-power engine under this arrangement could give a slow motion to a machine—for instance, Mr. Fowler's draining plough—requiring one hundred horse-power to move it. Now, suppose the speed of the engine was doubled—say to a good ploughing pace of two miles an hour—and the power thus reduced one-half, or to that of fifty horses, and that we took Mr. Fowler's estimate of the loss of power by friction and in drawing the rope; here we had a clear forty-eight horse-power remaining to draw say twenty common ploughs, or a relative number of other implements. It would thus be seen what an invaluable power this gave us for deep cultivation. Here, then, we simply wanted mechanical adaptation to a special farm or district. But then came the question, who was going to pursue this slow and expensive process of mechanical adaptation further? Mr. Atkins, who had made the nearest approach to realisation, said, he would go no deeper in the mire, having "spent his last penny." Mr. Fowler, too, said he had made up his mind how much further he would go, which need not create much uneasiness in the agricultural mind, as he was now within sight of the winning goal, having realized an article the value of which, as a commercial speculation, would now induce others to join him. But what was the case with every other inventor? Their ideas were probably matured, but their mechanical embodiment was in embryo, and their means were gone. If Mr. Atkins was an index to this class of inventors, the dividend-seeking public would not join in bringing out their machines. Would it not, therefore, be politic that we should have a national experimental farm, under two or three highly competent commissioners, to put all such inventions to the test, and report upon them? Such an institution was suggested to the Highland Society of Scotland twenty years ago, by a practical farmer, and not unfavourably received. As he saw Mr. Fisher Hobbs present, he would ask him, as one of the Council of the Royal Agricultural Society of England, if he thought such an institution would trench on the domain of that Society? He should not discuss the relative merits of digging and ploughing; suffice it to say that there was no necessity for an engine employing the greater part of its power in carrying its own weight over the field; nor was there any chance of its being able to do so at a profit. He had seen Mr. Jasper Rogers' celebrated locomotives for common roads stopped by a little fresh macadamising. Mr. Mechi had stated in detail how a horse's muscular power was expended, and how little was left for labour after what was expended in dragging his own body about. Wire rope, as Mr. Fowler had shown, had lessened the necessity for travelling engines, and Mr. Fowler had satisfied him (Mr. Scott) by carefully recorded experiments with his machinery, that motive power could be obtained by it at an average cost of one-half that of horses. This pecuniary consideration was much more likely to induce the adoption of steam cultivation than the economic crotchet that it would save the food consumed by the million of horses now employed in agriculture, for the use of the people. The present cost of horse-flesh, as well as all kinds of provender, would no doubt excite increased attention to the subject discussed here tonight. As a practical agriculturist, he (Mr. Scott) thought its necessity was becoming as evident as its ap-

plication to well arranged farms was feasible; and, although there appeared no immediate prospect of its realisation and general adoption, he could not help saying, as Mr. Mechi had done on another occasion, that "his hope was in the future."

Mr. JOHN BETHELL could not allow the evening to close without saying a few words, as his name had been mentioned in the course of the discussion as one of the inventors who had spent his money for the benefit of the human race without deriving any himself. He represented the class of inventors who seemed to have found little favour that evening. His invention was one for cultivating the land with a steam-engine which was locomotive. The digging apparatus was attached to the engine itself, and the engine was fit to be used for all the other purposes of a farm when not required for digging. At first he thought it was a very simple thing, but on bringing his machine into the field he found numerous difficulties. He had been working it for three years with various alterations, and had spent a great deal of money upon it, but he had at last succeeded, and had just ordered drawings to be made for the construction of a new engine, as the field was still unoccupied; for they must admit they had seen nothing that evening which could be represented as a perfect steam digging or cultivating tool. He was unable to lay before the meeting all the details of his plan. He could only simply state that in principle it was the same as was described in his patent of December, 1852—a rotatory digger. It dug like Parkes' steam forks, and left the ground in a perfect state of tilth after the operation; it threw the earth up into the air, the earth falling first, because the heaviest, and the weeds coming upon the surface. They had no difficulty in working about four or five acres a day with that machine. It dug down to the depth of nine inches, and farmers who had seen it working had stated that it did as much in one operation as would require two or three ploughings to perform, besides scarifying, harrowing, &c. The estimated cost of its working was about 9s. an acre, whereas 23s. was stated to be the cost under the ordinary mode. The experimental engine was worked at a pressure of 45 lbs., but the one he was about to construct would work as high as 100 lbs. to the inch.

Mr. FISHER HOBBS had not intended to make any remarks that evening, but as his name had been mentioned in connexion with the Royal Agricultural Society, he felt it his duty to state that the Society had, for a long time, had under its consideration how the question of steam cultivation could be best promoted. He was happy to say, that a short time since arrangements had been made by the Society to offer a premium of £500 for the best steam cultivator, which would turn up the soil, and become a substitute for the plough and the spade. Knowing as they did that horse power cost them in ploughing £1 per acre, it was clear that if it could be done for less, a very considerable saving would be effected to the country. When they looked at the small amount of the income of the Royal Agricultural Society, not exceeding £5,000 a year, they would at once see the importance they attached to this subject when they set aside one-tenth of their income to promote it. He thought that even if the Government or Parliament would not take up the subject, the public might subscribe such a sum as would assist agricultural engineers and others in making experiments to bring steam cultivation to perfection. He had only made these remarks believing it to be his duty to inform them that in such a movement the Royal Agricultural Society was ready to do its part.

The CHAIRMAN said it was evident, from the information thrown before them that evening, that for a very long period much attention had been given to this important question, and that something like sixty patents had been taken out in connection with it. It was also very certain—and quite within the pocketable experience of several individuals in that room—that the experiments they had individually made had been attended with a fearful expenditure of money; and for all that expenditure of time, of talent, and of money, it was well to consider to what they had already attained. It was still a question upon which of the various systems there appeared to be most hope of ultimate success, and there appeared to be a fair chance that each might be fairly tried out. Some advocated the original idea of the locomotive travelling over the land and dragging after it the implements in present use modified to the novel purpose; of that class Boydell's steam-horse was an instance. Some contended for a locomotive which should, as a part of the same machine, convey rotary motion to a new class of implements, by which the soil should be broken up and pulverized; of that class were Usher's and Bethell's. A third party was endeavouring to effect the object by fixed engines, or by portable engines to be fixed in one spot of the field, from which motion should be communicated to rotary machines or cultivators—as exemplified in the system of Mr. Atkins. And a fourth was sanguine as to the results to be obtained from using the general agricultural steam-engine, to be fixed in a given spot, by means of a system of ropes working round pulleys, by the intervention of a windlass, to draw the ordinary implements, or any suitable modification of them, in straight lines across the field; of that class the experiments of Mr. Fowler and Mr. Smith gave the most evidence of practical success. He (the chairman) did not pretend to give a decided opinion as to which of these systems might ultimately prove the best, but he was strongly inclined to believe that following out the principle of the use of the present agricultural engine, and the system of ropes and windlass, would lead with the least cost to the earliest development of a practical result. He believed it possible that at some future time the more elaborate plans might be developed to a still more perfect result; but that was not to be obtained until after a long and expensive series of experiments: while the simpler plan would, he believed, show its practical results at a very much earlier period; and the experiments might be conducted by a number of persons who, having steam-engines, and requiring no great outlay for new implements, might, without any ruinous outlay, attain a practical and beneficial result; and when once such result should be attained and made public—that by any method steam-cultivation might be so conducted as to effect a saving over the use of horses, even if such *method* should not be so perfect as others which might ultimately be developed, great encouragement would be given to stimulate further improvement. He agreed with Mr. Atkins that there existed no difficulty in a mechanical point of view. He did not believe in any engineering difficulty, except the lack of funds; and that was the great difficulty in the present case. The cost of bringing new inventions to bear was at any time great, but especially great when the introduction of the invention involved, as did that, the accompanying introduction of a new system. It was too costly an experiment; and the beneficial return for that certain cost was too uncertain and too remote for unassisted private enterprise. The remarks they had heard that evening, from those who had made considerable advance, went to prove that the time sooner or later was sure to arrive when hope of profit faded, and patriotism was not strong enough (unless, like some of his friends on his left, they had the heart of a lion, and a pocket deep as a well), to induce

the further prosecution, always so costly, and sometimes so ruinous. There was no doubt but that steam cultivation might be brought to bear, but it could only be developed by large and costly experiments, and these could only be successfully carried out by some general fund, as they could not be accomplished by individuals excepting at a severe loss, and, in many cases, ultimate ruin. He had now only to move a vote of thanks to Mr. Fowler, not only for his valuable and interesting paper, but for his enterprise, assiduity, and long devotion to the subject. It had only been by the most unwearied exertion, zeal, and talent that he had been enabled to bring his valuable invention to bear. He hoped and trusted he would receive that reward in full which he so well deserved, and which had hitherto been denied to others; and that having proved the advantage of his machine on one branch of the subject—that of draining—he might go still further, and perhaps be the first to prove that the extension of steam to general tillage was less remote than had been generally supposed.

Mr. FOWLER thanked the company for the compliment. There was one part of the subject which had been but briefly alluded to—the conveyance of engines

from one part of a farm to another. Mr. Boydell had invented a means of readily doing so, upon which further experiments ought to be tried. Mr. Fisher Hobbs had alluded to a public fund for the purpose of making a series of experiments, with the view of ascertaining the best means of applying steam to the cultivation of the soil. He would ask that gentleman whether the Royal Agricultural Society would take the initiative in raising it. If they would only hold up their little finger for the purpose, he felt assured they would have no difficulty in raising £15,000 or £20,000. They had only to use their influence, and he was certain the public would readily respond to the call.

Mr. HOBBS could only say that he would be happy to bring the subject before the Council of the Royal Agricultural Society. He considered that that Society had never been supported as it ought to be, and that it only required the means to enable it to make most important experiments for the good of the country. He felt with Mr. Fowler that they ought to have an income of £15,000 or £20,000; and if so, they could enter upon inquiries which would much benefit the agriculturist and the country.

## FORM OF FARMING AGREEMENT.

(ORIGINALLY RECOMMENDED BY MR. HUMBERSTON, NOW REVISED AND ADOPTED BY THE CHESHIRE AGRICULTURAL SOCIETY.)

Terms and Conditions for Letting and Occupying a Farm and Lands, situate at \_\_\_\_\_, in the County of Chester, comprising \_\_\_\_\_ statute acres, and delineated in the map drawn at the foot of this agreement.

CLAUSE 1.—The tenancy to be from year to year, commencing as to all the lands and the garden (except a boozey pasture, to be appointed by the landlord) from the 2nd day of February, 185\_\_\_\_, and as to the house, out-buildings, and boozey pasture, from the 1st day of May, 185\_\_\_\_, to be terminated by either party giving the usual six months' notice to quit, on or before the 2nd day of August in the first or any subsequent year.

2.—The rent to be £\_\_\_\_\_ a year, payable by equal half-yearly payments, on the 29th day of September and the 25th day of March in each year. The tenant, after any second day of August, if required by the landlord or his agent, to pay all rent that shall be coming due the 29th day of September, and the 25th day of March then next ensuing, or give satisfactory security for the same, and on non-payment thereof, or failing to give such security, the landlord to have power to distrain for the same, as if it had been then due and in arrear. And before entering the premises to pay the off-going tenant for any manure over \_\_\_\_\_ tons; also for all compensation claimed by the off-going tenant under Nos. 1, 2, 3, 4, 5, and 12 of the schedule. And the additional rent of £\_\_\_\_\_ per cent. on the outlay in bone expended upon any land which may be boned at the expense of the landlord. Also £10 a year to be paid for every statute acre of land ploughed, broken up, or cultivated, contrary to the conditions hereinafter contained, £10 for every load of manure which shall be sold or carried away from the premises; such additional rent to be payable half-yearly, on the days and in the manner hereinbefore appointed for payment of the said reserved rent of £\_\_\_\_\_, the first payment thereof being made on the first of such days which shall happen next after such boning shall have been done, or such additional rents for improper cultivation have been in-

curred, to be recoverable as rent in arrear, or in an action at law as liquidated damages. In addition to the rent the tenant is also to pay the land tax, and all rates, taxes, chief rents, and other out-goings (except the landlord's property tax), tithe rent charge, which may become due or payable in respect of the premises or the occupation thereof during the tenancy.

3.—The tenant is not to assign, under-let, or otherwise part with the possession of the premises, or any part thereof during the tenancy, without the consent of the landlord first for that purpose obtained in writing.

4.—The tenant is not to plough or have in tillage any of the lands, excepting the lands numbered \_\_\_\_\_ on plan, and coloured brown on the same plan, or to mow any of the land numbered \_\_\_\_\_, or any lands which may hereafter be boned by the landlord (without the consent of the landlord or his agent in writing for that purpose first obtained), not to have more than \_\_\_\_\_ acres in tillage in any one year, including fallows.

5.—The landlord shall forthwith put the farm-house, buildings, and premises into repair, according to the specification of \_\_\_\_\_, and this being done, the tenant is, at his own cost, thereafter to keep and leave the farm, buildings, and premises with their respective fixtures and appurtenances, and all the gates, gate posts, stiles, rails, platts, and fences in and upon the same in good tenantable repair and condition. The landlord is to find all necessary materials for such repairs, and the tenant is to cart the same to the premises.

6.—The tenant is to cultivate and manage the land in a good husbandlike manner, keeping the same in good heart and condition, in a perfectly clean state, and under a proper and systematic course of cultivation.

7.—The tenant is not (except on the breaking up of fresh turf) to take or have two white straw crops in succession on the land, without the consent of the landlord or his agent in writing first obtained. And is not to sell or carry away from

the premises any manure made thereon, but is to use the same upon the premises in a husbandlike manner, and shall, on quitting the farm, leave tons of rotten manure properly thrown together in a heap for the use of his successor, without receiving any allowance or compensation for the same but shall be paid for any quantity of manure there may be left beyond tons, and shall pay the landlord or in-coming tenant for any quantity less than the amount stipulated for to be left on the premises as before mentioned (regard being had to the quality of the manure in each case), the sum to be paid in case of difference to be ascertained by arbitration; but it shall be lawful for the tenant from time to time to sell hay, roots, or straw, from the premises, on bringing back such quantity of good stable manure, or on expending on the grass land such quantity of bone manure in lieu thereof, as may cost not less than half the amount realized by the sale of such hay, straw, or roots, and a correct account of such sales and purchases, together with proper vouchers, shall be by the tenant presented half-yearly to the landlord or his agent, and the off-going tenant shall be at liberty (provided he and the on-coming tenant cannot agree as to price) to sell the off-going share of wheat with the straw, together with any hay, straw, and fodder which may be unconsumed at the expiration of the tenancy, and one-third of the amount to be received for such hay, straw, and fodder shall be paid to the landlord, to be applied in permanent improvement of the land, in lieu of the manure that would have been made from such hay, straw, and fodder, being left on the premises.

8.—The tenant is to keep all the ditches well cleansed and of proper depth, and the under-drains clear and free from obstruction, and at the most seasonable time once in every year at the least effectually to cleanse all brooks and watercourses upon the farm, and keep the same at all times free and open.

9.—In case the tenant shall make any of the permanent improvements upon the premises, which are enumerated in the schedule hereunto written, fulfilling the conditions annexed thereto and set out on the second column of the schedule, he shall on leaving, be compensated for the amount of permanent improvement then remaining to the estate, to the extent in each case stated and specified in the third column of the schedule. The compensations specified in the third column of the said schedule shall be made and paid only in case the tenant shall have substantially complied with the terms of this agreement, and on the express condition that the tenant delivers previous notice, in writing, to the landlord or his agent, of his wish to make such improvements respectively as are numbered in the schedule 2, 6, 7, 8, 9, 10, 11; that the tenant receive the written authority of such landlord or his agent before such improvements respectively be made, and after any or every improvement mentioned in the said schedule is made, the tenant shall, within three calendar months at furthest from the completion of the work, present his account, in writing, of the costs of such improvements, with envoices of the amounts expended under numbers 1, 2, 3, 4, to be investigated by the landlord or his agent, and approved of by them.

10.—All timber, stone, and mineral, is reserved out of this letting to the landlord, with liberty to fall, get, and carry away the same, making reasonable compensation for any damage done thereby. Also all game, fish, or wildfowl, with full and free liberty to sport upon the premises at pleasure.

11.—That upon any change of tenancy, the in-coming tenant shall be at liberty to enter upon any part of the stubble land for the purpose of ploughing the same, at any time after the first day of November, and shall, after that time, be accommodated with stable-room for a pair of horses on the premises, free of charge, finding his own provender,

12.—Any alteration of rent or variation of terms that may be made, is not to affect these terms and conditions beyond the extent to which they may be altered and varied.

THE SCHEDULE ABOVE REFERRED TO.

DESCRIPTION OF IMPROVEMENT.	CONDITIONS ANNEXED.	RATE OF COMPENSATION TO BE ALLOWED ON QUITTING.
1.—Fine ground bone & half-inch bones	On drained or naturally dry tillage land	Two-thirds of the cost of what has been used in the last year of tenancy, and one-third of that used in the year preceding.
2.— Bone dust and half inch bones	On dry or well drained pasture or meadow land the same not being afterwards mown	Seven-eighths of the cost of that used in the last year of tenancy, and diminishing one-eighth every previous year subsequent to the application.
3.— Dissolved bones or guano	On dry or well drained land	One-fourth of the cost of that used in the last year of tenancy, for turnips and rape.
4.—Lime .....	On dry or well drained land	One-half of the cost of that used in the last year of tenancy.
5.— Draining—landlord finding tiles	Provided the drains are not less than three feet deep at regular distances, and cut under the superintendence of the landlord or his agents, and are in perfect order at the expiration of tenancy	Six-sevenths of the expense of cutting, laying, and filling in the drains made during the last year of tenancy, and diminishing one-seventh for every crop grown on the land since it was drained.
6.— Draining—tenant finding tiles	Same proviso as above	Thirteen-fourteenths of the cost of those made in the last year of the tenancy, and decreasing one-fourteenth for every crop grown since it was drained.
7.—New buildings or walls — landlord finding materials	Provided the same are done under the direction and approved of by the landlord or his agent, according to plan and specification previously agreed upon	Nine-tenths of the cost of those erected in the last year of the tenancy, and decreasing one-tenth for each year's occupation after erection.
8.— Ponds and roads	Same proviso as above	Nine-tenths of the cost of those roads made, or ponds filled up in the last year of the tenancy, and decreasing one-tenth for each year's occupation after completion.
9.—New walls or buildings — tenant finding all materials	Same proviso as above — keeping and delivering up in good repair	Nineteen-twentieths of the cost of those made in the last year of tenancy, and decreasing one-twentieth for each year's occupation after erection.
10.— New fences of hawthorn, landlord finding posts and rails	Provided they have been properly protected and cleaned	Nine-tenths of the cost of those made in the last year of tenancy, and decreasing one-tenth for each year's occupation after completion.
11.— Clover and grass seeds	Provided proper seeds have been sown, in a husbandlike and proper manner, and have not been depastured or trod by stock	The invoice cost of seeds sown in the last year of the tenancy, and 2s. per acre for labour of sowing.

I, \_\_\_\_\_ landlord, do hereby agree to let, and I \_\_\_\_\_ tenant, do hereby agree to take and occupy the aforesaid farm and lauds, at the rent and on the terms and conditions hereinbefore expressed. Witness the hands of the parties this \_\_\_\_\_ day of \_\_\_\_\_ 185 .

## THE LONDON, OR CENTRAL FARMERS' CLUB.

## AGRICULTURAL STATISTICS.

The first monthly meeting of the year was held on Monday, February 4th, Mr. J. Wood, of Ockley, Sussex, as Chairman for the year, presiding. Mr. Williams, of Bayden, Wilts, opened the subject appointed for discussion, which was stated in the following terms:—"Agricultural Statistics, combined with a Practical and Equitable System of taking the Annual Average Price of Corn."

After a few introductory remarks from the Chairman,

Mr. WILLIAMS said: The circumstance of the Committee of the House of Lords having recommended in their report "that it is desirable that the Government should introduce a bill into Parliament as early as possible" on the subject of agricultural statistics; and "that it is expedient that power should be given therein, to compel the occupiers of land to make the necessary returns, in case of their neglect or refusal to do so," it behoves the agricultural interest, through the medium of the Central Farmers' Club, at the earliest opportunity (ere the bill recommended by the Committee of the House of Peers is introduced into Parliament), to assemble and discuss the question, with the view of ascertaining whether a more practicable and less humiliating plan cannot be suggested than that of being compelled to make publicly known to the fullest extent their own private affairs. I think, sir, your committee have acted wisely in choosing this subject to take precedence of all the others selected for this year's discussion; and I feel convinced, from the number of practical men I see around me, that this evening's discussion may possibly throw some new light on the matter, and induce those in authority to abstain from making a law, un-English in its character, and degrading in its effect. With respect to the *principle* of agricultural statistics, I am decidedly of opinion that no nation ought to continue in ignorance of its capabilities for producing the first necessities of life, viz., the cereal crops, and more especially the wheat crop. Our own country in particular, with its increasing population, may well be desirous to obtain all the information possible respecting it. At the same time, it will be well to bear in mind, that to carry out the system to its full extent, as recommended by the Committee of the House of Lords, would require such an exposure of the farmer's business and private affairs as I am satisfied no other class of the community would submit to; some of the witnesses examined before that committee having gone the length of recommending that our fields should be mapped and numbered, and the crops thereon, with the measure, annually returned to Government, whether we would or not. The subject which I have proposed for discussion this evening is of a twofold character, viz., "Agricultural Statistics," and the obtaining a proper system of taking the corn averages; and to which must be added, to complete the latter, an uniform system of measure for the sale of corn throughout the kingdom. I will commence my observations by showing, first, what appears to me an anomaly of the present system in each of these cases; next, where they act, or are likely to act, injuriously to the farmer's interest; and then propose a scheme which I think would act fairly and beneficially to the farmers and the country at large. As regards "Agricultural Statistics," certainly nothing has yet been proposed (not even the far-famed Scotch system) which is worthy

of the name; for how can any system be considered practicable or satisfactory which has no means *at any one time* of testing the accuracy of that part of it which has been assumed? And no proposition that I have met with, and none of the evidence that I have seen, as taken before the Committee of the House of Lords, at all alludes to any plan that would produce such a desirable and indispensable result. So that, at the end of the year, according to the plans at present proposed, after having the benefit of the acreage of each crop returned (which is the basis of all statistics), and assuming the produce, you would be no more able to assert it AS A FACT than M'Culloch, who, in his estimate of the number of acres of wheat in Scotland, assumed there were 350,000, whereas Mr. Hall Maxwell proves by the returns there were only 168,216. Again, M'Culloch estimated the produce of wheat in Scotland at 9,100,000 bushels, and Mr. Maxwell at only 4,836,210, rather more than one-half, although taken subsequently to M'Culloch, and consequently, I presume, under a better system of cultivation. So much for assumed statistics, uncorroborated by facts. I will now direct your attention to that part of the system of "Agricultural Statistics," which I honestly believe will prove adverse, and positively injurious, to the interest of the occupier of the soil, viz., the estimate of the produce as early as possible after harvest. Suppose that, with an average acreage, those appointed to return the estimated produce should report the crop as above an average, what would be the effect on the market? This coming from authority, the next time the farmer offered his corn for sale, and asked the price he last obtained, the answer would be, "What! with such a crop as you have got! How can you expect it?" It would most assuredly tell on the market, and you must be prepared to take less money, as the effect of this inquiry. On the other hand, if it should be reported that the crop was under an average, or greatly deficient, the early information thus obtained would send orders over the whole world to supply the deficiency, and perhaps inundate our markets with foreign corn, to the injury, if not the ruin, of the producer of half a crop of home grown, and thus turning a national calamity into an individual loss. I may here remark that it is nothing but natural, *on the part of the consumer*, that the Government and country at large should wish for this early information, to guard against the evil of a deficiency; and when one of our legislators, high in office, has asserted that, "*come what may, we will have cheap food for the people*," I am not surprised at it. But that the farmers should in any way be called upon *by compulsion*, or should be persuaded to assist in making such an estimate—and without their assistance it would be good for nothing—under the plea (as is asserted in the report of the Lords' Committee, and confirmed by several, or nearly all, the witnesses examined thereon) "*that it will be beneficial to themselves*," is directly at variance with common sense, and with England's boasted freedom! What, let me ask, can compensate the producer of a deficient crop but a higher price? If a blight comes over our crops just previous to harvest, and the quantity is greatly reduced, and the quality injured thereby, it is a *national scourge* inflicted by the Almighty, and the nation at large should feel its

effect by having to pay a higher price. But the wisdom of the present day is for avoiding the evil and its consequent effect, by procuring the earliest *authentic* information possible; so that, by making up the deficiency, or more, from the world at large, the producer alone would have to sustain the loss, the price being kept down by large importations. I know full well that by making these observations I shall lay myself open to criticism on the score of selfishness; but I will beg the critic to remember that I am one of the producers, not wishing to commit an act of suicide, but only asking for fair play. There is another effect that might be produced by a system of agricultural statistics, respecting which, I confess, I am very jealous, notwithstanding all I have read to the contrary, in the evidence given before the committee. I allude to the immense facility it might hereafter give for laying additional taxation on the occupier. I have too great a cause to remember the effect of an order from Government some few years ago, for valuing all the parishes in England at their *full value!* No sooner was the work completed than out came Sir R. Peel, with his income-tax and the poor-rate book; which was made from that valuation was the basis, if it exceeded the rent, and in most cases where people occupied their own, on which to tax the owner and occupier of the soil. Although these in authority assert in the present case they have no such intention, and I give them credit for it, still they cannot answer *for the acts of their successors*; and after the unscrupulous manner in which the Legislature has dealt out its recent laws towards the farmers, in respect to free competition, it will be some time before I cease to look with an eye of mistrust on any subject so searching in its character as "Agricultural Statistics" in their full extent. I know that this feeling is shared by most of my brother farmers, and is in a great measure the cause why the Government could not get the returns! In my own county (Wilts) they could do nothing. The guardians of the Devizes Union, in their return, entered the following protest:—The committee appointed by the Board of Guardians of the Devizes Union to collect statistical returns of agriculture, regarding the present inquiry as merely preliminary, desire to enter their *protest* against any inquiry respecting agricultural stock and produce, as *unjust and injurious* to the cultivators of the land, unless conducted in such a manner as to prevent the exposure of their private affairs!" This is from my own county. Now for Berkshire. Mr. Piggot says in his evidence, "In some instances where the Board of Guardians undertook the collection of statistics in their Unions, and thereby gave to the measure the whole weight of their example, they could not persuade the occupiers of farms in many instances to make returns. I might instance the district round Wantage, which is one of the best-cultivated districts, and the most important, in an agricultural point of view, in central England; there the failure was greater than in any other part of the county of Berks, from the absolute unwillingness of the occupiers to lend themselves to the measure at all." Of Hampshire, Mr. Hawley in his evidence states, "I found a considerable disinclination on a part of the occupiers of property in the former year to give the returns; but the last year, that disinclination has increased considerably. . . . It has chiefly arisen, I think, from an idea that the inquiry is *inquisitorial*, and from their not wishing to have their affairs looked into, as they conceive that they have been, through the means of this inquiry." From Sir J. Walsham's evidence I gather that "four Unions in Suffolk and two in Norfolk refused to give any returns." Mr. Torr states, that "the farmers in Lincolnshire are averse to it." Mr. Miles, M.P., says, that "nearly two-fifths of the farmers of Worcestershire would make no returns." Our friend Mr. Skelton, from Lincolnshire (to whom I am indebted for

much valuable information, and whose extensive acquaintance with the farmers is well known), writes me word: "I find a *very strong feeling against it* amongst the farmers generally; they say, 'all speculation would be done away with,' and they like a little speculation." Even the farmers of Scotland, according to Mr. Maxwell, have made the returns they have, under a kind of promise held out to them, that in any future legislation on the subject, the law would not be made compulsory on them! And with respect to the compulsory measures with which we are threatened, Mr. Maxwell says, in answer to a question from Lord Berners, as regarded Scotland:—"Would you consider it desirable to make the returns compulsory?"—"I consider it would be most undesirable in Scotland. I believe, to use a common phrase, it would put the back of the Scotch farmers up at once. They have been almost promised against compulsion." I think I have stated sufficient to show, then, if we were not already aware of the fact, how thoroughly obnoxious this system, as attempted by the Government, is to a large majority of the farmers of England. I cannot leave this part of the subject without placing these opinions in contradistinction with the evidence of most of, if not all, the witnesses examined before the committee "That if the law were made compulsory the farmers would be satisfied, and have no objection to make the returns," and which evidence, I have no doubt, decided the committee, in recommending that that course should be adopted. As regards the present system of taking the annual average price of corn, there is no person acquainted with its working but must acknowledge it as the most fallacious and unjust method that could possibly be adopted. All the witnesses examined before the committee of the House of Lords, who were asked questions thereon, agreed in condemning it; though none of them were prepared to propose an alteration further than an increase of the number of towns, or that the seller should make a return, to check that made by the buyer; or that the millers should be required to make an annual or triennial return of all the corn ground by them, to see how far it corresponded with the quantity returned as sold during the same period. The subject is of far too great importance to be lightly passed over, seeing that the tithe-commutation is regulated by it; and that in the cases of a great many farms which are let at a corn rent the amount is decided by this precious system of taking the averages. If a dealer from Bristol should attend the market at Newbury, the corn which he purchases he returns at Newbury; he then sends it to Bristol at a cost of from 1s. 6d. to 2s. per qr., adds to that a profit, and sells it again, when it is returned a second and perhaps a third time, and the farmer who sold it at the first sale has to pay his tithe and his rent (if a corn rent), at an augmented rate from which he has never derived benefit, instead of on the average of the first sales only. This case serves to illustrate thousands of others throughout the kingdom. By requiring a return of the buyer only, there is no restriction as to whom he buys it of; the consequence is that some of it naturally gets returned a second time, at an augmented price. Again, the system of selling by weight, and having the quantity reduced to bushels at the rate of 61½ lbs. or of 62 lbs. per bushel, or 12 score 8 lbs. net (far above its *general natural weight*), as adopted at several of our large towns, and of selling by measure, to weigh 62 lbs. per bushel, as it is done in many other towns, helps to make the price returned higher than the natural weight would bring; thus the farmer has to pay upon a higher price than he receives. Mr. Skelton writes me word: Boston averages are generally 3s. to 4s. *over* those at Wisbeach, because at the former, returns are made per qr. of 36 stones, or 63 lb. per bushel, and at Wisbeach by its natural weight." Then with regard to the correctness of the returns

under the present system: I have taken the trouble during the past week to compile a table from the *London Gazette* averages of the several counties that have made returns of less than 300 qrs. of wheat per week, and 100 qrs. of oats; and to show you the neglect there must have been in the buyers not making their proper returns, I will just mention a few of them. The returns of wheat for the four weeks in January, just past, are for

	Qrs.	Qrs.
Buckinghamshire . . . .	1,118, or an average of 279 per week	
Monmouthshire . . . .	1,026	256
Herefordshire . . . . .	536	134
Rutland . . . . .	79	20
Westmoreland . . . . .	218	54½

Making a total for these five counties of 2,977 qrs. per month, or 743½ qrs. per week. The counties of Cheshire and Derbyshire only slightly exceed those I have named, Derbyshire averaging 332 qrs. per week, and Cheshire 438. Now, that these *seven counties* should only average 216 qrs. of wheat per week for the last month is perfectly absurd, when the town of Newbury alone (which I have before mentioned) has returned for the same period 4,548 qrs., or an average of 1,137 qrs. per week—a quantity three-fourths in amount to the whole of the seven counties I have named put together! Again, as regards the return of oats, which is of still greater importance, I find that in the return made Jan. 4 there were 11 counties that returned only 385 qrs., or an average of 35 qrs. each; Jan. 11, 14 counties only returned 578 qrs., or 41 qrs. each; Jan. 18, 17 counties only returned 650 qrs., or 38 qrs. each; and Jan. 25, 12 counties only returned 391 qrs., or 32½ qrs. each! And further still, the counties of Buckingham, Wilts, Surrey, Dorset, Devon, Monmouth, Gloucester, Hereford, Worcester, Shropshire, Stafford, Derby, Warwick, Rutland, Bedford, Durham, Hertford, and Cornwall—18 in number, out of the 42 making the returns—for the past month have only returned 5,411 qrs. of oats, being an average of 75 qrs. each county per week! And this in the midst of winter, when most of the farmers are thrashing oats, for the straw for fodder! Now what, in all probability, will be the effect of this? From the scarcity of hay, and the turnips getting rotten, as many of them are, oats are perhaps much cheaper now than they will be throughout the year; yet, from the proper *quantity* not being returned at the present price, the average of the year may very far exceed what it ought, and the farmers again be the sufferers. We may fairly conclude, then, that, until a better system is obtained for taking the averages than that of *trusting to the buyers alone* to make the returns, and considering the large amount annually regulated by these prices, the farmer will have to pay more money in the shape of rent and tithe than he receives for his produce, and that therefore we may condemn the whole system as fallacious and unjust. But there is still another part of this anomalous system to be considered—viz., the want of a uniform measure by which corn should be sold (Hear, hear). Mr. Skelton has been kind enough to send me an abstract of the different modes of selling and buying wheat in some of the markets in England, from which I gather the following: Ten of our towns sell by the quarter, and are required to weigh their natural weight—that is, to weigh one sack, and then send in the bulk at that weight. Several more sell per bushel; Liverpool and Manchester, per 70lb.; 10 other towns, per 63lb.; several others at 62lb. and 60lb.; 8 towns at per load of 5 qrs.; some at per load of 3 bush.; Carlisle at per bag of 3 bush.; Garstang at per windle of 220lb.; Falmouth at per Cornish bushel of 180lb. and 189lb.; Ulverstone at per 144 *quarts*; Belfast, per ton; Dublin and Athlone, per barrel of 20 stone; and Glasgow, per boll.

Mr. SKELTON.—It is necessary I should state, perhaps, that

in my neighbourhood we purchase by the quarter, the farmer stating the natural weight at the same time.

Mr. MECHI.—A varying weight, I suppose.

Mr. SKELTON.—Yes, of course.

Mr. OWEN.—The natural weight of eight bushels to the quarter?

Mr. SKELTON.—Yes.

Mr. WILLIAMS resumed his paper:—Now, as all these weights and measures must, for the averages, be reduced to quarters, how much better would it be to compel all parties to sell by one measure! It would answer two purposes—it would be ready for easy transfer to the returns; and it would place the stranger who might attend a distant market in a more easy way of transacting his business. Having pointed out what I consider to be the evils, both present and prospective, with respect to “agricultural statistics,” as proposed by the Committee of the House of Lords, and the absurdity of taking the average price of corn *from the buyer alone*, I will now venture to lay before you a scheme for your consideration, which, working well for the country, would at the same time not act injuriously to the agricultural interest. Most of my brother farmers will agree with me that, however they may dislike to make any of their business or private matters known, the Government and the country at large should know, once in each year, the quantity of corn the kingdom has produced, that they may know how to estimate for the future. But how can this be ascertained *except by facts*? Well, then, if we had a law that *required (not compelled)* every farmer to make a return in the month of June, of the number of acres of wheat, barley, oats, rye, beans, peas, and potatoes, and that the returns should be collected by the churchwardens and overseers of each parish in the kingdom, and sent by them to the Board of Trade (without that Board being allowed “to alter” and *cook* “them, if they deem it expedient,” as is recommended in the report of the Lords’ Committee), if those returns were properly made, and I see no reason why they should not be, *that would be a fact!* It would be the *basis* on which to work all that would be required; and every practical man in the kingdom might judge for himself, as to the probable amount of the harvest. There would be no public authority prying into the farmers’ affairs, as at present proposed, and the farmers would be as well qualified to judge of the produce of their own fields, and the harvest in general, and, I should think, much better able to do so, than those merchants who employ people to go about and cut up square yards or feet of wheat, rub out the corn, measure and weigh the produce, *and estimate the growth of the whole country from such a source!* I mention this matter because great stress is laid, in the blue book from which I have quoted, on the circumstance that the merchants and corn-dealers have an advantage over the farmer by this means, and that therefore it will be to the latter’s interest that everything should be made public; that *he might partake* of the general information; and the first resolution of the committee concludes in these words: “That amongst the many classes that would benefit by agricultural statistics, none would derive greater advantage than those connected with agriculture.” This plan, then, as far as regards agricultural statistics, would answer every purpose, *except that* against which the guardians of the Devises Union *protested!* It would be a basis on which men of business might rely; the different counties would report as at present, by practical men, the state of the crops; a general conclusion would be arrived at, as to whether we had an average, or over or under an average crop; the effect would have a legitimate influence on the markets, either way; and the farmer would have no cause of complaint! As to the return of the acreage of green crops,

and of live stock, it can answer no purpose but that of gratifying an idle curiosity, and is too prying into the farmer's private affairs to be tolerated! The best argument of the witnesses who were examined on the subject was "that as you were collecting statistics, you might as well get all as part." Some could not even say they were necessary, but would be *interesting curiosities!* Mr. Miles, M.P., and Mr. Caird recommended that they should not be taken at all; and the latter, in his evidence, makes use of the following observations:—"If even you could ascertain that there was a great falling off in the amount of stock, there is no means of supplying the deficiency." And again, "I think farmers are generally more reluctant to give information as to their stock, than their crop." If then these statistics of acreage were made through the churchwardens and overseers (but paid for by the Government), I have no doubt myself that a perfect return would be made; for as there are generally four filling these offices, who, generally speaking are farmers, if one or two in the parish should decline to make their return, they would be able themselves, having the rate book, to fill in the deficiency (signifying it as being done so), and send it complete to the Board of Trade. Thus the objection to the system, as at present acted on, and still recommended by the committee, of forwarding the returns through the Board of Guardians, would be obviated. I will assume, then, that this system was at work, and that next time a return would be sent in, stating the number of acres of corn, of each description now mentioned in the corn returns, and likewise potatoes, as before alluded to—I include them, because they have so much to do in families as a substitute for bread, though often they are grown as food for cattle, more especially when they are plentiful and when at a low price. We will suppose, for want of better information, that the number of acres of wheat returned should be 3,000,000, and that at harvest it should be about an average crop, which I will put at 28 bush., or 7 sacks per acre. If this were correct, the quantity grown in England and Wales would be 10,500,000 qrs.; but as regards the estimate of the produce officially I would have nothing of the kind; all people should estimate for themselves, as heretofore, having the basis of acreage to act upon. A system of this kind would in no way injure our interest, and as thrashing continued it would soon be seen what sort of a crop we had; and it could at all events be ascertained whether it was an average, or above or below an average. As I stated before, these statistics are worth nothing, unless they are based upon facts! And this conviction induced me, in proposing this subject, to consider also, "a practical and equitable system of taking the average price of corn." It must be, and is, admitted by all parties, that the present system ought to be improved! But how can that be best done? My own opinion is in favour of blotting out the present mode altogether, and beginning afresh; and I will offer for your consideration a plan which I think would prove to be practicable, beneficial, and just to all parties, and moreover useful, *as a test*, to prove whether our assumed produce of 10,500,000 qrs. of wheat as an average crop was correct or not. It is no doubt in the remembrance of many here present, that on the 4th of February, 1850, just six years ago to-night, this very subject, as proposed by Mr. Bennett, was introduced by the late Mr. Shaw, and discussed in this room. In that discussion I took part, and agreed that the buyer and seller should both join in making the return. I produced a blank schedule for the purpose, and recommended that at the time the buyer was paying for the corn he purchased, the seller should make the entry in the schedule (the buyer not being allowed to do it), but that he should at the end of each week sign his name to the following

certificate at the bottom of the schedule:—"I hereby certify that the above entries are a true and correct return of the quantity of corn purchased by me of the farmers, in the week ending \_\_\_\_\_" \* It was objected at the time, that the farmers would not like their neighbours to see, on the schedule, what they sold their corn for; and I remember saying, "I thought that feeling was fast waning away. But if that was at all an argument against it, how will they like the proposed statistics to the full, which will almost make them prove the state of their affairs?" Since that discussion took place, I have given

NAME OF SELLER.	Wheat.	Price.	Value.	Barley.	Price.	Value.	Gats.	Price.	Value.	Rye.	Price.	Value.	Beans.	Price.	Value.	Peas.	Price.	Value.
	qr. b.	s. d.	£ s.	qr. b.	s. d.	£ s.	qr. b.	s. d.	£ s.	qr. b.	s. d.	£ s.	qr. b.	s. d.	£ s.	qr. b.	s. d.	£ s.
		Aver. Price.	Value.		Aver. Price.	Value.		Aver. Price.	Value.		Aver. Price.	Value.		Aver. Price.	Value.		Aver. Price.	Value.
	qr. b.			qr. b.			qr. b.			qr. b.			qr. b.			qr. b.		
Total .....																		

I hereby certify that the above entries are a true and correct return of the quantity of corn purchased by me during the week ending \_\_\_\_\_

A Schedule, showing the quantity of English corn bought by Mr. \_\_\_\_\_, during the week ending \_\_\_\_\_, 185, of the following persons: the entries to be made by the Vendors, and the whole certified by the Purchaser, agreeably to Act of Parliament passed, &c.:—

\* COUNTY OF \_\_\_\_\_

the subject a great deal of consideration, and have seen nothing to alter my opinion, that if the buyer is to have any hand in making the returns (as many of them are not to be trusted in doing it), it should be done in conjunction with the seller. In considering this matter, I have thought on many plans that, joined together, might make a pretty good whole; for instance, in this scheme, I would propose, that for the purpose of the Government *knowing whom to expect returns from*, and that the returns might be thoroughly accurate, all purchasers of corn should be bound to take out a license to deal therein. It is not for the sake of revenue (as I would only put it at 10s. to 20s.), but to *register the individual*, and compel him to make his return. If he omitted to do it, he should be immediately written to, by the proper authorities, and fined if he neglected to send it. It is evident, if this system were adopted, and only the farmers were allowed to make the entries, that no resale could be returned, and consequently the price thus given would be correct; instead of being confined to the towns which are now employed, it would be extended, even to the barn-doors; and as far as the annual sales were concerned, might be correct. But to make the returns complete as to the annual growth, the churchwardens and overseers could be employed to ascertain, as nearly as possible, from the farmers of their respective parishes, the quantity of corn sold otherwise than to licensed purchasers, viz, that in small quantities, what they had themselves consumed, and, likewise, what was required for seed. These could be returned in one sum, and, therefore, could show no particular item for curiosity. By these means, used in conjunction, a true and just return would be made by the licensed dealers, by which the annual amount of tithe and rent would be fixed; and by adding to those returns the quantity of corn used by the farmers for consumption and seed, would give an amount at the *end of the year* (when it could not damage the grower), whereby we might test whether the 10,500,000 qrs. of wheat, as estimated, was correct or not; and from the experience thus annually gained, you would require no officially assumed produce of the harvest beforehand; but you would have the *facts of the past* on which to base your opinion for the future. There is an obstacle, though, which seems at first sight to stand in the way of these returns being made correctly, as to the produce of the year. It is the quantity of old corn remaining in the farmers' hands at the time of harvest; but as the greater part held over is generally sold during the first four months after harvest, this could be met by a column in the schedule, specifying the quantity of old corn thus sold. The system then would work thus: In the month of June the churchwardens and overseers would collect and return the acreage as proposed. At the end of the farmers' year, which, for this purpose, should be the 31st of August, or as early as possible afterwards, the authorities should make known the returns made during the past 12 months. The quantity collected from the farmers by the parish officers could be added thereto; and at the end of December, the returns of old corn, taken from those made since the 31st of August, added to the other amount, would give a statistical account nearly as true and perfect as under any system could be got at; and I take it for granted that no plan can possibly be devised whereby every quarter could be returned in such an extensive affair. At the end of the year, then, it would be seen how much was grown per acre in the previous one—a *fact, instead of an assumption*; and which, I am inclined to think, would prove more satisfactory to all practical men. Having thus laid before you the imperfections of the present system of affairs, and a rough sketch of what I think would be a much better plan, I will now leave

the subject in your hands, convinced that its importance will call forth many practical remarks, from which, perhaps, some definite plan may be devised, either by improving the one I have offered for your consideration, or suggesting another, which, whilst equally serviceable to the country at large, as the proposed agricultural statistics, would be much less objectionable and degrading to the cultivators of the soil (cheers).

Mr. SKELTON (of Sutton Bridge) was pleased with the general views expressed by Mr. Williams; but that gentleman had not given his opinion with regard to an improved system of selling corn in the markets. After pointing out the discrepancy now existing in that respect, the paper would have been more complete had it also mentioned a remedy.

Mr. WILLIAMS presumed Mr. Skelton alluded to the measurement. He would adopt the imperial bushel and quarter as the standard, and arrive at the average price per quarter. There should be a uniform measure throughout the kingdom, but of course sales might be made by bushel, sack, or quarter, two sacks being a quarter.

Lord BERNERS: What is the present law?

Mr. WILLIAMS: The imperial bushel and quarter.

Lord BERNERS: But that is not carried out.

Mr. SIDNEY (of Peckham) said, the paper of Mr. Williams contained some very valuable information, at the same time that it exhibited in strong relief the prejudices of a most estimable body of men. He was sorry to observe, for instance, that the proposal for establishing a system of agricultural statistics was described as "un-English," "inquisitorial," and injurious to the interests of the farmer; although the hon. gentleman himself, almost in the same breath, said he would introduce the truly inquisitorial system of licensing to deal in corn. (Hear, hear.) The fact was, that Mr. Williams had looked at the question too much from one point of view—the present hour and the latest newspaper gossip. (Hear, hear.) If he had studied the question fairly, he would have found that agricultural statistics were not intended to push down prices, but that they were in reality no more than the concluding portion of a course of policy which this country had pursued later than others, namely, that of collecting all possible information respecting the progress of the nation; and which had already been carried out in the case of textile manufactures, by the establishment of a system of inspection, and the regulation and limitation of the hours of labour of women and young children; also in the cases of mines, and emigrant and passenger ships, and in the system of registration of births and deaths. It was one of the peculiarities of the farming class to rush to sell their produce when prices were falling, and to hold hard when prices were rising, and the reason for this was that they were ill-informed of what was actually passing around them. They were, therefore, the people of all others to whom a good and complete system of agricultural statistics would be likely to prove most advantageous. If the existing system had been productive of benefit to the farmers, then he could conceive why a strong prejudice should prevail against statistics; but the very reverse was the fact, for a large body of the farmers were constantly making mistakes. A cry would be raised that the crop was excessive, and at once they rushed to the market, and the corn would come down to 40s., but soon this was discovered to be an error; the crop was short, and up it went again to an exorbitant price. In such cases, he believed inquiry would prove that the farmers were the principal losers. All were agreed that truthful information, as to the produce of the country, was necessary, and he could not imagine that any large body of men seriously entertained the belief that the call for agricultural statistics was made for the purpose of depressing prices, but that rather it was for the purpose of destroying speculation, or acting upon and being misguided by inaccurate information. Visit a farmer at his residence, and the first question he put to you, if you came from a market town, was, "What is the price of corn, and what is it likely to be?" And what was it that supported and gave weight and influence to papers like the *Mark Lane Express* and *Bell's Weekly Messenger*? Simply the anxiety of the farmers on this score, which induced the proprietors of these journals to expend large sums of money in collecting information and furnishing calculations with regard to the market prices. Now the system

of agricultural statistics would be an attempt to gather together, as well as they could, information as to what the country had produced, and, as soon as harvest was over, what it was likely to produce; and information like that would not only have the effect of preventing much speculation, but a good deal of ruin. At present, in respect of these matters, we had always an over or an under estimate. But agricultural statistics would correct all that (Hear, hear). Being agreed that some system of correct information was necessary, the question was what that system should be. In collecting the statistics, he would not for the first two or three years have any attempt at an estimate. The question then came, how they should be collected; and for his own part without saying that it should be by excise officers, he would certainly say that it should be done by an organised and disciplined body of men, who had fixed residences, and were at the same time in the habit of reading and writing, which churchwardens and overseers not always were. As to whether it should be compulsory to furnish the information or not, experience as to the census showed that if it were not made compulsory they would fail to get it all.

Mr. OWEN WALLIS (of Overstone, Northampton) saw no reasonable objection to a correct and well-arranged system of agricultural statistics; and thought that, so far from injuring, it was more likely to benefit the farmer (Hear, hear). Exaggeration was, he believed, the general rule, with regard to reports of a forthcoming harvest. Wherever the rumour prevailed that it was to be short or productive, there was always unnecessary exaggeration, and in either case mischief was the result. The year before last, when they had a very fine harvest, prices were so depressed that, at the conclusion of the harvest, a great deal of wheat was sold in his neighbourhood as low as 44s. per qr.; yet, in less than a month from that time, the price rose to 70s. Who was the party injured in that case? The sellers, of course. But if they had had a correct return of that harvest, coupled with a return of the unexhausted stocks of the previous harvest, there would have been no occasion for the depression in the first instance, or the great rise in price which followed. He firmly believed, then, that the farmer had nothing to fear from any returns that he might ever be compelled to make. The farmer could have no secrets. His farm was open to everybody's inspection, and he had no reason whatever to be ashamed of the amount of his produce, unless he had bad crops in consequence of pursuing a bad system of cultivation (Hear, hear). He could not be injured by having correct information, instead of the vague and idle rumours that were circulated daily in newspapers by commercial travellers riding about the country, and even by Mr. Caird himself. As a preliminary step, supposing there were to be statistical returns made, it was essentially important that there should also be a uniform system of weights and measures throughout the country. It was, he thought, a disgrace that every corn-merchant should be obliged to carry about with him a card, such as he then held in his hand, for the purpose of enabling him to arrive at accurate conclusions as to the relative prices of corn in the different markets. The card was published in Liverpool, and referred to various measurements of wheat, bushels of 72lb. and 75lb.; quarters, composed of bushels of 60lb., 61lb., and 64lb.; stones of flour, barrels of flour of 190lb., loads of 240lb., and sacks of 220lb. In short, it appeared that the measurement differed in almost every market; and in order to arrive at the relative value of corn in each, the dealer must first refer to his ready-reckoner, instead of being able when he went into the market to know at once when a price was quoted to what exact measurement the quotation applied. In respect to the present system of taking corn averages, too, it was most vague and uncertain; but if, supposing Mr. Williams' plan were adopted, any very great reduction took place in the averages, seeing that the tithes had been commuted upon the existing arrangement, they would at once have the titheowners down upon them for an increased rate upon the present commutation, so that no good could possibly arise by disturbing that question (Hear, hear).

Mr. WILLIAMS: I would have justice on both sides.

Mr. WALLIS: You must do justice to both sides.

Mr. WILLIAMS: Well, that would be just.

Mr. WALLIS: No; it was not just to disturb what he believed to be an equitable arrangement. If they disturbed the present system, they would certainly open the door to a very

awkward and disagreeable subject, which he had long since hoped was for ever buried in oblivion (Hear, hear). With regard to the plan Mr. Williams recommended for getting statistics, he thought a mere return of the acreage would be about tantamount to having no return at all. Unless they could also get an estimate of the quantity per acre, the acreage would really be of no practical value whatever. Again, so far from being of opinion that the excise, or the churchwardens and overseers, were the proper parties to collect the information, he thought the boards of guardians constituted the best and most practicable machinery for the purpose. Moreover, every farmer should be compelled to make a return of the acreage he sowed; and a person should be appointed by the board of guardians to make a valuation of each separate parish, not of each separate field or farm, but of the entire produce of the acreage, in wheat, barley, and oats; he should then send that return under seal to some person in authority, who should make the necessary calculations for the given district. Thus anything like returns of an inquisitorial character would be effectually avoided. With such returns the public might be satisfied as to the probable results of the forthcoming harvest; for although some estimates might possibly be in excess of the real quantities grown, on the other hand some would fall short, and the one correcting the other, something like an approximation to the real state of the case would be arrived at. (Hear, hear).

Mr. E. STENNING (of the Croydon Farmers' Club), as a practical agriculturist and a tenant farmer, felt that the subject of agricultural statistics was one of greater importance, perhaps, to the class to which he belonged than to any other in the community, because the system, in effect, called upon them to do that which no other interest in the country was required to do. (Hear, hear). One of the speakers had illustrated the policy of preparing these statistics, by reference to the registration of births and deaths. But there was no analogy between the cases. The difference was great, and to make and publish returns of births and deaths bore no parallel to inquiring into a man's private affairs. With the views expressed by Mr. Williams he generally concurred; and on the 22nd of December last he had the pleasure of introducing the question at the Croydon Farmers' Club, when he took almost precisely the same line of argument as Mr. Williams had adopted to-night. The evidence given before the Committee of the House of Lords on agricultural statistics was such that, speaking with all due respect, he was sure their lordships must have had some difficulty in coming to a conclusion upon it, and he could not help repeating the remark which was made by one of the newspapers, that their lordships seemed to have jumped at a conclusion that was directly against the evidence. (Hear, hear). The country looked to the subject with great interest. It anticipated that something would be done in regard to agricultural statistics; and for his (Mr. Stenning's) part, he had no objection, for he thought it was only right the country should know what were its capabilities of production. One who was now no more, whose services to the agricultural interest, especially in connection with the *Royal Agricultural Society's Journal*, were universally acknowledged and appreciated, he meant the late Mr. Pusey—(Hear, hear)—remarked, when the subject of agricultural statistics was first brought under the public notice, that it was most important that we should be kept thoroughly acquainted with the improvements that were taking place from year to year in the agricultural world; and, in that proposition he (Mr. Stenning) quite agreed, but he could not assent to the principle that the farmer should state in the early part of the year what were his future prospects (Hear, hear). For he held that there would be no possibility of testing the accuracy of any report until after the harvest had been got in and thrashed (Hear, hear). They knew from their experience of last season that many of them anticipated at times a fine crop; and that at other times they altered their opinions, and found in the end that they varied perhaps two or three sacks an acre. Presuming that the plan were adopted of making a return of the acreage, and that competent persons—he meant practical valuers—were, after the acreage was placed in their hands, sent through every district to make their estimates, it was well known that men of that class were used to making Midsummer valuations; and what did they find in these valuations? Why, that if they arrived within a sack of the actual produce of wheat per acre, they thought they had done well, and so he

(Mr. Stenning) thought. But what would be the effect of that sack of corn per acre throughout the country? It would give not less than five million quarters; a quantity equal to, if it did not exceed, the largest foreign importations we had ever yet received in one year. Now, admitting that we were likely to have this deficiency of a sack of wheat an acre, what security would the agricultural interest have that no more than the five million quarters would be imported? None whatever; for as soon as the corn merchants of Liverpool, Hull, Bristol, and other places, learned that there was likely to be this deficiency, they would send to all parts of the world for supplies, no limit would be set to the amount of importations, and, probably, instead of importing five million quarters, it would be nearer ten or fifteen millions. It was obvious, then, that any such result must be injurious to the agricultural interest, though he did not doubt it would be beneficial to the consumer (Hear). For the last two years farmers had been in a better position than previously; they were, therefore, in a more favourable temper to consider and discuss the question coolly. They were not now labouring under depression; but, though prosperity attended them at present, it was their duty to look to the possible recurrence of times when they might again experience adversity (Hear, hear). To acreage returns he saw no objection, provided there were no such things as covenants of leases. As practical farmers they knew that by those covenants of leases they could sow only a given number of acres of one description, and a given number of acres of another description. Where they were living under landlords who would not willingly take advantage of them, this was a matter of little importance; but there were some landlords, and they had recently a striking instance of the sort (Hear, hear), who would be prepared to take every advantage of the broken covenants of a lease (Hear, hear). And, when it was suggested that returns should be made of acreage, they would bear in mind that those returns would have to go through many hands, and that after they had left the hands of the board of guardians it would be impossible to tell how they might be sifted and investigated for particular purposes (Hear, hear). True, that might not be done immediately, but no one could say how soon the opportunity might be seized for using the return to operate against the interests of the farmer (Hear, hear). It behoved them, therefore, to watch carefully the proceedings that were now going forward with reference to these agricultural statistics (cheers). It was undoubtedly desirable to have authentic returns relative to the producing capabilities of the country, and he was sure that no farmer would object to a return made "in the lump," so long as it did not show what was the particular and special growth of his own farm. The idea of Mr. Williams, that the buyer and seller should both make a return, was a good one. But there was an omission in that gentleman's plan in reference to one point. For instance, his plan would show the produce of the country, but not the consumption (Hear, hear). With regard to providing a remedy for taking the averages, if they wished to have accurately the yearly produce of this country, they must have a fair and clear start. He would therefore propose that on the 1st of August a return should be made by every farmer, miller, corn merchant, and all others who might be in possession of corn, meal, or flour, &c., of the quantities held by them on the 1st of Aug. That being a near margin for the harvest, they would at once see the quantity of corn and meal the country was in possession of at the commencement of the harvest, and this he would call stock in hand. Then, instead of corn being returned by corn merchants over and over again, he would not allow corn to be returned more than once, and that once by the producer. He would also require the buyer to make a return as a check on the producer; and in order that these returns should be accurately made, he would inflict a penalty of 10s. for the first offence, and 20s. for the second. It would be necessary to have two receiving boxes fitted in some conspicuous place in every market town in the kingdom for buyer and seller; if corn was sold at home, which they knew was done to a great extent, it would only then remain for the buyer and seller to arrange the market boxes, and the tickets should be deposited. This plan, strictly carried out, would give the quantity sold by the producer. Then the following 1st of August the farmer should be compelled to make a return of wheat consumed by his family; oats, &c., consumed by his horses; barley, &c., for feeding purposes; the quantity he had

seeded the land with, and the supposed quantity he had in stock. These several items put together would give the produce for the year. Another return must be required from the millers, corn-merchants, and all others who were holders of corn, at the same 1st of August; they would then, by comparing the stock of each year, have before them the yearly consumption; but to be correct about the yearly produce, it would be requisite the buyer and seller should state in the selling-ticket the year's growth. Now this was nearly similar to the plan of Mr. Williams, except that Mr. Williams had omitted the old stock of corn in hand.

Mr. WILLIAMS: I have provided for that by means of a column for the period between the 31st of August and the last day of December.

Mr. STENNING: It was of no use to know what the produce was, unless they knew also the consumption; for they would not be able to provide for the consumption without knowing the quantity required. The two pieces of information should, therefore, be combined and go together. He recollected, however, that when this club went a year or two ago to the Board of Trade, and had an interview with Mr. Cardwell, that gentleman seemed to think that an alteration in the corn averages would so upset the tithe question that he gave them no encouragement as to anything of that kind ever being done; and certainly, if ever a fair system of agricultural statistics was carried out, it would not be by the farmers only making returns (Hear, hear).

Mr. GRANGER (of Stretham, Ely) thought, in the first place, that if returns were made, Government should be at the expense of collecting them, and not the boards of guardians, or the churchwardens and overseers (Hear). There could be no doubt, if the returns were properly made, that they would be productive of great advantage to the community, and in that case the country ought to bear the burden. To be correct, however, he believed they must be obtained through the agency of a Government official going over the land, and making his report accordingly. That might be done in the month of August. With regard to the averages, there could not be a second opinion respecting them. Only one return should be made, and that a joint return—buyer and seller (Hear, hear).

Mr. SPEARING (of Chilbolton, Hants) thought the only ground upon which they could argue this question was that of the public benefit. At the same time, whilst they did that, it behoved them to be careful not to injure any particular interest. Hampshire was one of the first counties that were selected two years ago for making returns for the purpose of agricultural statistics; and at that time he (Mr. Spearing) objected to make a return, because, after the severe lesson which the farming class of the community had received from that and preceding Governments he regarded with some little fear anything that might come from the same quarter. Last year he was not asked to make a return; consequently he had not had to give a refusal. He had since modified his opinion, and was inclined to think there would not be danger in furnishing the acreage return that had been sought for; but he was not prepared to go the length of Mr. Williams when he said he did not mind having his crops valued before harvest, admitting, as that gentleman did, that the valuers put some too high, and others too low, and stating that probably the correct estimate would lie between them. He put it to any practical farmer whether they were ever likely by such means to arrive at a fair estimate of the corn throughout the kingdom (Hear, hear). The community had a right to the means of alleviating any distress that might be caused by a short crop; but he did not like the way in which it was proposed to collect those statistics. It would be most objectionable to have a paid valuer riding about, inspecting and valuing the crops. There was something un-English in prying into a man's private affairs, and something was due to the feelings of the farmer in this respect. He was decidedly convinced of the necessity of a uniform system of weights and measures; but for the sale of the farmer's produce, measure was preferable to weight (Hear, hear). The returns for making up the corn averages should be made by the seller, backed by the signature of the buyer. The excise might be used for collecting the returns, as he did not think churchwardens and overseers were the right men to employ, and he certainly did not repose much faith in boards of guardians. It was desirable that the farmers should know what was the quantity of old

corn in hand at the time of harvest, and a proper system of agricultural statistics would inform them of the quantities in the hands of men who could afford to hold more than they themselves could.

Mr. SKELTON observed, with reference to the injustice which might ensue to the tithe-owner from an alteration of the averages, that the tithe commutation was a settlement based upon the assumption that the averages were fairly taken. If, however, there had not been proper returns for the purposes of the Tithe Commutation Act, and that arose from the irregular and unfair method of making them, and if they were put upon a safer and better footing, then indeed the tithe-owner could have no good ground of complaint. It was scarcely necessary, perhaps, to go into an argument to show that the averages were not fairly taken; but he associated with both producers and consumers a great deal, and at Wakefield the other day he asked some of the millers if they had made any returns, and the answer he received was, that they had not made a single return since free trade (a laugh). It was pretty well known, also, that in London the sellers of corn made the returns, and not the buyers. The remarks of Mr. Stenning as to stocks in hand were important; and if they were to have a system of agricultural statistics, he did not see why it should not include all the information with regard to stocks at the same time. (Hear, hear.) As to the best method of carrying out the system, he admitted that it would be difficult so to shape it that it would not on the one hand be offensive, or on the other fallacious. That a system of agricultural statistics was necessary had been granted by all parties, and his own impression was that the first step to be taken should be simply to ascertain the acreage cultivation of the whole of the arable land in the kingdom. Then they would see what effect that had, and what other information it led to; and afterwards, if there could be any sound system based upon that acreage return. At the outset, however, he did not think they could get further than the acreage cultivation. It was his impression that there were parties to be found in every district capable of giving a correct opinion as to the acreage and probable yield about harvest time. Still that was a matter of doubt, and might be improved upon; but he did not think that a perfect system could be arrived at all at once. He concurred with Mr. Williams that the returns should be made by measurement throughout the kingdom, for the present system was really disgraceful to an enlightened age and great commercial nation in a business point of view. It was a remnant of barbarism—a stupid system—and he trusted the legislature would show its wisdom by adopting a uniform standard for purchase and sale. (Hear, hear.)

Mr. GUY (of Kingston, Oxon) considered this one of the most important subjects to farmers that had ever been discussed. If farmers made a return of their corn, he thought they would be entitled to know the acreage of green crops cultivated, for their guidance as to the best time for selling their sheep. He would not like to see churchwardens and overseers invested with the control of the corn returns. (Hear, hear). Agreeing as he did with Mr. Williams, that there ought to be a uniform measure or weight, he thought a standard weight would be most acceptable to farmers as well as buyers. (No, no). Well, he himself generally grew corn of tolerably good weight; perhaps the case was otherwise with the gentleman who expressed his dissent. (Laughter). If a sample of corn were shown to the buyer he could tell the weight from inspection almost as well as by measuring it; and what difference, then, could it make whether they sold by weight or by measure? Mr. Wallis was for having a valuer to inspect the crops before harvest. Now he (Mr. Guy) thought any practical man would testify that during the past year at all events no valuer could have estimated the crops correctly. (Hear, hear.) He was himself offered 83 acres of wheat at a certain price; and when the wheat came to be thrashed, it yielded one quarter per acre more than had been expected; and this, too, although the grower was one of the most practical farmers in Oxfordshire. He had a suggestion to offer with regard to the collection of agricultural statistics, which differed considerably

from any that had been made that evening. It was that the farmers of every parish should appoint a committee, who should in turn appoint a chairman, and that the committee thus formed should make the necessary returns. The parishes should, he thought, be divided into unions, as under the Poor-law; and the chairmen of the committees of the several parishes be allowed to assemble in the Board-room, when the Board of Guardians were not sitting, and discuss some practical mode of collecting agricultural statistics. Many persons were of opinion that statistics should be collected by the boards of guardians, and delivered by them to the Board of Trade for preparation. He thought the Board of Trade had sufficient to do already; and therefore suggested the appointment of little branch boards, composed of practical men, throughout the country. (A voice: "Unpaid or paid?") Paid, of course; very few Englishmen liked to do anything without being paid. (Hear, hear). There were plenty of intelligent farmers who fully appreciated the importance of the subject, and were thoroughly capable of collecting careful statistics. As regarded landlords, he had too high an opinion of them as a body to fear that they would ever use statistics for mercenary purposes; but all farmers were not of that opinion, and therefore due precautions must be taken. Farmers did not want half-measures: they desired thoroughly good machinery to ensure such statistics as they could rely upon.

Dr. ELLIS (of Sudbrook Park, Richmond) said: I have listened with attention to the interesting paper read by Mr. Williams, and also to the speeches which followed it by gentlemen who have doubtless considered the subject. From all I have heard, I can scarcely come to a conclusion that any better plan than that suggested in the paper can be introduced as a basis of an act by the Legislature. It is, I believe, recognised as a first principle in legislation, to pass laws which will be approved by the masses of the people, and be observed by all. To inflict laws which a body of men may think arbitrary or inquisitorial, is to hold out a temptation for their non-observance. The next principle in legislation, if not the first, I believe to be to ascertain the practicability of the accomplishment of the object in the Act of Parliament or law proposed. It may be on account of my infantine experience in agricultural affairs that I am unable to see the possibility of obtaining strictly correct statistical returns of what will be the produce of the cereal and food crops of the country before the harvest is gathered in. To give a false report—would it not be worse than none? An unsatisfactory report, if not altogether a false one, has been laid before the public long enough to show how prejudicial it is both to the consumer and farmer. That grain crops indicate various degrees of information I can attest from the changes which took place in my crops last season. At one time nothing could be more promising than that appearance; so a favourable report of them, and perhaps of many grain crops besides in the country, at that time, would have proved altogether an exaggeration. For when the test was applied to the quantity by the thrashing machine, full one-third per acre less was realized than had been expected: I mean, of course, on some parts of my farm. A considerable difficulty exists, in taking the average of quantity before the crops are collected, on account of the great length of time which intervenes in the gathering of straw in one part of the kingdom after the other portion has been safely housed. The comparison of acts of the Legislature passed to investigate mines, factories, and emigrant ships, is, I think, scarcely allowable to one which is to affect the private affairs of farmers, the amount of capital employed, with the profit and loss, which such an investigation would indicate. I nevertheless think that there can be no reasonable objection to a careful return being made of the capacity of the country to meet the wants of the people every year. My impression, received since I entered the room—for I came in unbiassed on either side—is rather in favour of a statement being returned every season of the breadth of growing corn and potato crops, and the probable quantity to be realized upon the gross acres. An opinion might be ventured; but as to the certainty of the

real or anything very near the actual quantity, it appears to me impossible to decide. The short or deficient crop certainly might be considered as a national calamity, with some reason; for only a small portion of the nation, and that the most dependent on crops—I mean the farmer—to suffer alone can be scarcely made to appear equitable; therefore, such returns as are to be fully depended upon should be made public, lest the burden should be unequally felt by the producer, instead of with the consumer. The next obstacle to a legislative enforcement of returns of the quantity of corn and crops, year by year, is the inequality and great diversity in the measures and weights by which the commodities are estimated and sold in the United Kingdom. Would it not be prudent for the House of Commons to pass a law, first of all, to regulate and enforce uniform measurement and weight, for the sale of these articles of consumption? I conclude by observing that it appears to me that Mr. Williams's plan of estimating the quantity before harvest will be true, and as full of information as can be furnished, and when obtained, will be like a bird in the hand. While some other plans which have been suggested would be as good or better, if they could be realized or depended upon; but this not being practicable, they will resemble the two birds in the bush, verifying the saying of multitudes of the people, that "One bird in the hand is better than two in the bush."

Lord BERNERS said, having been appealed to by the Chairman a short time before, as to whether he had any observations to make, he declined to rise then because he was most anxious to hear all the observations which might suggest themselves to other gentlemen present. When he first saw the subject appointed for discussion, he felt it his duty, if possible, to attend there on that occasion; and the instant he could leave the House of Lords he proceeded to the club (cheers). He regretted that he did not hear the introductory portion of Mr. Williams' address, having come there for the purpose of learning, and not of teaching; but all he could say in reference to that was, that when he received the report of the opening address and the discussion, he would again give the subject his best attention, and having ascertained the opinions of farmers with regard to it, he would attempt to embody them in any legislative measure which might be brought before Parliament (cheers). With regard to the observation of a preceding speaker as to the disadvantage of having the acreage returned lest advantage might be taken of it by the agent of the landlord, he wished to say that, so far as he could learn, it was not intended by any of those who advocated the collection of agricultural statistics that the acreage or the quantity of stock of any individual should be made public. The intention was that the returns should be so made that after going through the hands of the enumerators they would at once be destroyed; no one except the enumerators being enabled to ascertain what the returns of any particular individual were. He (Lord Berners) was most strongly in favour of having a uniform measure. Under the present law they must sell by imperial measure, and by failure in that respect they subjected themselves to a fine. If farmers when they went to market said they would not sell by any but imperial measure, there must soon be an alteration in the system; but as the farmers of different parts of the kingdom entertained different views on the subject, nothing was done in the matter. He might refer to an instance which occurred to himself only in the previous week. The corn merchants of Leicester market would not buy except to make up so much weight; the effect of which was to give a false return. His barley and wheat this year appeared likely to produce the most tremendous crops; whereas, in fact, he never before had such bad crops (Hear, hear). As to his oats, many practical farmers in his neighbourhood who looked at them predicted that they would yield from 11 to 12 quarters; but the result was that the rain knocked

them all down, and when the oats were thrashed there was a great deal of corn that never came out at all. In the previous year his wheat was 18 stone neat; last year it was only 16 to 16½ st.; and yet, in accordance with the practice of the place, he was, on the occasion to which he had alluded, forced to make up the weight. Having sent to market 36 qrs. of wheat, he had to give three sacks extra for weight.

Mr. E. TATTERSALL (of Hyde Park Corner) thought there was scarcely any question of greater importance, whether to agriculturists or to the public in general, than that under discussion. To both it was exceedingly important that they should be enabled to arrive at the truth, with regard to the extent of the national produce. He was very much struck with an argument used by a preceding speaker, especially as while the argument tended one way, the conclusion arrived at was in a contrary direction. That gentleman appeared to think, that if they could attain a pretty accurate knowledge of the amount of corn which would be wanted, such knowledge would give rise to a considerable amount of speculation. He (Mr. Tattersall) was of the contrary opinion; he thought that if it were ascertained with tolerable accuracy that, for example, only five million quarters of foreign corn would be wanted in the ensuing year, the merchants of this country would for their own sakes abstain from buying ten millions (Hear, hear). Such information would be the best safeguard against excessive speculation, and would tend greatly to the benefit of agriculturists. Under present circumstances, every individual was left to form his own conclusions, and whether they were accurate or not, he was accustomed to act upon them. It was impossible to do away with speculation. As had been previously remarked, farmers wanted a little speculation. He, for one, did not object to that. What he maintained was that it would be far better if speculation proceeded on a sound basis (Hear, hear). Farmers seemed now to have arrived at the conclusion that something would certainly be done in this matter; and that if they did not do it themselves, it would be done for them by other people. It was now generally admitted that agricultural statistics must by some means or other be collected. He was very glad to hear such a good suggestion thrown out by Mr. Williams. He could not imagine any difficulty in forming a tolerably correct calculation as to how much land was under plough; the great difficulty was to estimate with accuracy the amount of produce. Having, however, been some years in business as a valuer, he must say he did not consider the obstacles insurmountable. There were very few instances in which valuers could not make a pretty fair valuation of the crops in a particular district. There were very few persons who could not do the same; and he thought that, if six weeks were allowed for the purpose, it would be possible to make an accurate calculation, not merely as to what the crops were before they were reaped, but as to what they were after they were reaped (Hear, hear). He felt certain that, by Michaelmas in every year, as accurate a valuation might be made as circumstances would allow. He felt confident that the more the question was discussed, the more would it be felt to be for the interest of the farmers especially that such knowledge should be gained.

Mr. WILLIAMS, having replied to the remarks of the different speakers, concluded with proposing the following resolution, which was seconded by Mr. T. OWEN (of Clapton, Berks):

"That this Club is of opinion the farmers of England should unite in cheerfully giving the acreage of their crops of wheat, barley, oats, rye, beans, peas, and potatoes; but as regards the acreage of green crops, and the returns of the numbers of different kinds of stock, they consider it can lead

to no practical result, is of too inquisitorial a character to be entertained, and would have an injurious effect on the grower, inasmuch as it would affect the market value of his commodity. As regards the present system of taking the averages of the price of corn, it is conducted in so careless and disreputable a manner, that an alteration in the law respecting it is imperatively called for. That a uniform system of measure for the sale of corn should be adopted and enforced throughout the kingdom. And that petitions to both Houses of Parliament should be got up by the Club, embracing these several measures."

On which, Mr. OAKLEY (of Doughty Street, London)

moved the following amendment, which was seconded by Mr. BIDWELL (of Ely) :

"That a system of agricultural statistics, carried out on broad and equitable principles, would be of general advantage to the country—And, that the present plan of taking the average price of corn is conducted in a manner so careless and inefficient as to imperatively demand some alteration."

The amendment being put, was carried by a majority of at least two to one. The proceedings terminated with a vote of thanks to Lord Berners, for his attendance; a similar compliment to Mr. Williams, for his paper; and to Mr. Wood, for his conduct in the chair.

REVIEWS.

JOURNAL OF THE ROYAL AGRICULTURAL SOCIETY.

The second part of the sixteenth volume of the *Journal of the Royal Agricultural Society*, just issued, contains twelve valuable articles, besides an appendix comprising, among other things, the list of prizes awarded at the Carlisle Meeting. To give anything like a detailed notice of these is far beyond the limits of a single article. All, therefore, that our readers can expect from our pen is a very imperfect outline of the important addition which they make to our agricultural literature.

Chemistry is well represented, there being no fewer than four of the twelve papers on this subject. One of these is a posthumous production of the late Mr. Pusey, and will be read with the deepest interest by every member of the Society. It is an account of an "experiment on the elementary principles of manure, as applied to the growth of wheat," and is prefaced by an explanatory note, which we transcribe :

"It is believed that the following paper was written by its lamented author about the time at which he was prevented by severe domestic affliction from taking, at Lincoln, the honourable place assigned to him by the Society, as its President for the second time, and shortly before his last illness. Its publication was delayed, in the hope that he might live to give it his final correction; but, as it is, it will doubtless be received with interest by many of the members, as his last act in the service of the Royal Agricultural Society."

The experiment was made, in an exhausted field of eight acres, "by drilling separately superphosphate and peat-charcoal, with wheat, in the autumn, and top-dressing a portion of each lot in the spring with cubic saltpetre." The result is given in the following table :

Per Acre.	Bushels of Wheat per Acre.	Ditto, with Top-dressing of 170lb. Nitrate per Acre.
4 cwt. of superphosphate. . . .	7	19½
6 cwt. of peat charcoal . . . .	8¾	18
Nothing . . . . .	7½	19 3-10ths

The effects of the nitrate, it will thus be seen, are very remarkable, the result being an increase of 12½ bushels after the superphosphate, 9½ after the charcoal, and nearly 12 after nothing. The charcoal is perhaps the most deserving of notice, as it gives 1¾ bushels more than the superphosphate when applied alone, but when followed by nitrate 1½ bushels less; so that this mixture is injudicious, on the quality of soil experimented upon. The last two plots, again, yielding a greater return than the first, proves the inefficacy of superphosphate to wheat crops. In each case, the ne-

gative evidence thus furnished is invaluable as a guide to future practice.

The next chemical paper is a prize essay "On the Chemical Changes in the Fermentation of Dung," by the Rev. Mr. Bowditch, St. Andrew's, Wakefield. Its perusal will well repay the reader. Talking of the formation of water, and its decomposition in the formation of ammonia, when the work of fermentation is properly performed, and loss when *vice versa*, he says :

"This strong affinity of hydrogen for oxygen leads to the formation of a large quantity of water during the fermentation of dung, as every one knows by experience; and as he might perceive must be the case by inspecting the chemical formula of the substances undergoing decomposition. A large quantity of ready-formed water is added in the excrements of animals, which probably never contain less than 90 per cent.; and the sum of this existing and generated moisture is increased by the rain-fall. Yet we see every heap made of horse-dung, burnt; and often those of an ill-managed farm-yard are in the same condition. What renders the case more noticeable is, that the burning is the worst when the evaporation is the greatest; and no spectacle is more familiar to an observer of the fermentation of manure than a cloud of white vapour, which completely conceals the workmen who are removing a heap of 'fire-fanged' horse-dung. But every particle of that exhaling moisture was designed by a beneficent Providence to be condensed into a liquid charged with the precious burden which it is now bearing away on the wings of the wind. Elements of corn and cattle are volatilized with every grain of the steam, and (in towns) are becoming sources of disease and death to those whom, if differently managed, they might feed! And why? Simply because man will defeat Nature. Nature designed putrefaction (combustion) to be slow, and to that end required all decomposing refuse to be buried; in which case its slow but useful conversion was certain. Man, on the other hand, places the waste substances so that the combustion may be rapid. He employs the light porous material, straw, to mix with animal excreta, and places the whole so as to ensure a free passage of oxygen among the putrefying mass. The rapid burning of sticks is ensured by their being laid carefully across each other, so as to afford the readiest access to the atmospheric oxygen; and this is a close approximation to the state of dung thrown lightly into a pit. The heat generated during its combustion converts the water of the burning wood into steam, which passes freely and rapidly up the chimney, and that of the dung may be seen in a still dewy morning forming a column of some twenty feet in height above its source. But suppose all

the water had been retained by the heap. Suppose the oxygen had been supplied to the decaying mass as it is supplied in the soil, abundantly but yet slowly, would there have been any fire-fang, or would the ammonia and other valuable products have flown away almost as quickly as they were generated? We are always wrong when we can perceive a law of Nature, and do not conform to it."

Mr. Lawes and Dr. Gilbert contribute a controversial paper of great length in reply to Baron Liebig. We thank the great chemist of Giessen no less than the great experimentalist of Rothamstead for this important addition to chemical science. The dispute at issue, we believe, is too well known to require notice. The experiment of the late Mr. Pusey, already quoted, proves—if proof is required—what the editor of the *Journal* justly observes is now the axiom of the English farmer—"That *nitrogen* is the principal desideratum in a manure for *corn*, and *phosphate* in one for *turnips*;" though Liebig points to the contrary, or rather, perhaps, would fain apologise for his having once done so (?).

The last article on chemistry is "On the Value of Artificial Manures," by Mr. Way, the consulting chemist to the Society. Coming from such a source is a sufficient guarantee of its value. It comprises four tables. The first exhibiting at a glance the present price of artificial manures; the second, for calculating their money value; the third, analysis of genuine samples of Peruvian guano, 1852 to 1855 inclusive; and, fourth, analysis of superphosphate of lime (commencing with the year 1852), exemplifying an amount of labour and assiduity for which every reader of the *Journal* must feel more than thankful. Of 171 specimens in the latter table there are, containing of soluble phosphate,

Less than	5 per cent.	11 samples,	or	6½ per cent.
Between	5 & 10	" 49	"	29 "
"	10 & 15	" 60	"	35 "
"	15 & 20	" 40	"	23 "
Over	20	" 11	"	6½ "

From this abridgment our readers will join us in again thanking Professor Way for his unwearied labours in the laboratory, to promote the interest of the Society and the great national work it has espoused.

"The obstacles to an exact valuation of manures," he says, "appear to be as follows:—

"First. The agricultural value of different substances has not yet in all cases been clearly ascertained.

"Secondly. Where this value is ascertained, the same substance is of different value in different soils, and especially under the influence of variation of climate.

"Thirdly. The value is not the same for all crops.

"Fourthly. The mechanical condition of a manure materially affects its action.

"Fifthly. The commercial value of the same substance varies with the source; or, in other words, the same substance has a different value in the arts, according to its origin or form of combination.

"Sixthly. The price of the same substance in the same form varies continually from a variety of causes."

Having dwelt at such length on these valuable articles on chemistry, our space will only permit of a very condensed notice of the others.

Two are prize essays. The first—A Report on the Farming of Buckinghamshire; by Clare Sewell Read, Benton Hall, Brandon. The report is accompanied by an outline map of the geology of the county, with two railway sections, which greatly enhances its value, as *the like would do every other county report for the future.*

The second is On the Retention of Moisture in Turnip Land; by Robert Valentine, Burcot Farm, Leighton Buzzard, who, in his general conclusions, says:—

"Moist climates are more favourable for the growth of turnips than dry climates. To preserve the moisture which is so essential to root crops on light land in a dry climate, foul land should, if possible, be cleaned in autumn or early in spring. Land should be worked as little as possible during the summer months, when the evaporation is usually great. Short dung is most suitable for roots on light soils; otherwise, artificial manure. There have been reasons assigned for growing turnips both by the Scotch system of ridges, and also by the flat system. The matter of hoeing turnips has also been discussed, with especial reference to the retention of moisture in the land."

Other two of the papers are Reports of the Carlisle Meeting: the one On Live Stock, by Mr. Wm. Simpson, 29, Saville-row; and the other On Implements, by Mr. Wm. Fisher Hobbs. Both speak favourably for our summer meeting of 1855—satisfactory progress having been made in each department. On the now all engrossing topic of Steam Culture, Mr. Hobbs says:—

"No satisfactory attempt appeared at Carlisle to carry out the much sought-for application of steam-power to the cultivation of the soil; it is evident, however, that the minds of mechanicians have been extensively turned to the subject. The time is probably not far distant when mechanical invention may yet produce a machine fulfilling the society's condition—viz., that it shall 'in the most efficient manner turn the soil, and be an economical substitute for the plough or the spade.'"

We hardly think less could have been said when so much is at stake, or one word more added without doing dishonour to the golden standard of the society—"Practice with Science."

The remaining four papers are, (1), by Mr. J. Evelyn Denison, On the Grubbing-up of Woods and the Conversion of the Soil to Aration. To landlords wishing to reclaim profitless woodland, the article will be found invaluable, as it gives the *£ s. d.* view of the subject. (2), by Professor Buckman, of the Royal Agricultural College, Cirencester, On Agricultural Weeds. This comprises three valuable tables much wanted—the first exhibiting in seven columns, 1, natural order; 2, botanical name; 3, common or local name; 4, soils; 5, duration; 6, habit of growth; and 7, general remarks as to distribution, &c.: the second, the analyses of the ash of weeds; and the third, estimation of the probable power of increase of weeds; a single plant of red poppy, for example, has about fifty thousand seeds! (3), by Finlay Dun, "On Lameness of Sheep and Lambs." From the experience which Mr. Dun had in the Veterinary College, Edinburgh, no one is better qualified to discuss this timely and seasonable subject; and we venture to say few readers of the *Journal* will be disappointed with his present communication. In the columns of the *Mark Lane Express*, there is hardly a week passes but some unfortunate shepherd or farmer is asking for the information here given. To all of them, therefore, we say, enter the ranks of the Society, and benefit by the knowledge it is half-yearly and yearly conferring on its members through the columns of its *Journal*. And (4), by Mr. C. Wren Hoskyns, Wrexhall Abbey, "On Agricultural Statistics." This is the right article in the right place, at the right time, when Parliament is just assembled, when peace is about to be restored, and when a nation's eye is beginning to look on both sides of her balance-sheet—and by the right author too. What affords an additional pleasure, is the promise that the article is a "mere preliminary one," and that the important subject may furnish hereafter a topic of annual notice in the *Journal* of the Society. We can only quote the concluding sentence—

"Its aim is to exchange doubt for certainty, guess-work for fact, error for truth; and in so doing, to hold up a mirror that can neither flatter nor distort—exhibiting to British agriculture a sight which it has little cause to fear, in a comparative view of the station that it holds in the industry of the world.

## THE CHARTER OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND VERSUS AGRICULTURAL STATISTICS.

A very prevalent opinion, we fear, is current that the Royal Agricultural Society of England cannot, like the Highland Society of Scotland, take an active part in co-operation with Government in the establishment of agricultural statistics, in consequence of its charter excluding the discussion, at its Council meetings, of topics then pending, in or about to be brought before Parliament. Let us inquire, for a little, how far this opinion is correct.

In the first place, there cannot be a doubt that agricultural statistics form a very important branch of agricultural science — one which the Royal Agricultural Society cannot avoid discussing at its Council meetings, or rather which it is in duty bound by its charter to discuss, and that it is perfectly justified in giving a prominent place to the subject in the columns of the Journal, as has just been done in the last number issued.

Such being unquestionably true, what, then, it may be asked, is the meaning or object of the *second* law contained in the charter, that a fundamental "principle of the society shall be, the total exclusion of all questions at its meetings, or in its proceedings, of a political tendency, or having reference to measures pending or to be brought forward in either House of Parliament"? Obviously that its Councils shall not waste their time, at their weekly or monthly meetings in fruitless party-political discussions, which can only be decided by Parliament. "Proceedings of a political tendency" it cannot avoid discussing, itself being a "body politic and corporate." And, as any one or all of the ten objects for which it was constituted may be brought forward as measures before either House of Parliament, it would be absurd to conclude on that account that as a corporate body the society would then be *pro tempore* defunct! Granting that such measures were brought before Parliament, it would still be the province of its Council to discuss freely those objects; only not as Parliamentary questions. For example, granting that a measure were brought before Parliament, "to promote the comfort and welfare of labourers, and to encourage the improved management of their cottages and gardens" — the *tenth* object of the society, and a very important one, too—it would still be at liberty to discuss the subject in any manner it pleased, provided always the question at issue was not made a Parliamentary one. In this case there is nothing to prevent the society appointing a committee to co-operate with Government in carrying out any scheme for the benefit of labourers, analogous to the appointment of the Guano Committee, to control the guano and manure question. In like manner the Council may appoint a committee to control agricultural statistics, and to this committee all correspondence on the subject might be referred; and in like manner, also, it might discuss all statistical topics connected with agriculture, provided no reference were made to Parliamentary measures, past, present, or future.

An example will best illustrate the soundness of the conclusion at which we have just arrived, both as to agricultural statistics themselves, and their discussion at Council meetings, viz.—

Agricultural statistics embrace a certain class of farm accounts, not only of the highest importance to farmers to be properly kept, but also to the nation or public at large. These are comprised in the crop-and-stock books, including those for the dairy and poultry. Into the details of such we need not enter at present; suffice it to say that the annual balance-sheet would show on the one side the total produce of the farm, with stock on hand brought from the previous balance; and on the other side so much sold, so much consumed on the farm, including "seed and bread," and balance in hand carried to next year.

Now, in casting an eye across our provinces, how many farmers will be found neglecting to keep such accounts! How few, indeed, give their farms credit for the whole of what they annually produce! At the year's end they may be able to give you a rough guess how much they have sold, from the weight of their pockets, provided Nature has gifted them with anything like a retentive memory; but beyond this, agricultural statistics are a dead letter to them—a sort of mystical geography they would much rather shun than approach.

But is this state of things such as it should be in 1856? Is there not here a wide field of usefulness, which the Royal Agricultural Society is bound by its charter to occupy and cultivate, and to whose labours every farmer in the kingdom is bound to respond? It is a subject which has, we believe, been oftener than once discussed before its Councils—one which will doubtless be so again, without any member ever dreaming of infringing its charter, and one which never more loudly invited practical consideration than at the present time.

And even this is not all; for every farmer is not only bound to take such a balance at the year's end, as just stated—which we may technically term his actual balance-sheet—of produce; but he is also bound, no less for his own individual interest than that of his country, to take an approximative balance at harvest, by inspection, or as soon as practicable, in order to enable him to draw the necessary conclusion as to what price should be realized when he goes to market. And this balance-sheet ought to be similar to the other, being engrossed in his books in the same form, so that he could fill up the schedule of the statistical department of Government when called upon to do so, profiting by his actual balance as a guide.

We have obviously here, again, another field which the Royal Agricultural Society is bound to enter upon immediately; for it cannot, as a politic body, lose sight of the £ s. d. view of the produce of the British soil. In the United States of America, and several States of Europe, agricultural statistics "lead to practical benefit in the cultivation of the soil;" and therefore, according to the *second* object of the society, they ought to be reduced to practice in England, with its hearty co-operation.

Such is but a very condensed review of this comprehensive subject. It is sufficient, we hope, however, to show that the Council of the Royal Agricultural Society of England would be justified in appointing a statistical committee, to control this important branch of rural affairs.

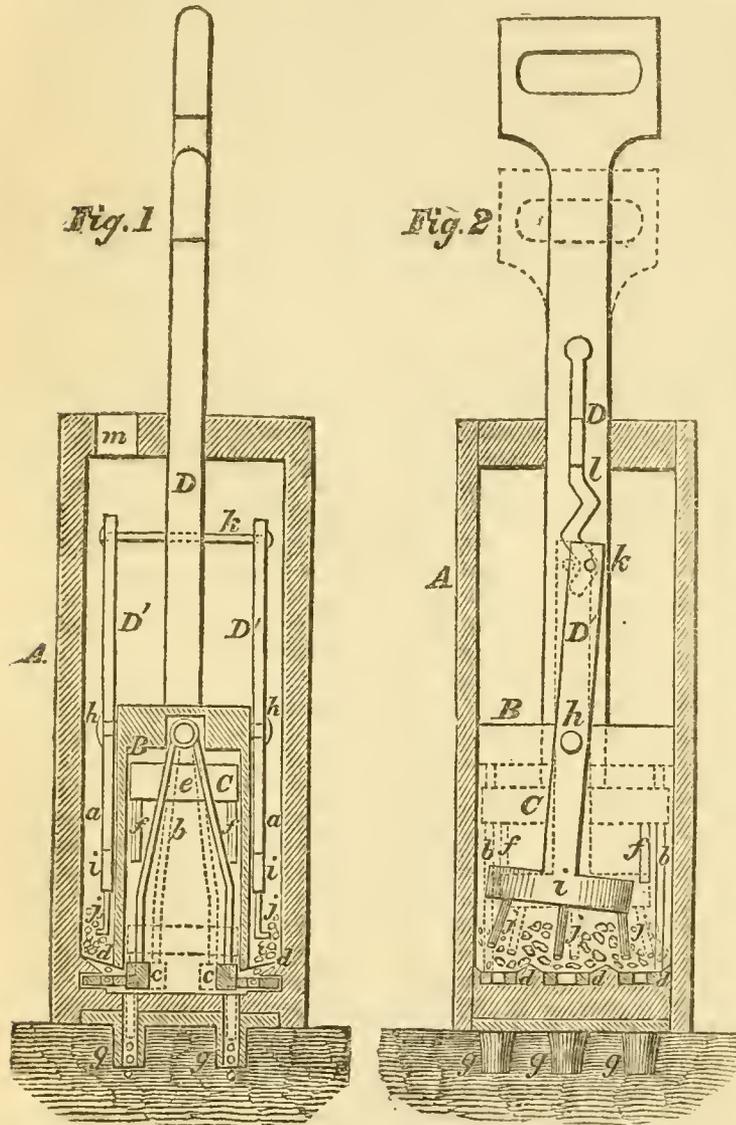
IMPROVEMENTS IN CORN PLANTERS.

[For the following we are indebted to the Editor of the *Engineer* newspaper, which is a most valuable literary addition to the weekly press of London, and brought out in a most finished style as respects both the typography and engravings.]

The accompanying engravings represent Stoddard's improvements in hand corn planters. They are vertical sections taken at right angles to one another; the same letters refer to like parts in both.

A represents a rectangular case of a suitable size, having within it a smaller case, B; within the smaller case, B, there is fitted a follower, C, to which there is a handle or rod, D,

attached, and passing up through the top or cover of the case, A. The smaller case, B, in one direction is equal to the breadth of the case, A, as shown in fig 2, but it is narrower in the other direction, as shown in fig. 1, so as to leave a space, *a*, at each side between them. To the upper part of the smaller case, B, there are attached two springs, *b b*, at opposite sides. The lower ends of these springs are attached to bars, *c c*, to which bars perforated plates or dropping slides are attached, and working through apertures in the lower sides of the case, B, and over the bottom of the spaces, *a*. The end of the follower, C, has recesses or notches, *e*, made in it, in which the springs, *b b*, fit. To the under surface of the follower, C, there are attached a series of rods, *f*; any proper number may be used (probably six would be sufficient—three at each side of the follower), and through the bottom of the case, A, there are made a corresponding number of holes, over which short tubes, *g*, are secured. To each side of the smaller case, B, there is attached by a pivot, *h*, a lever, *D'*. The lower ends of each of these levers has a cross bar, *i*, attached to it, and the vertical rods, *j*, are attached to the lower surfaces of the cross bars. The upper ends of the two levers, *D' D'*, are connected by a cross rod, *k*, which passes through a slot, *l*, in the handle or rod, D, of the follower, C. The upper part of the slot, *l*, is straight, and the lower part of zigzag form, as shown in fig. 2. The top or cover of the case, A, has an aperture, *m*, made through it, as shown in fig. 1.



The implement is used as follows: The case, A, is filled with corn, and the rod or handle, D, is drawn upwards, as shown in the full lines. The tubes, *g*, are then forced into the ground, and the handle or rod, D, pressed downward. As the follower, C, descends, the springs, *b b*, are contracted, and the plates or distributing slides, *d*, are drawn within the smaller case, B. The apertures in the slides are then brought directly underneath the rods, *f*, attached to the follower, and the zigzag portion of the slot, *l*, operates the levers, *D' D'*, while the rods, *j*, attached to the cross bars, *i*, of the levers are vibrated, and cause the corn to enter the apertures in the plates or slides, *d*, previously to their being drawn within the case, B. As the follower, C, descends, the rods, *f*, force the corn from the apertures in the plates, *d*, down within the tubes, *g*, and leaves each kernel the requisite distance in the ground (represented by dotted lines). As the follower is drawn upwards, the springs, *b b*, are allowed to expand, and the plates or slides, *d*, return to their original position.

The nature of this invention consists in the arrangement of the follower, C, the slide plates, *d*, and the levers, *D' D'*, provided with the cross arms, *i*, and rods, *j*, operating as has been described. One of these implements with six tubes places six grains in a hill, and these at equal distances apart and at an equal depth throughout the field. It is used by a person

planting the same as if he were walking through the field with a walking cane, it making the holes when set down, and covering the seed when raised.

BATH AND WEST OF ENGLAND SOCIETY.

The monthly meeting of this society was held on Saturday, the 26th January, at Taunton, C. A. Moody, Esq., M.P., in the chair. There were also present Messrs. H. G. Andrewa, Mark Farrant, T. Newman, J. D. Hancock, T. Danger, Jonathan Gray, J. H. Cotterell, C. Gordon, jun., J. Widdicombe, W. E. Gillett, John Gray, H. G. Moyses, T. D. Acland, and J. Sillifant.

The reports from the different sub-committees appointed to

arrange the chemical lectures which had been delivered by Professor Augustus Voelcker, were brought up, and which stated the satisfaction that such lectures had caused, and also suggesting the great utility which might be anticipated from a continuance of them.

Some routine business relating to the approaching meeting at Yeovil having been transacted, the following new members were enrolled:—John Webber, West Ragborough; S. T

Seddon, Broadclyst; Henry Coate, Sherborne; P. Bunt, Exford; John Tamlyn, Stoke Zero; A. Bodley, Exeter; H. Norrington, Exeter; John Kelly, Chudleigh; John Game, Milborne Wick; F. Rowde, Ekey Lostwithiel; Rd. Foster, Castle Lostwithiel; Oliver Maggs, Wincanton; James Harding, Dorchester; Wm. Marden, Yeovil; Thos. Marriott, Floor Weedon; J. Spiller, Honiton; A. Gregory, Montacute; J. Anthony, Yealmpton; Jas. Howard, Alphington; Benjamin Start, Kingsbury, South Petherton; Wm. Trehane, Plymouth; and Wm. Thompson, Maristowe.

### COVERED YARDS AND BOX FEEDING.

SIR,—The general introduction of under-cover feeding which is gradually superseding the ordinary open farmyards with untroughed buildings, renders it necessary to consider the matter with reference to the health of our animals. The heavy losses from disease prove that at present there are many points affecting the sanitary condition of our animals that require inquiry and amendment. I purpose stating my own experience and some other facts, in the hope that my brother agriculturists will communicate their views and practice on this important question. I say all-important, because I believe that when we get statistics of the number of all animals lost by disease on each farm, it will show a formidable sum-total of deduction from the farmers' profits. For many years I have kept my bullocks, sheep, and pigs on open boarded floors, and with complete success, never having in any instance had a complaint amongst them, although sometimes from 300 to 400 pigs, 200 sheep, and 30 to 50 bullocks have been placed in close quarters.

Although I cut up a great quantity of straw for consumption by my animals, still, owing to the large bulk I now grow, I find I cannot get rid of it all in that way. I therefore converted my large barn into a covered yard, and have had therein at various times three lots of bullocks, none of which turned out satisfactorily, either as regarded the animals or the manure, although they were well littered down with clean straw every day. I suspected that the cause of this was the heating of the manure under them, which became so intensely hot, although moist, that, on removing the upper layer, volumes of steam would rise to the top of the barn. One week was sufficient to render it as hot as a cucumber bed, and in five or six weeks the dung became "fire fanged" and undecomposed. Knowing how many covered yards succeed, and having observed the dung from these removed in a rich, cool, "spitting" condition, and knowing too how discrepant have been the various results of box and under-cover feeding, I instituted inquiries into the cause, and received from one whom I consider the father of covered yards a most lucid explanation. I had for many years seen in the covered homestalls of the Rev. Mr. Cooke, of Semer, near Hadleigh, many fine beasts in perfect health and condition, on manure from two to four feet thick. To him, therefore, I applied for explanation and information. "Well," he said, "like yourself, in my early days I found my cattle unhealthy, and perceived that the cause was a too liberal supply of straw as litter; the air being thus admitted, set up violent fermentation and the heating process. I therefore allowed the 'pudding' or solid manure to accumulate, scattering by hand very thinly merely as much straw as would make a pasty mortar bed of thick doughy consistence, the result being the exclusion of air and perfect coolness. It would be better to run the risk of the animals being somewhat dirty, than that there should be an active fermenting mass."

This explanation of Mr. Cooke's I consider so valuable, that I think it an agricultural duty to make it known. By only applying as much straw as will tread into and amalgamate with the manure, it is preserved in that condition in which it may be ploughed-in for roots, without the process of dung-heaping. We all know practically, that if pigs are permitted to lie on fermenting or hot manure they will have the "heaves," a lung disease, as fatal as the pleuro-pneumonia in

cattle. The whole question of under-cover feeding thus resolves itself into one of so proportioning the straw to the manure that the mass shall be sufficiently pasty to remain cool. I have known pig-feeders (not farmers), who, having no straw, successfully fattened their hogs, although wallowing in and bedaubed with cool manure; whilst others who permitted too free a use of straw got heat and disease.

The natural tendency of a farm-yard labourer is to litter abundantly; nor can we wonder at it, when we know the thorough washing which farm-yards receive by heavy rains and water from untroughed buildings. There is no fear of too much heating here. Still, in a warm dry spring I have known cattle attacked with lung disease by lying on dense masses of manure in open yards, the internal heat of which was fatal to their health. We must never forget that the liquid manure is thirteen times more in weight than the solid. If so, how great must be its loss in sloping open yards!

Thinking this matter a very important one, I have sent a copy of this letter to several agricultural periodicals.

Tiptree Hall,  
Kelvedon, Essex, Jan. 31.

Yours truly,  
J. J. MEEHL.

P.S. Mr. Lawrence, of Cirencester, keeps his farm horses in boxes, removing the manure once in six or eight weeks. He cuts his straw into 4-inch lengths. In our eastern counties straw is generally more glassy and reedy than in moister districts. Mr. Randall, in the vale of Evesham, manages his sheep in winter under cover by placing them upon burned clay, or brick-dust, in fact. He has been for many years a great clay-burner; and wheels daily (I believe) one barrowful, morning and evening, to every six large sheep. The result is perfect health and appetite, and a most valuable compost, producing great crops of roots. I can, from my own experience, strongly recommend burned clay for this purpose. I find a chalk floor has a greater tendency to heat than a bricked floor.

### YIELD AND QUALITY OF THE WHEAT CROP OF 1855.

SIR,—According to the old adage, it is said that  
"On Candlemas Day"

we should have—

"Half our turnips and half our hay:"

I say, half our wheat also; but the steam engine has been so constantly employed in driving the thrashing machine ever since the completion of last harvest, that I fear more than half the crop of wheat has passed from the growers' hands. And having thrashed and sold full half of my crop of wheat, I can speak as to the yield and quality, and have no hesitation in saying it is the worst crop I have grown for 30 years.

As compared with that of 1854 there will be a deficiency of upwards of 600 qrs. upon 400 acres of wheat, and more than 3 lbs. per bushel short of the weight of last year's grain; and 500 qrs. less than the average of four previous crops of wheat upon my farm here.

I have made frequent inquiry of my neighbours as to their crops of wheat, and find they are all deficient in the produce to the like extent. And what is to be done with the flocks of sheep I am at a loss to conjecture. The turnips and swedes are very much decayed, and hay is very scarce.

Respecting the wheat in the stack, I would recommend my brother farmers to thrash and sell *regularly* during the next 25 weeks that will intervene between this time and the period when the growing crop may be expected to be ready to cut; and I hope the merchants will be able to import enough wheat to carry us through until the next harvest is completed.

I am, sir, your obedient servant,

JOHN HUDSON.

Castle Acre, Feb. 14th, 1856.

METEOROLOGICAL DIARY.

BAROMETER.			THERMONETER.			WIND.		ATMOSPHERE.			WEAT'R.
1856.	8 a.m.	10p.m.	Min.	Max.	10p.m.	Direction.	Force.	8 a.m.	2 p.m.	10 p.m.	
	in. cts.	in. cts.									
Jan. 22	29.27	29.42	38	40	38	N. East, var.	gentle	cloudy	cloudy	cloudy	rain
23	29.23	29.48	37	53	48	S. West	brisk	fine	fine	cloudy	dry
24	29.00	28.99	44	46	46	S. West	strong	cloudy	cloudy	cloudy	rain
25	29.00	29.40	42	50	41	West	gentle	cloudy	sun	fine	dry
26	29.50	29.41	40	49	42	S. Westerly	gentle	cloudy	fine	cloudy	showers
27	29.65	29.78	38	44	33	W. by N.	gentle	fine	sun	fine	dry
28	29.75	29.63	28	40	36	W. by N.	gentle	fine	cloudy	fine	showers
29	29.66	29.70	28	38	29	W. by N.	gentle	fine	sun	fine	dry
30	29.72	29.30	25	35	31	W. by N.	gentle	cloudy	cloudy	fine	dry
31	30.05	30.20	26	35	29	W. by N.	gentle	fine	sun	fine	dry
Feb. 1	30.11	30.08	27	36	34	W. by N.	calm	cloudy	cloudy	cloudy	dry
2	30.01	29.95	30	34	32	Variable	calm	cloudy	cloudy	cloudy	dry
3	29.99	30.00	29	43	32	S. by E.	gentle	fine	sun	fine	dry
4	30.01	29.95	28	42	39	South	gentle	fine	cloudy	cloudy	dry
5	30.15	30.15	36	48	43	W. to N.	airy	fine	sun	cloudy	dry
6	29.99	29.64	42	48	49	S. West	fierce	cloudy	cloudy	cloudy	rain
7	29.70	29.96	48	53	52	S.W.	brisk	cloudy	cloudy	cloudy	showers
8	30.05	30.06	48	52	50	S.W.	brisk	cloudy	cloudy	fine	showers
9	30.05	29.92	47	55	51	S.W.	lively	fine	sun	fine	dry
10	30.00	29.95	45	52	48	S.W.	gentle	cloudy	fine	cloudy	dry
11	29.95	29.86	46	50	46	S.W.	gentle	cloudy	cloudy	cloudy	dry
12	29.82	29.70	45	50	48	S.W.	gentle	cloudy	cloudy	clear	dry
13	29.83	29.68	42	52	48	S. by E., & W.	gentle	cloudy	cloudy	fine	drops
14	29.77	29.77	45	52	43	South	airy	cloudy	sun	fine	drops
15	29.77	29.77	43	52	44	S. by W.	lively	cloudy	sun	fine	dry
16	29.77	29.82	38	53	44	East	var.	fine	sun	cloudy	dry
17	29.85	29.84	37	40	38	East	brisk	cloudy	cloudy	cloudy	dry
18	29.83	29.73	34	36	36	E. by N.	lively	cloudy	cloudy	cloudy	rain
19	29.77	29.83	33	37½	35	E. by N.	fresh	cloudy	cloudy	cloudy	drops
20	29.87	29.84	31	37	33	E. by N.	brisk	cloudy	cloudy	cloudy	dry

ESTIMATED AVERAGES OF FEBRUARY.

Barometer.		Thermometer.		
Highest.	Lowest.	High.	Low.	Mean.
30.82	29.17	53	21	38

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
45.18	37.3	40.85

WEATHER AND PHENOMENA.

January 22. Changeable.—23. Night shower.—24. Tempestuous wind.—25. Bright day.—26. Change of wind, and a shower.—28. Change to north, introducing frost, continuing to the end.

LUNATIONS.—Full moon, Jan. 22nd, 3h. 29m. A.M.; last quarter, 30th, 8h. 35m. A.M.

February 1 and 2. Overcast and chilly.—3. Bright and cheerful.—4. Changeable.—5. Night

shower, then fine.—6. Driving winds; some rain: and on the 7th a shower.—9, 10, 11, 12, and 13th with rain above 0.30 cts.—14. Improving; fine p.m.—15. Fine.—16. Change to east; light driv-winds.—17. Cutting east wind.—18. Close; rain in the night.—19 and 20. Overcast, and cold.

LUNATIONS.—New moon, 6th, 10h. 35m. A.M.; first quarter, 13th, 2h. 12m. A.M.

REMARKS CONNECTED WITH AGRICULTURE.

The mean of this changeable period exceeds that of the usual estimate by rather more than 2 degrees. Frosty and extremely warm periods have alternated each other, and the amount of rain has been ample. Snow has been little and transitory. Corn has required no protection; and of this the promise is good. The verdure of pastures was restored some weeks since, and the keen east winds of the last five days afford a seasonable check.

Croydon, Feb. 20.

JOHN TOWERS.

REPORT OF AN EXPERIMENT ON GROWING TURNIPS WITH DIFFERENT MANURES ON THE FARM OF CRAIGLOCKHART.

By MR. ALEXANDER SCOTT.

The turnips were Skirving's purple-top yellow; they were sown on the 11th June, 1855, and lifted and weighed on the 22nd of November. The soil is black loam, lying on whinstone rock, naturally dry, of medium fertility, and inclined to grow a small quantity of straw.

Manures applied.	Per acre.		Coat per acre.	Produce per acre.	Value of crop.			Value of crop, less cost of manure.
	Cwt.	Price.			Tons cwt.	Ton.	Acre.	
		a. d.	£ s. d.		s.	£ s. d.	£ a. d.	
Guano.....	4½	11 4½	2 11 2¼	20 4½	10	10 2 3	7 11 0¾	
Phosphate of lime.....	4½	8 4 1-5	1 17 6 9-10	19 16	—	9 18 0	8 3 5 1-10	
Bone-dust .....	4½	8 6	1 18 3	18 18¼	—	9 9 1½	7 10 10½	

From the time the turnips braided until the end of August the different lots could scarcely be distinguished from each other. About that period the whole began to suffer from want of rain, and became much mildewed; however, those grown with guano suffered less than the others, and from that time until the end of October distinctly marked themselves by a greener and fresher appearance, which, although to a less extent, continued until they were lifted.

The turnip tops have been all left on the ground to be ploughed in, and it is intended to sow the field with wheat, and next season ascertain the result of the wheat crop.

The following is an analysis of the manures employed, as furnished by Professor Anderson, Chemist to the Highland and Agricultural Society of Scotland:—

	Guano.	Bone-dust.	Phosphate of lime.
Water .....	14.22	8.10	8.43
Organic matter and ammoniacal salts .....	50.63	38.70	3.95
Phosphates .....	26.54	44.50	{ soluble 11.54 insoluble 16.69
Alkaline salts ....	7.38	—	2.42
Sulphate of lime .....	—	—	41.62
Sulphuric acid .....	—	—	8.86
Carbonate of lime ....	—	7.14	—
Sand.....	1.23	1.56	6.44
	100.00	100.00	100.00
Ammonia.....	16.15	4.96	1.21
Phosphoric acid in alkaline salts, equal to 5.11 phosphate of lime	2.34		

— *Journal of Agriculture.*

THE EFFECTS OF THE WAR UPON THE COMMERCE OF THE COUNTRY.

The unhappy gentlemen who, for this last year or so, have continued to prostrate themselves for peace, have still the worst of the argument. Honour, character, and national repute might easily be sacrificed if we but lost our business in the endeavour to maintain them. Our cause must be a bad one for this reason; our fate on the strength of the same premises was argued as equally unfortunate. We were a commercial people, and we were simply destroying our trade and commerce by going to war. We were denied the opportunity of supplying our best customers, and so with increased taxes and decreased returns, we were committing a political suicide in obstinately persisting to defy the dictates of justice, humanity, and common sense.

All this is as true in any one of these particulars as it is in any other—that is to say, it is a piece of special pleading, utterly false from beginning to end. We knew our cause to be a just one from the moment we took it up, and the further we

proceed, the more strengthened are we in believing that it will be successful. So far then, and we may continue satisfied with what we have done. But this is not all. The worthy man who would barter name and reputation to drive a good trade, has been a little premature in his fears and assumptions. The war has not destroyed our commerce. We have been engaged with a country which has been quite powerless in effecting anything of the kind. Here, at the close of our second year in the contest, the official returns just published show us to be doing as good an export trade as when we first commenced the struggle. There never could be a better argument for the position England is entitled to hold than these returns offer. We pay for war of course. We naturally suffer something in men and means; but we are no hand-tied people who have nothing else but war to talk and think about. Each one of us may pursue his own business as profitably as ever. The croaker who thinks he cannot, will be heard with as much respect and

attention as when he preached up peace at any cost and sacrifice.

From the returns published the chief falling-off will be found in our imports, especially in articles of consumption; and for this there may be many reasons almost altogether independent of the requirements for war—the indifferent harvest, for instance, in America, 1854, and in France and other parts of the continent last season. In a very able digest of these returns in the *Economist*, a somewhat different cause is assigned. As peculiarly in place here, we give the passage entire, altogether demurring as we must to our own harvest of last year being recorded as a *large* one:—

“We are now at the end of the second year of war; and, though we are not furnished with any estimate of the value of our imports in 1855 to compare with the value in 1854, the quantities of those articles most affected by the war have suffered no great diminution, or some compensation for the diminution has been found. Foremost amongst the articles which have declined, and the most important of all our imports, is corn, of which the following figures will tell the history during the last three years:—

	Wheat.	IMPORTED.	Wheat Flour.	Total Flour
	qrs.	Total Grain.	cwts.	& Meal.
	qrs.	qrs.	cwts.	cwts.
1853....	4,915,430	8,847,608	4,621,506	4,638,010
1854 ..	3,431,227	6,850,500	3,646,505	3,705,160
1855....	2,667,702	5,729,241	1,994,224	1,922,318

There has been, therefore, in 1855 a great falling off in the imports of wheat, as compared to 1854 of one-fourth, and as compared to 1853 of almost one-half; and of flour, as compared to 1854, of almost one-half, and as compared to 1853 of much more than one-half. Now, it must be recollected that our own harvest in 1853 was small, and the harvests of 1854 and 1855 were large, and that the deficiency of the foreign imports in the two years is in great part due to the abundance of our own crops. There can be no doubt that the war has now begun to operate seriously against our supply of food; and were it to continue, and should Providence afflict us with a bad harvest, we might be somewhat straitened; but our difficulties, whatever they might be, would be shared by the whole trading world. At present the price of food in the United States, affected in this respect by the war only indirectly through our demands, is very nearly or quite as high as in England.”

This puts what may or might yet follow certainly in the least favourable light, but even then we should be no worse off than other countries. The

only possible deduction to be drawn is, that as large consumers of breadstuffs, we must be made to depend more and more upon our own resources. Could Great Britain, now, but grow sufficient corn for her people, how unprecedentedly strong would be her position! And yet there are men who still complacently refer to all they have done and advised, who told us but a very few years since that it would be quite as well for us if we did not ourselves produce a bushel of corn!

A decline in the importation of stock is also observable, but by no means in the same ratio. An increase, indeed, in some descriptions of animals justly compensates for the less numbers of others. Cows, calves, sheep, and lambs, as our table shows, have fallen off during the last year; while oxen and swine exceed those landed in 1854. The article we have already quoted from makes out another run-and-read summary equally interesting to the agriculturist:—“From the tables we learn that the quantity of hops charged with duty in 1855 was 83,221,004 lbs., against 9,877,126 lbs. in 1854, and 31,757,693 lbs. in 1853. Such a comparison, showing the revenue yielded in one year nearly nine times as great as in another, combined with the fact that hops, though an article of general consumption, grow in very limited districts, suggests the conclusion that they are one of the articles which should be relieved from excise duties. The quantity of malt charged seems progressively to decrease, and was in 1853, 42,039,693 bushels; in 1854, 36,819,554 bushels; and in 1855, 33,884,609 bushels; a decline of more than a fifth in three years.”

The Malt Tax is generally characterised as a war tax, while its effect continues to assure us it is one of those imposts that cannot be too soon modified, if not altogether removed. With wine promising day by day to be dearer, the repeal of the Malt Tax will become more and more a consumer's question. The last returns say nothing in its favour. Even with an outward trade alone in malt liquors that might be made more and more of, “the quantity of malt progressively decreases.” In England, too, beer is anything but that attainable luxury it should be.

At such a momentous crisis, we repeat, it is a matter of peculiar satisfaction to find the commercial prosperity of the country so intact. Our very wants can hardly be chargeable to the struggle in which we are engaged; while the knowledge of what we have here before us should incite our representatives to maintain to the full the honour of the country—seeing at how small a detriment this may be to the people.

## CALENDAR OF AGRICULTURE.

Sow oats and barley on dry lands in favourable weather; also vetches, peas, beans, and flax-seed. Sow lucerne on well-prepared ground, trenched or very deeply ploughed, and richly dunged. Sow carrots and parsnips, best on warm sandy loams in good condition from previous usage, without the

present application of fresh manure. Steep the seeds in lyes of urine, and dry them with lime. Sow sainfoin, and dress the young plants with gypsum. Apply artificial manures as top-dressings on young wheats, barleys, and clovers—soot and salt, malt-coombs, rape-dust, nitrate of soda, pigeons

dung, and gypsum. Sow cabbage-seeds for summer plants, and lay composts on grass lands.

Plant hops, and make the hills six feet distant each way; use thoroughly rotted dung, and put four sets in each hill, one in each corner, and cover them lightly with earth, leaving the upper end of the set just in the light of day.

Continue the planting of forest-trees and of young hedges, but cease if dry weather sets in. The cutting of underwoods will now be finished. Watered meadows may now be stocked with light animals. Set traps for vermin, and spread mole-hills.

Cross-plough fallows for green crops, and also clay lands for wheat fallows, if the weather be dry. Shut up the fields of young grasses that are intended for hay, and finish the preparation of meadow grounds by bush-harrowing and rolling. In wet weather, thrash grain, and carry dung from the yards to the heaps in the fields.

In most situations, this month will be the busiest with the ewes dropping lamb: feed amply with juicy food, as beet, cabbages, and turnips; provide shelter, that is equally necessary as the food. The shelter sheds must be littered to be dry, best with chaff and very short straw; remove the ewes and lambs to the pasture fields from the lambing paddock regularly, as the lambs get strong.

Keep the poultry houses dry and warm, and set all kinds of eggs for hatching—feed well, and provide clear spring-water.

Finish the killing of hogs for bacon, and keep all young pigs for summer stores, and for early-feeding next winter. The latest fattening bullocks will now be sold, or pushed forward by superior feeding. The longer days will now require a greater supply of food, as day-light always induces animals to eat more.

## AGRICULTURAL REPORTS.

### GENERAL AGRICULTURAL REPORT FOR FEBRUARY.

Although numerous alternations have been experienced in it, the weather during the greater portion of this month has been fine, though, perhaps, rather too mild for the young wheat plant. Apart from the state of the weather, we have had a growing interest, both on the part of producers and consumers, respecting the future range in the value of wheat. Although the late panic in the trade—arising from peace prospects—had subsided, and although a slight advance has taken place in the quotations, the demand for all descriptions has been by no means active. Millers generally have purchased for immediate wants only, and bakers have acted upon the same cautious system, both these classes being apparently under the impression that we shall have prices considerably lower. We, however, are really at a loss to understand the principle upon which calculations for a much lower range in the currencies has been made. Is it assumed that we shall have overwhelming importations? or that the stocks of home produce now in the hands of our growers are in excess of the ordinary run of years? But we are told that the restoration of peace will bring us immense supplies of wheat and other articles from Russia, and those, too, purchased at a very low price. Now, assuming that we receive 1,000,000 quarters of wheat from that country by the end of next September, will that quantity compensate for the falling off in the yield of English grain last year? We say deci-

dedly not. Then, again, it is supposed that the United States have very large quantities of food to spare for us, over and above the ordinary consumption of that country. No doubt America has yet to forward a good supply of wheat and flour; but when we bear in mind that about one half of the entire shipments from the States goes to France and other parts of the continent, and that Europe still requires an immense supply of foreign food, the fair inference to be drawn is that we shall import no more than we actually require; consequently, to dispose of stocks under the influence of a panic, is simply a departure from the true principles of commerce. We all know that Russia is a very large corn-producing country—that in former seasons, during periods of peace, she has shipped extensively; yet we must bear in mind that during the last two years she has been engaged in a severe conflict; that nearly 800,000 men have been withdrawn from the soil; that large breadths of land have gone out of cultivation; and that the crops in the southern portions of the empire have proved a failure. Under these circumstances, we are much inclined to doubt the ability of Russia to ship largely this year; and we feel confident that the total importations of food into England will not be more than adequate to our wants.

We have to report a considerable decline in the value of all spring corn, especially in oats, beans, and peas. Malt, too, from the uncertainty which prevails on the subject of the duties, has been excessively heavy and drooping. According to the

last act, the additional duties are to cease on the 5th of July, immediately after the conclusion of peace; consequently, if we have peace before that period, the new duties will be repealed.

Much has been said of late respecting the available stocks of wheat in the hands of the growers: some parties have intimated that fully one-half of last year's crop has already been disposed of. Such may be, and no doubt is, the case in some districts; but we question much whether the remark can be applied to the whole country. There is no doubt whatever but that very great inroads have been made upon it; and there is no question in our minds but that large quantities of dry foreign will be required for mixing. The potato crop is still proving immense. Not only the metropolitan, but likewise the country markets are most abundantly supplied with potatoes, some of which have sold as low as 40s. per ton, the highest value for York regents being 95s. The quantities on hand are, we learn, still very large.

The cattle trade has been by no means so active as could be desired. Although, towards the close of the month, there was an improvement in the demand, prices, taken collectively, have ruled much easier than for a considerable period.

We have to notice a considerable improvement in the demand for all kinds of English wool, the stocks of which appear to be reduced to a very narrow compass, and prices have advanced fully 1d. per lb. The public sales of colonial wool now in progress, and at which about 40,000 bales will be brought forward, are going off well, at an advance in the quotations of from 2d. to fully 3d. per lb.

The supplies of each kind of hay continue limited, and prices are still very high. The failure in the growth in 1855 has been severely felt by all parties immediately interested in the trade. Straw has come forward freely, and sold at low prices, viz., 24s. to 29s. per load.

In Ireland and Scotland the corn trade has been in a most inactive state, from causes to which we have alluded.

In cattle a steady business has been done for the English markets, but the shipments of produce have not increased.

#### REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

The comparative inactivity in the cattle trade during the greater portion of the past month has, we find, led many parties to conclude that the consumption of food has been materially curtailed, and that the value of live stock has not yet seen its lowest point; but a very few observations will, we imagine, tend to dispel any such illusion. True it

is, that the importations of foreign stock into the United Kingdom have exhibited a great falling off, and that our various cattle markets have not been so extensively supplied as at some previous corresponding seasons; but on the other hand, causes over which the graziers have had no control have operated against value. In the first place, the weather has been extremely changeable; and in the next place, owing to the facilities now afforded by the various railway companies for forwarding dead meat to London at a very low rate of carriage, enormous supplies of beef and mutton, drawn from distant parts of England as well as from Scotland, have been on sale in the dead markets. Then, again, in consequence of the limited supplies of winter turnips, and the high value of artificial food, numerous graziers have found it necessary to slaughter their stock and forward it to London, under the impression that a loss would result from keeping a surplus number. The fall in the value of tallow, and the decline in the price of rough fat, have, as a matter of course, had their accustomed influence upon the trade, which has returned to the graziers a smaller amount of profit than in any month since the beginning of 1855. Still, we look forward to a much better state of things; in other words, we anticipate a considerable increase in the consumption of meat; and unless we have an immense increase in the importations from the continent, prices are therefore likely to rule very high during the whole of the present year, even though the available supply of stock in the United Kingdom may be large. Our reason for this supposition is based upon a strong impression that we shall shortly have peace with Russia—that it will give an immense impetus to trade and commerce, and, consequently, that it will be the means of giving great additional employment to our citizens and others. We may, too, look forward to the period when taxation will become lighter, and when we shall have a lower range in the value of money; all these features, highly valued as they must be, cannot fail to impart their usual influence upon the trade in cattle, and to give both the farmer and grazier a steady return for their outlay of capital. But we may be met with the assertion that our imports from abroad will be so overwhelming that prices will fall rather than advance; we, however, are no believers in such a doctrine, because if you create additional wants, means must be adopted to meet them; and as far as fat stock is concerned, the position of the trade in it during the last two years fully warrants us in saying that the surplus produce of Holland is now, from the enormous demand likely to continue for it on French account, little calculated to have any serious influence upon the prices of home-fed animals.

On the whole, the health of the stock in our leading districts continues good; but the scarcity of turnips and other food has been productive of much inconvenience.

The following are the imports of foreign stock into London during the month:—

	Head.
Beasts .....	2,230
Sheep .....	353
Calves .....	496
Pigs .....	8
<hr/>	
Total.....	3,087
Corresponding month in 1855 .....	2,839
„ 1854 .....	10,683
„ 1853 .....	12,433
„ 1852 .....	9,123
„ 1851 .....	11,828

The above have been chiefly derived from Holland; but we have had two arrivals of beasts direct from Oporto. These animals have been in only middling condition, and we doubt much whether they are likely to prove a source of profit in future, notwithstanding the low prices at which they may be purchased in Portugal.

The total supplies of stock from all quarters exhibited in the Great Metropolitan Market have been

	Head.
Beasts .....	19,642
Cows .....	495
Sheep .....	99,950
Calves .....	673
Pigs .....	2,614

COMPARISON OF SUPPLIES.

	Feb., 1852.	Feb., 1853.	Feb., 1854.	Feb., 1855.
Beasts ..	18,797	19,308	20,091	17,436
Cows ..	433	470	520	385
Sheep ..	95,306	86,910	92,441	91,180
Calves ..	1,503	2,098	1,028	596
Pigs ..	2,439	2,420	2,279	2,705

Of the supplies of beasts shown last month, 10,200 Scots and short-horns were received from Norfolk, Suffolk, Essex, and Cambridgeshire; 2,800 of various breeds from other parts of England, 1,420 Scots from Scotland, and 484 beasts from Ireland, chiefly *via* Liverpool. We may observe that the general quality of both beasts and sheep has exhibited a decided improvement over several previous months. About 3,000 sheep have appeared out of the wool: if graziers generally considered the great loss which they frequently sustain by sending clipped sheep to London during inclement weather, they would immediately stop a system which presents no advantages to any party.

Full average supplies of meat have been on sale in Newgate and Leadenhall. Generally speaking, a steady demand has continued as follows:—Beef from 2s. 8d. to 4s. 4d.; mutton, 2s. 8d. to 4s. 4d.; veal, 4s. to 5s. 4d.; and pork, 3s. 2d. to 4s. 10d. per 8lbs. by the carcass. A few carcasses of lamb have sold at 5s. 6d. to 6s. 4d. per 8lbs.

M I D - K E N T .

Since the last report, we have passed through what is usually the worst winter months; but somehow the present one differs widely from the last, in fact the only severe weather we have had was some sharp frost immediately before Christmas. Since then it has been very mild, and though not very wet, it has been sufficient to keep the fields and roads in an extremely moist soft state; the roads especially being very dirty and bad: even those which are generally good in winter have been very indifferent this season. It is to be hoped that the dry weather we expect to have in future will benefit them; at the same time, we must not be too sanguine of having dry weather; for, on the whole, the present winter has been a dry one since October, compared with the generality of seasons, so much so, that at the present time (the 19th of February) some of our small streams are low and wells anything but abundantly supplied. In respect to crops, the wheats look well, and the same may be said of autumn-sown tares; but turnips have gone off sadly at the bottom, the best roots amongst the swedes being almost all decaying; so that many growers are hurrying them off, in some cases, at a great sacrifice. This is unfortunate, as there is every possibility of a late spring, and fodder is anything but plentiful, the hay crops of last year being light; and though there was no deficiency of straw, still the quantity grown in this district is by no means equal to its wants, more especially as there has been a growing demand for it at the paper mills in the neighbourhood, where large quantities are used. And as the month of September was not a growing month for after-grass, there has been less feed in the meadows than usual in winter; added to this, sheep in a general way have done very badly; a disease difficult to explain has carried off large numbers, especially lambs of last year. This is very unfortunate; many farmers have lost quite one-half their flocks; different remedies have been tried without much success, but it is hoped the evil is subsiding. Cattle have in some places been attacked with the lung disease, but not to any serious extent, the mortality amongst sheep being the most heavy loss. As usual, much difference of opinion exists in regard to the prospects of hops; and as most of the growers still hold large quantities on hand, a considerable latitude of opinion exists in regard to the prices likely to be obtained next year. As the most experienced growers predict an indifferent crop, many that are not necessitated to sell out hold on, expecting to realize quite as good prices hereafter as those now offered. This spirit, more than any aid from the export trade, tends to keep up the price of autumn for most descriptions of hops; but it will likely fluctuate very much as the season advances, and the varied prospects of the ensuing crop act on the market. There is no disposition to decrease the plantation, which is more extensive now than at any former period of the history of the hop; and the fact of fifty per cent. more hops being grown last year than in the most prolific one of the present century (1826), it necessarily becomes a matter of anxiety what future demand there may be for this production. It is, however, gratifying to record the general spirit of enterprise of most of our hop growers, especially those who have sold out; for low as the price was, compared with the last two years, it was still a remunerating price, and the large growth made up for it. The winter certainly has not been favourable for getting on with many works connected with this time, so that the ensuing spring weeks will be busy ones; and it is to be feared that the long, dull, moist season, succeeding the frost of December has nearly neutralized its effects in fertilizing or rather pulverizing the soil. This will in a measure be guided by the weather that is to follow; but those having a stiff obstinate soil to deal with, begin to look on it with alarm, as being likely to resemble the spring of 1853. This is very unfortunate where there are large breadths of land under spade cultivation, and it must necessarily be equally bad for all growing crops. It might be added that the soft state of the ground has prevented the plough being used much this season yet, and our heavy land farmers hail with delight the prospects of fine weather, which the last few days present; in other respects there is little to complain of, in the general aspect of things.—Feb. 19.

## AGRICULTURAL INTELLIGENCE, FAIRS, &c.

**BEDALE FAIR.**—We had a moderate show of all descriptions of cattle. Beef sold at prices a trifle higher than last market. Holding stock and incalving cows were a trifle below late rates. A thin supply of sheep had brisk demand, mutton being  $\frac{1}{2}$ d. per lb. higher. Beef, 6s. 6d. to 7s. per stone—mutton, 6d. to 7d. per lb.

**BROUGH FAIR.**—The weather was exceedingly wet, yet there was a large show of cattle, which was mostly sold, and at prices better than was expected; calvers from £12 to £17; good fresh geld were much looked after; and cattle of all descriptions met with a ready sale.

**CHARLBURY FAIR** was more numerous and satisfactorily attended than in any former years, and trade in cattle was very good, especially for horses.

**DORCHESTER FAIR** was more than usually large, the supply of stock being very extensive, and the attendance of buyers comparatively good. Useful cart-horses sold well at high prices. There were also a few inferior hacks, which owing to their scarcity made tolerably good figures. Fat cattle and good barreners were scarce, and readily met with purchasers, the former making from 10s. to 11s. per acre, and the latter from £8 to £12 per head, the average price being £9 or £10. Inferior cattle, being plentiful, were a drug in the market, and changed hands at low prices, though many went away unsold. Anything of good quality, however, was readily bought up. This not being a sheep fair, there were only a few lots exhibited, which were quickly disposed of at about 7d. per lb.

**DUMFRIES HORSE MARKET.**—On Wednesday there was a very large turn-out of draught horses, being nearly 800 of all kinds, but of these there were considerably more of a secondary description than on Tuesday, though there was no lack of superior animals. The day was, on the whole, favourable; for, though dull and lowering, the weather was fair up to four o'clock. The demand was fully better than on Tuesday, but by no means animated. Good horses were quite as dear as the previous day, but for animals of a secondary description the prices of four weeks back could not be obtained; and for horses under £40 value prices may be quoted twelve to fifteen per cent. down, and, in the opinion of some, something more. Most of the first-class animals were in the dealers' hands—few being shewn by breeders or farmers—and in some cases where they were the same price could not be obtained for them that had been offered by dealers previous to the market. Mr. Teenan sold a number of horses from £50 to £60. Mr. J. Clarke, Glasgow, sold to Mr. Muir, Banks, near Kirkcudbright, a very superior bay mare, six years old, at £67, and a four year old horse to Dr. Cowan of Dildawn, at £60. He purchased two grey mares, five and seven years old, at £110—these animals were bought from him last Candelmas Fair at £102. He sold a brown horse, five years old, to an agriculturist in this neighbourhood, at £63. The prices of his stud generally ranged from £45 to £55. Mr. Crawford, Beith, sold a fine bay mare four years old, at £63, and a pair at £90. Mr. Giffen had a superior lot: he sold two horses at £120, and a number above £50. Mr. Elliot, Hardgrave, sold a horse and a mare at £110. Mr. Bell, Gotterhie, refused on Tuesday 60 guineas for a powerful draught horse five years old. The animal found a purchaser on Wednesday, but at no advance on that price. Mr. Dunlop sold a two-year-old colt for £46. Of this description of stock there were a good number shown. For a pair dark greys—colt and filly—from Annandale, 80 guineas were asked. Prices for two year olds ranged from £25 to £46; yearlings from £15 to £25. There were very few good saddle or harness horses shown, and for those exposed the demand was slack, and few sales reported. Good ponies were limited in number; prices for these ranged from £8 to £26. The prices of first-rate draught horses ranged from £50 to £65; good animals from £35 to £45; and ordinary and inferior descriptions from £30 downwards. On Wednesday evening a good number of animals remained unsold.

**EXETER FAIR.**—Although the attendance of farmers and dealers was rather large, there were not more than 300 bullocks, and amongst these were but a few of a very superior description. The best fat bullocks were sold at about 10s.; inferior sorts, 9s. per score. The number of sheep driven in was comparatively small, but the quality generally was good. Ewes fetched  $5\frac{1}{2}$ d.; and wethers, 6d. to  $6\frac{1}{2}$ d. per lb. There was not a butcher's calf offered for sale, but there was a plentiful supply of cows and calves, which sold at from £12 to £17, and in some instances £18. The show of barreners was large, and business in that class appeared to be brisk, at from 5s. 6d. to 6s. 6d. per score. Working oxen were disposed of at £18 to £20; and steers, at £12 to £14 each. At a late hour a few horses were driven in, but the demand for them appeared small.

**KELSO FORTNIGHTLY MARKET.**—There was a large supply of fat cattle, principally of excellent quality. There was a good attendance of buyers, with a quick demand, and almost the whole were readily disposed of at from 6s. 3d. to 7s. per stone. There was a smaller supply of sheep than usual, for which the demand was dull, and only a portion sold at  $6\frac{1}{2}$ d. per lb. A good show of cows, the better descriptions of which met with a good demand; Ayrshire from £9 to £13; short-horns from £14 to £18.

**LEOMINSTER FAIR.**—Fat cows fetched from 6d. to  $6\frac{1}{2}$ d.; store cattle sold well, also good barreners and cows and calves. Other stock lower. Fat sheep  $6\frac{1}{2}$ d., and few offered. A large show of cattle, and many dealers attended. The horse fair was well supplied, especially with waggon horses, which fetched very high prices. A two year old cart colt was bought before it reached the fair, at £40; £43 was asked.

**LINCOLN FAT STOCK MARKET.**—The show of fat beasts was only very limited, and holders were, therefore, very cautious in their dealings in the early part of the market; later in the morning, however, some business was done in the beef trade, though it was a dragging trade, at prices varying from 7s. to 7s. 6d. per st. There was a very fair show of sheep, and a somewhat brisk demand; ewe mutton realizing 6d., and wether 7d. per lb.

**NORTHAMPTON FAIR.**—The supply of fat sheep was rather limited for this fair, which caused rather a lively trade. Best fat wether mutton made from 4s. 6d. to 4s. 8d., and fat ewes from 4s. to 4s. 4d. per 8lb. Fat beasts were plentiful. The best made from 4s. to 4s. 4d.; inferior sorts sold at less money, with a very flat trade. Store beasts were in short supply, and consisted principally of fine Herefords, with a few lots of black South Welsh beasts. There were some good useful new milch cows with calves, and a fair show of useful barren cows, with rather a flat trade. There were not many horses, and not much doing in them.

**SHREWSBURY FAIR.**—Fat Beef realized from 6d. to  $6\frac{1}{2}$ d., fat calves  $6\frac{1}{2}$ d., and wether sheep 7d. per lb. Store cattle in demand, and cows and calves. Fat pigs 6d. per lb.; stores selling very well.

**ST. COLUMB CATTLE MARKET.**—There was an excellent supply of fat cattle, and an average sale, at prices for fat cattle from 56s. to 58s. per cwt., and sheep 6d. and  $6\frac{1}{2}$ d. per lb.

**WINSLOW FAIR** was well supplied with stock, and was numerously attended by agriculturists. The best description of stock realized high prices, but the inferior class was not saleable.

**YORK FORTNIGHT MARKET.**—Fat beasts were in about equal supply and demand, at 6s. 9d. to 7s. 3d. per st. Mutton sheep, ewes, and heavy weights sold at 5d. to  $5\frac{1}{2}$ d.; but wethers, gimmers, and light weights brought 6d. to  $6\frac{1}{2}$ d. per lb. Hogs and grazing sheep were in greater supply than demand, at nominally former rates. There was an average show of calving and dairy cows, which met a fair sale, at steady prices. Lean beasts, for grazing purposes, were in short supply, and sold readily, at rather higher rates.

## REVIEW OF THE CORN TRADE DURING THE MONTH OF FEBRUARY.

The month of January closed with a dull aspect as respects the corn trade, after a fall in wheat of fully 5s. per qr., the consequence of an expected peace. From this reduction many country markets seemed on the eve of recovery, but on the first Monday of February the town trade fell into a state of still greater prostration than that occasioned by the first pacific tidings. On that day several farmers who were impressed with the idea of the near approach of much lower prices, deemed it best to become their own factors; and by their appearance in greater numbers than usual at such a time with their samples, when the stands were oppressed with those left over from the previous week, which, though many to the eye, were small as respects the real quantity, a most damaging effect was produced on prices, as well as the power to sell. Another five shillings fall was the consequence; millers, as a matter of course, being as much on the reserve as they found their custom solicited. The effect of this panic told very differently on the country, the greater number of markets refusing to make a full response, among which was Liverpool; but others, taking example from the metropolis, exceeded it in the reduction—Louth, for instance, quoting the decline that week as great as 9s. per qr., though 5s. was about the average. The second Monday showed that with all the fears of the previous week the English supplies had been insignificant, 3,700 qrs. being the total sum, with only 4,300 from the continent. Confidence was consequently resumed, and prices became more fixed and firm. A reaction immediately ensued in those country markets which had been excessively depressed, and the decline was in many cases recovered; but as opinions varied, and supplies were short or liberal, so prices ranged—Liverpool closing at 1d. per 70lbs. improvement on American samples. On the third Monday a further upward progress was made, supplies continuing moderate, all good samples obtaining an advance of 1s. to 2s. per qr., though Kentish factors scarcely found so much improvement, and the country generally was slow in its response. The last Monday brought in but a heavy report, there being, with only an average supply, an inability to quit samples, unless at lower rates. To this Essex factors deeming it unnecessary to accede, most of their parcels were unsold; and though at the Kentish stands there was a readiness to take 1s. to 2s. less, they also were not

cleared. Fine foreign wheat has not undergone the same decline, the bad condition of the English making it in demand for mixing; so that through the month the fall on such has scarcely exceeded 2s. This has served to keep up the price of town flour.

As respects the London supplies, the foreign have nearly doubled those of January, the difference being traceable to the greater quantities received from the United States and India; from the former about 17,000 qrs. being reported, with 37,000 brls. of flour, and from the latter 15,400 qrs.; showing, that should the war with Russia long continue, the immense colonial resources of Great Britain would obtain such development, as greatly to relieve her from foreign dependence. On the other hand, the arrivals of native growth have been less, at the rate of about 1,500 qrs. per week, with a falling-off in country flour at a still greater ratio, the last week excepted.

The average sales of the country have, however, shown only a small decrease, being kept up hitherto through both months of the present year at a weekly rate, in January, of 94,100, and in February of 92,000 qrs. Still, this very free consumption of a somewhat less than an average crop must have made a deep inroad into stocks; and every foreign source, as the season progresses, is likely to be well drained. Let us hope that peace will be the issue of the present Conferences as regards Russia, and that the ruffled sea on the American shore will resume its tranquillity. But with all this political aid, we anticipate but little to spare by the time that our own fields whiten; and the seeming necessity of such a dependence on the future forbids the slightest waste in consumption. The exports for the month have been 1,395 qrs. wheat and 936 sacks of flour.

Barley, with only a very scanty increase of foreign (the month's supply for London being only about 6,000 qrs.), exhibits a falling off in the English supply of 15,000 qrs. The whole of February, as respects prices, has exhibited a course of decline. The first Monday found it involved in the fate of the wheat market, without one foreign arrival, and a fall of two shillings on all qualities was announced. The dearth of stout samples for malting has kept a market price for them all through; but the secondary kinds used for distillation have been exceedingly difficult to quit, and wherever forced could

only realize a grinding value. Foreign inquiry has given but little relief to the trade, the exports for the month being only 437 qrs. The second Monday showed a deficiency in the English supply, which, with the aid of foreign, only reached a moderate amount; but while the wheat trade was recovering, this grain underwent a further reduction—say, 1s. to 2s. per qr.—without any increased facilities of sale. Malt, with an equally slow demand, fell 2s. per qr., and has remained without further change. The third Monday's arrivals were short, and a slight reaction was perceptible, with an improved demand for picked parcels, there being occasionally a better price obtainable; but business was far from being in an active state, notwithstanding the reduced rates. The last Monday showed a continuance of this improved tone, though nothing could be quoted dearer.

Country markets have varied in their reports, but the average statements have been dull and declining, with, however, some indication of improvement at the close. This grain must necessarily depend for its value on wheat, and in the absence of a demand for the purpose of human food, can hardly be expected to realize the extreme prices which were lately obtained, especially in the event of peace. This month's arrivals in London were, of English 22,790 qrs., of foreign 5,480, the mild weather having brought some Danish supplies. In January the arrivals of English were 37,118, and of foreign 746.

The oat supplies have continued moderate, the winter having reduced the arrivals from the Baltic, and the deficiency thence arising being only partially made up from Ireland; the better condition of the agricultural interest in that country enabling growers to hold off in the expectation of more remunerative markets, in which, however, they have been disappointed. The panic of the 4th February produced its effect on this grain in an equal degree with all other descriptions, the rates for foreign, English, and Irish oats being at once reduced 1s. 6d. per qr., without much making way. To this reduction there was a full response throughout the country, with very little cheerfulness in trade, but rather, on the contrary, a still further indication of decline. The second Monday came, therefore, without the slightest rally, and another reduction of 6d. to 1s. had to be submitted to, before sales could be effected, though business was effected with more readiness and on a larger scale, those dealers who were low in stock beginning to entertain the conviction that prices had for a time, at least, reached their lowest point. The pressure of this day's market was more especially on the low qualities of Irish, which, being unsold the previous week, were

coming on demurrage; factors, therefore, had no alternative but landing on consignees' account, or quitting at the best prices of the day. These parcels being thus cleared, fresh arrivals of a similar description, by the following Friday, had recovered their proportionate value, with a more steady sale. On the 18th there appeared a considerable falling off in the arrivals of English and foreign while the easterly winds kept the Irish cargoes out at sea. On inferior sorts of the latter there was, therefore, an improvement of 6d. per qr., though the moderate show of samples in general did not enable sellers to obtain the least advance on other kinds. The last Monday brought the best supply of foreign, there then arriving from the Danish Isles and Holland nearly 22,000 qrs. From the openness of the season, the English and Scotch were moderate; say 4,600 qrs., and Irish were still kept out. A general stagnation, however still prevailed; and those parcels of low Irish which had not been quitted, not bearing comparison with the fresh arrivals of foreign, were again neglected, and to quit them it was again necessary to abate 6d. per qr. The London supplies for February were—English and Scotch 25,000 qrs., Irish 16,000 qrs., foreign 40,500 qrs.; against, in January, English and Scotch 30,000 qrs., Irish 26,000 qrs., foreign 57,000 qrs. The mildness of part of the season has brought several cargoes from the Baltic which had not been expected; and this, together with the probabilities of peace, has kept the trade in a dragging state; but we think the depression has been excessive, and that, with even a favourable issue of the present negotiations, prices can scarcely go much lower.

English beans have been plentiful enough for the requirements of the trade, though somewhat less than during the past month; but there was a heavy arrival of Egyptian at the commencement, which has made the weekly average of foreign 2,000 qrs. All through the month this pulse has been declining and neglected, being influenced by the low price of oats and the weather. The decline of the first week was 1s. to 2s. per quarter, and of the second 2s. more; since which, prices have remained without alteration. The extensive use, however, of Alexandrians for splitting, and the low rates to which they have now come, placing them relatively below the country of growth, induces the opinion that as spring progresses, the present prices will occasion a more liberal use, and prevent a further fall, if not enhance the value of this pulse.

As regards peas, the whole month has passed without a foreign contribution, excepting 68 qrs.; and though the home supplies have only averaged

550 per week, including all kinds, there has been an almost stagnation in business; every sort participating in a fall. On the first Monday, hog peas were reduced 1s. to 2s.; and white, 2s. to 3s. On the second, white boilers were 2s. to 3s. cheaper; though maples, that were fit for seed, have since rallied. Boilers, on the contrary, have receded fully 2s. further, the general anticipation of high prices turning out fallacious, through the unexpected mildness of the season.

Linseed was falling early in the month, but at the close has partially rallied, through an extensive demand for feeding purposes; it is, however, fair to presume, as there has been no destruction of this seed by the Allies, that there must be large accumulations in almost every Russian port, both in the Black Sea and Baltic; and in the event of a cessation of hostilities, that we shall see, after the lapse of sufficient time, a considerable fall in prices.

The cloverseed trade has been greatly impeded, first by wet, and subsequently by cold weather. A good stock of Southern French red is here, but in firm hands. The almost total failure of the English crop being so well ascertained, after prices had remained dormant till the close of the month, they became 1s. to 2s. dearer, as the result of more inquiry. Very little as yet has been doing in spring tares, of which we have had early arrivals from the Baltic, 7s. per bush. being the price demanded for good. Little change has passed in other seeds.

CURRENCY PER IMPERIAL MEASURE.

	Shillings per Quarter	
WHEAT, Essex and Kent, white, new	63 to 73	extra — 77
Ditto, red, new	62 73	„ — 74
Norfolk, Linc. and Yorksh., red, new	60 70	„ — 73
BARLEY, malting, new..	36 38	.... Chevalier.. 38 40
Distilling....	33 35	..... Grinding.. 29 31
MALT, Essex, Norfolk, and Suffolk...	68 70	extra 76
Kingston, Ware, and town made..	68 70	„ 76
Brown.....	60 63	„ —
RYE .....	—	— 50 54
OATS, English feed..	23 24	..... Potato.. 24 29
Scotch feed, new 25 27, old 29 30 ..		Potato 28 29
Irish feed, white .....	20 22	fine 24
Ditto, black .....	20 22	„ 23
BEANS, Mazagan.....	32	33 35
Ticks .....		32 36
Harrow .....		35 40
Pigeon .....		38 42
PEAS, white boiler 44 47..	Maple 37 38	Grey 35 36
FLOUR, town made, per sack of 280 lbs.	—	— 65 67
Households, Town 61s. 63s. Country	—	— 54
Norfolk and Suffolk, ex-ship	—	— 50

FOREIGN GRAIN.

	Shillings per Quarter	
WHEAT, Dantzic, mixed..	81 to 84	high mixed — 84 extra 89
Konigsberg .....	80 82	„ — 83 „ 84
Rostock, new .....	75 76	fine .....
American, white .....	78 80	red .....
Pomera., Meckbg., and Uckermk., red	80 81	extra 81 84
Silesian .....	76 78	white 80 81
Danish and Holstein .....	67 70	„ 72 73
Odessa, St. Petersburg and Riga..	68 70	fine 72 74
Rhine and Belgium .....	„	— old —
Russian.....	„	French.. none

BARLEY, grinding 29 34 .....	Distilling..	34 35
OATS, Dutch, brew, and Polands 26s. to 28s.	Feed ..	23 24
Danish & Swedish feed 23s. to 25s.	Stralaund	24 26
BEANS, Friesland and Holstein.....		37 38
Konigsberg ..	37 38	..... Egyptian .. 33 34
PEAS, feeding .....	35	36 fine boilers 47 48
INDIAN CORN, white .....	36 39	yellow 38 40
FLOUR, French, per aack.....	—	— Spanish 59 60
American, sour, per barrel	34 35	sweet 36 39

IMPERIAL AVERAGES.

FOR THE LAST SIX WEEKS.

WEEK ENDING:	Wheat.		Barley.		Oats.		Rye.		Beans		Peas.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 12, 1856..	76	2	38	3	25	11	53	6	46	5	45	7
Jan. 19, 1856..	76	1	37	8	26	7	53	4	46	0	44	9
Jan. 26, 1856..	76	11	38	4	25	8	54	8	45	3	43	4
Feb. 2, 1856..	75	10	38	6	25	5	53	2	44	5	43	1
Feb. 9, 1856..	73	8	37	5	24	6	51	4	43	4	42	2
Feb. 16, 1856..	71	7	37	2	23	10	50	4	42	7	41	6
Aggregate average of last six weeks	75	1	37	11	25	4	52	9	44	8	43	5
Comparative avge. same time last year	71	4	32	9	26	6	44	0	44	7	42	0
DUTIES .....	1	0	1	0	1	0	1	0	1	0	1	0

COMPARATIVE PRICES AND QUANTITIES OF CORN.

Averages from last Friday's Gazette.			Averages from the corresponding Gazette in 1854.		
Qrs.	s.	d.	Qrs.	s.	d.
Wheat....	87,591	.. 71 7	Wheat....	85,873	.. 70 3
Barley....	94,879	.. 37 2	Barley....	79,759	.. 31 9
Oats ....	20,709	.. 23 10	Oats ....	19,328	.. 25 7
Rye.....	25	.. 50 4	Rye.....	108	.. 45 3
Beans....	5,382	.. 42 7	Beans....	5,401	.. 43 1
Peas ....	1,874	.. 41 6	Peas ....	1,739	.. 41 0

DIAGRAM SHOWING THE FLUCTUATIONS IN THE AVERAGE PRICE OF WHEAT DURING THE SIX WEEKS ENDING FEBRUARY 16, 1856.

PRICE.	Jan. 12.	Jan. 19.	Jan. 26.	Feb. 2.	Feb. 9.	Feb. 16.
76s. 11d.	..	..	..	..	..	..
76s. 2d.	..	..	..	..	..	..
76s. 1d.	..	..	..	..	..	..
75s. 10d.	..	..	..	..	..	..
73s. 8d.	..	..	..	..	..	..
71s. 7d.	..	..	..	..	..	..

PRICES OF SEEDS.

BRITISH SEEDS.

Cloverseed, red, (per cwt.) .....	76s. to 86s.
Ditto white.....	80s. to 105s.
Trefoil, (per cwt.).....	36s. to 48s.
Tares, winter (per bushel).....	7s. 6d. to 8s. 0d.
Coriander (per cwt.).....	20s. to 24s.
Carraway (per cwt.).... new .. s. to 50s., old .. a. to .. s.	
Canary (per qr.).....	60s. to 62s.
Hempseed (none) .....	00s. to 00s.
Linseed (p. qr.) sowing .. s. to 73s., crushing 68s. to 71s.	
Linseed Cakes (per ton).....	£13 0s. to £13 10s.
Rapeseed (per qr.) .....	new 88s. to 90s.
Ditto Cake (per ton).....	£7 0s. to £7 10s.

FOREIGN SEEDS, &c.

Cloverseed, red, French .....	68s. to 76s.
Ditto, white, Dutch .....	74s. to 95s.
Hempseed, small, (per qr.) .. s. 56s., Ditto Dutch, 58s.	
Coriander (per cwt.).....	15s. to 20s.
Carraway .....	42s. to 46s.
Linseed (pr qr.) Baltic, 67s. to 69s.; Bombay, 71s. to 75s.	
Linseed Cake (per ton) .....	£12 10s. to £13 0s.
Rapeseed, Dutch .....	88s. to 90s.
Rape Cake (per ton).....	£7 0s. to £7 10s.

**HOP MARKET.**

**BOROUGH, MONDAY, Feb. 25.**

In the absence of any active demand, our market continues without any material alteration, and the business doing is limited to the immediate wants of consumers, at about the currency of this day week.

**POTATO MARKETS.**

**SOUTHWARK WATERSIDE.**

**MONDAY, FEB. 25.**

During the past week the arrivals coastwise have been moderate, but a fair supply by rail. The trade still continues in the same languid state, and inferior samples are next to unsaleable.

The following are this day's quotations:—

	s.	d.	s.	d.
York Regents .....	70	0	to	95 0
Kent and Essex do. ....	65	0		75 0
East Lothian do. ....	75	0		80 0
Ditto, Reds .....	65	0		70 0
Perth, Forfar, and Fifeshire				
Regents.....	60	0		70 0
Ditto, Reds .....	45	0		55 0
Aberdeenshire and North Coun-				
try Reds .....	35	0		40 0

**BOROUGH AND SPITALFIELDS.**

**MONDAY, Feb. 25.**

Since this day se'nnight only moderate supplies of potatoes have come to hand coastwise and by land-carriage. The demand is, however, from dealers generally being well in stock, very inactive, as follows:—York Regents, 85s. to 95s.; Kent and Essex do., 75s. to 85s.; Scotch do., 65s. to 75s.; do. Cups, 50s. to 65s.; middlings, 45s.; Lincolns, 65s. to 75s.; Blues, 55s. to 65s. per ton.

**COUNTRY POTATO MARKETS.**—YORK, Feb 16.: We had a good supply of Potatoes of moderate quality; they sold at 7d. per peck. and 2s. per bushel.—LEEDS, Feb. 19: A moderate show of Potatoes sold at from 7d. to 8d. per 21lb. wholesale, and from 8d. to 9d. retail.

**PRICES OF BUTTER, CHEESE, HAMS, &c.**

Butter, per cwt.	s.	s.	Cheese, per cwt.	s.	s.
Friesland .....	122	to 128	Cheshire .....	70	to 84
Kiel .....	100	120	Cheddar .....	74	90
Dorset .....	110	120	Double Gloucester...	66	72
Carlton .....	108	112	Single do. ....	60	70
Waterford ....	98	102	Hams, York, old 96	108, new	90 92
Cork, new .....	100	112	Westmoreland...	94	104
Limerick .....	98	102	Irish .....	80	90
Sligo .....	94	108	Bacon, Wilts., dried..	70	72
Fresh, per doz. 13s. 6d.	17s. 0d.		Irish, green....	69	64

**ENGLISH BUTTER MARKET.**

**FEBRUARY 25.**

We note a lively trade in Butter for all descriptions, except the lowest quality, which is neglected.

Dorset, fine new milk. ....	124s. to 126s. per cwt.
Do. middling .....	110s. to 112s.
Do. old .....	94s. to 96s.
Fresh .....	12s. to 16s. per doz. lbs.

**BISHOPSTOKE MONTHLY CHEESE MARKET.**

—About 200 tons were offered; and, notwithstanding there was a good attendance of buyers, business was not brisk; prices may be considered a trifle higher than at the last market, viz., Cheddar, 72s. to 76s.; yellow Somersets, 64s. to 70s.; doubles, 58s. to 62s.; half-coward, 52s. to 56s.; skims, 34s. to 42s. per cwt.

GLASGOW, (Wednesday last.)—Cheese, new 48s. to 50s., first-class 60s., skim milk cheese 27s. to 30s. per cwt.

GLoucester CHEESE MARKET.—An unusually large supply for the season (about 100 tons), the condition of which was rather inferior, owing to the damp weather. Trade was languid, but nearly all the cheese offered was cleared off at the following prices: Best doubles, 64s. to 68s., singles 58s. to 60s., seconds 52s. to 54s., skim 34s. to 36s. per cwt.

BELFAST, (Friday last.)—Butter: Shipping price, 100s. to 110s. per cwt.; firkins and crocks, 10½d. to 11½d. per lb. Bacon, 56s. to 62s.; Hams, prime, 72s. to 76s., second quality, 64s. to 68s. per cwt.; prime mess Pork, 90s. 6d. to 92s. 6d. per brl.; Pork, 51s. to 54s.; Beef, 105s. to 140s. per tierce; Irish Lard, in bladders, 74s. to 76s.; kegs or firkins, 68s. to 70s. per cwt.

Feb.	Butter.		Bacon.		Dried Hams,		Mess Pork.	
	per cwt.		per cwt.		per cwt.		per brl.	
22.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1852..	77 0	82 0	38 0	44 0	54 0	60 0	60 0	62 0
1853..	86 0	93 0	56 0	60 0	70 0	74 0	87 6	90 0
1854..	95 0	102 0	54 0	60 0	70 0	76 0	87 6	90 0
1855..	96 0	106 0	58 0	60 0	70 0	74 0	92 6	95 0
1856..	98 0	110 0	56 0	60 0	72 0	76 0	90 6	92 6

**WOOL MARKETS.**

**ENGLISH WOOL MARKET.**

FEB. 25.—The supply of all kinds of home-grown Wools on sale is very moderate for the time of year; and, from the fact that our manufacturers hold light stocks, and that the Colonial sales are still progressing favourably at fully the opening prices, the demand continues steady, at full quotations. Since our last report, several parcels have changed hands for shipment to the Continent.

	s.	d.	s.	d.
Down tegs.....	1	3	to	1 4
Down ewes .....	1	2	—	1 3
Half-bred hogs .....	1	2	—	1 3
Half-bred wethers.....	1	1	—	1 2½
Kent fleeces .....	1	1	—	1 2
Leicester fleeces .....	1	0	—	1 2
Combing skin .....	0	10	—	1 2
Flannel wool.....	1	0	—	1 2½
Blanket wool.....	0	9½	—	1 1

**LIVERPOOL WOOL MARKETS, FEB. 23.**

SCOTCH WOOL.—There is still a fair enquiry for laid Highland, and with the very reduced stock, prices are fully supported. White is in moderate demsnd. Good Cheviot and crossed still command a ready sale at full rates.

	s.	d.	s.	d.
Laid Highland Wool, per 24lbs. ..	10	0	to	10 6
White Highland do. ....	13	6		14 6
Laid Crossed do. unwashed ....	12	6		13 6
Do. do. washed .....	14	0		15 0
Laid Cheviot do. unwashed ....	15	0		16 6
Do. do. washed .....	17	0		21 0
White Cheviot do. do .....	26	6		30 0

**MANURES.**

**PRICES CURRENT OF GUANO.**

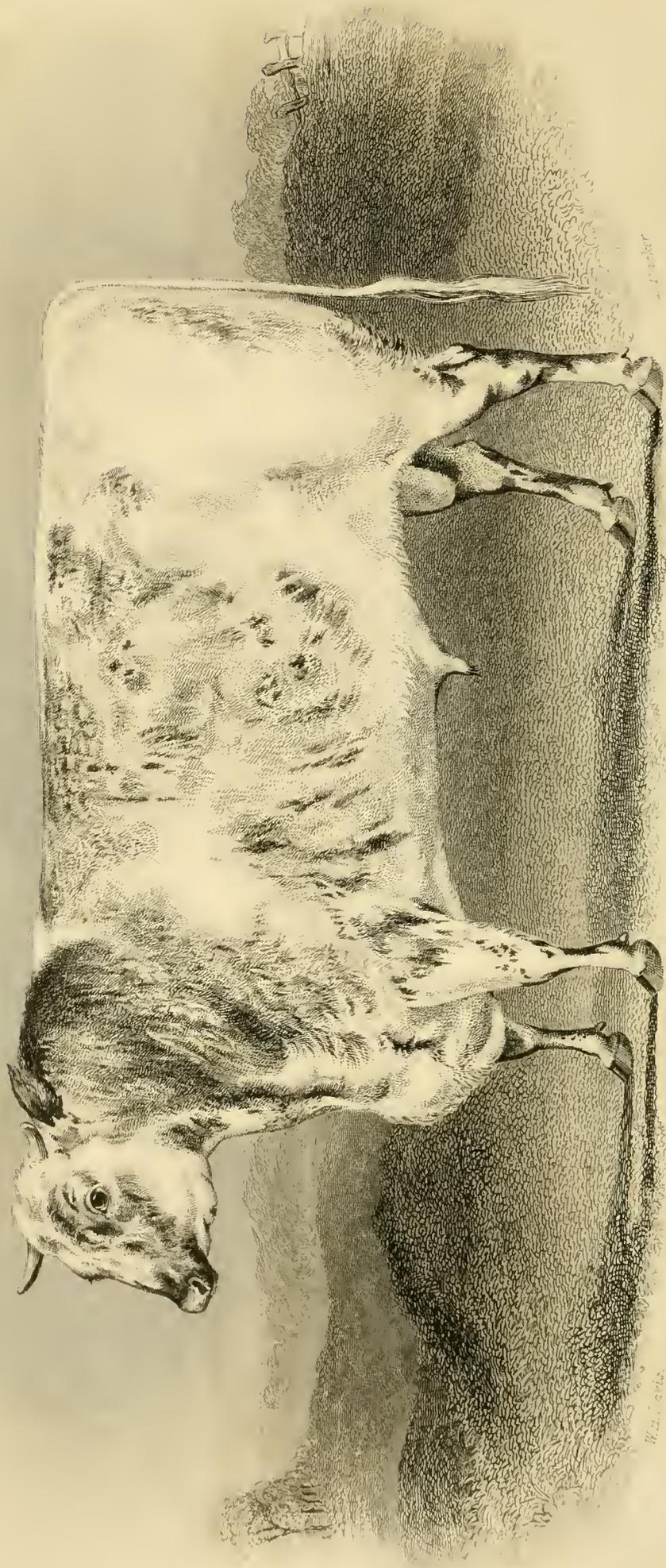
Peruvian Guano .....	per ton	£11 5 0	to	£11 10 0
" D. first class (damaged) ..		10 5 0		10 10 0
Bolivian Guano .....	(none)	0 0 0		0 0 0

**ARTIFICIAL MANURES, OIL CAKES, &c.**

Nitrate Soda .....		19 10 0		21 0 0
Nitrate Potash or Saltpetre.....		29 0 0		30 0 0
Sulphate Ammonia .....		16 0 0		17 0 0
Muriate ditto .....		22 6 0		23 0 0
Superphosphate of Lime .....		6 0 0		0 0 0
Soda Ash or Alkali.....		0 0 0		8 0 0
Gypsum .....		2 0 0		2 10 0
Coprolite .....		4 5 0		4 10 0
Sulphate of Copper, or Roman				
Vitriol for Wheat steeping....		42 0 0		43 0 0
Salt .....		1 5 0		2 0 0
Bones, Dust .....	per qr.	1 5 0		1 6 0
" ½ inch.....		1 4 0		1 5 0
Oil Vitriol, concentrated .....	per lb.	0 0 1		0 0 0
" Brown.....		0 0 0		0 0 0
Rape Cakes.....	per ton	8 0 0		8 5 0
Linsced Cakes—				
Thin American in brls. or bags ..		13 15 0		14 5 0
Thick ditto round .....		12 5 0		12 10 0
Marseilles .....		12 5 0		12 15 0
English .....		14 0 0		14 10 0

PICKFORD and KEEN, 35, Leadenhall-street.

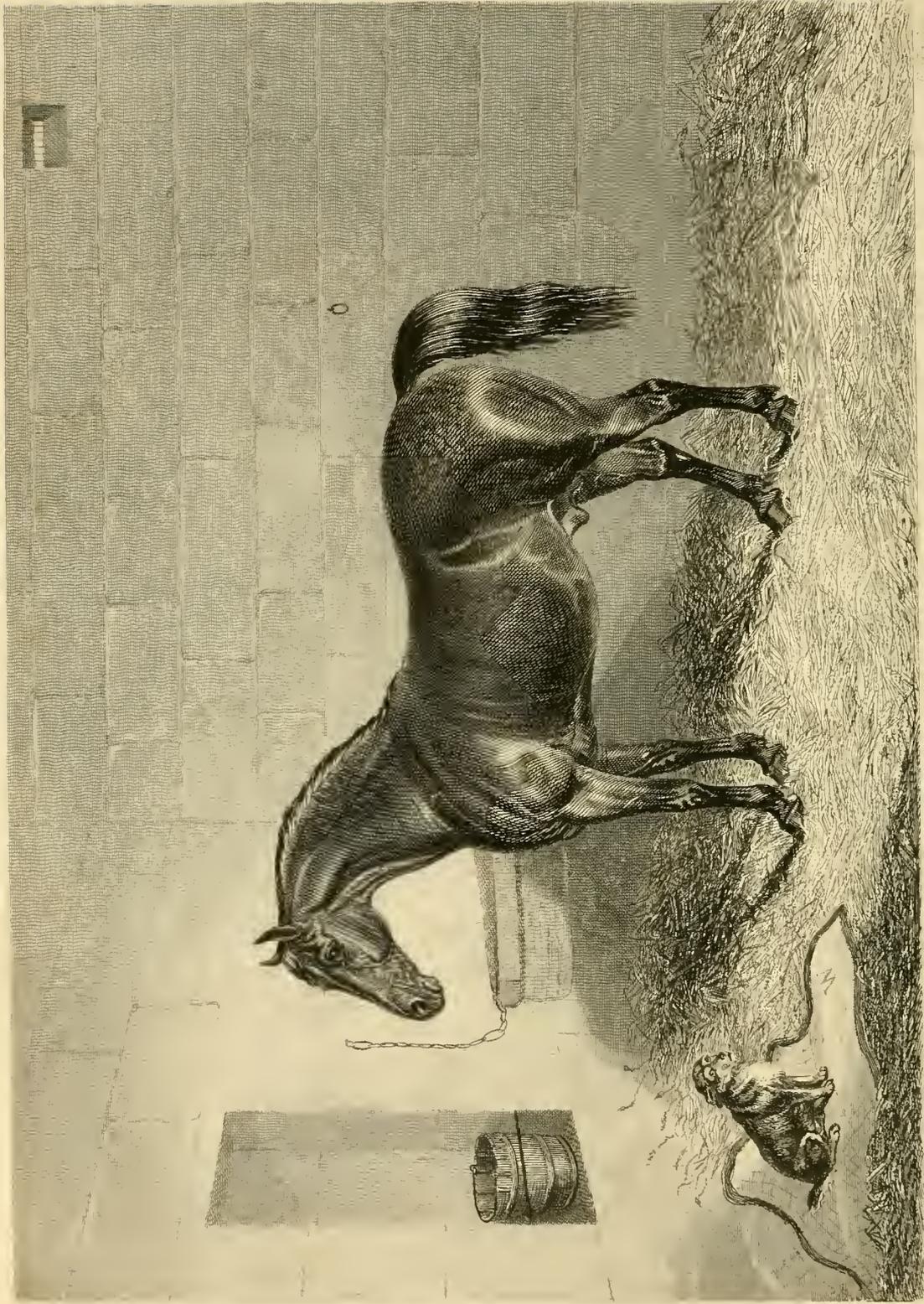




Master, Bull of the  
4. North Hill, Bull

Property of a Colonel, Secretary of the Society for which the First Prize of £25 was awarded  
at the Meeting of the P. A. of England held at Bristol July 1850.





*The Rearing Horse*  
A. C. COLEMAN, Engraver, 115 Nassau Street, N. Y.  
Published by G. W. Colver, 115 Nassau St.

# THE FARMER'S MAGAZINE.

APRIL, 1856.

## PLATE I.

### MASTER BUTTERFLY; A SHORT-HORN BULL.

BRED BY AND THE PROPERTY OF LIEUTENANT-COLONEL TOWNELEY, TOWNELEY PARK, BURNLEY, LANCASHIRE.

Master Butterfly was got by Frederick (11489), dam (Butterfly) by Jeweller (10354), g. d. (Buttercup) by Garrick (3863), g. g. d. (Barmpton Rose) by Expectation (1988), g. g. g. d. by Belzoni (1709), g. g. g. g. d. by Comus (1861), g. g. g. g. g. d. by Denton (198), a son of Comet (155).

In 1854, he won the first prize of £10 at the Royal Agricultural Society's Meeting, held at Lincoln; also the first prize of £5 at the Royal North Lancashire Agricultural Society's Meeting, held at Burnley; as well as a piece of plate, as the best of all the prize male animals. In 1855, he won the first prize of £5 and Silver Medal at the Royal Dublin Society's Meeting; and the Gold Medal as the best of all the prize bulls, there being 190 bulls exhibited. At the Royal Agricultural Society's Meeting, held at Carlisle, he won the first prize of £25 for yearling bulls; and the first prize of £5 as the best bull at the Craven Agricultural Meeting, held at Skipton, Yorkshire.

From the pedigree it will be seen that he is descended from Lieutenant-Colonel Towneley's celebrated cow Butterfly, the winner of the Purcell Challenge Cup, value 100 guineas, for three successive years, as also the Farmers' Gazette Cup, value 120 guineas, and all the prizes that a cow could win at the Royal Agricultural Society's Meetings, the Yorkshire, Lancashire, and others. It is satisfactory to be able to add that, possessing such blood as this, Master Butterfly has already proved himself a sure and good calf-getter.

## PLATE II.

### PHENOMENON; A CELEBRATED NORFOLK TROTTER STALLION.

THE PROPERTY OF R. H. WATSON, ESQ., OF DORSLEY, TOTNESS, DEVON.

Phenomenon, bred near Horncastle in 1845, is by Old Phenomenon, out of a well-known trotting-mare, (by a Norfolk Stallion,) the property of the Honourable Charles Dymoke, of Screelsby.

Old Phenomenon was by the celebrated "Bond's Norfolk Phenomenon," the best and fastest trotter ever shown in public—Bond's Phenomenon, by the Norfolk Cob, out of a Pretender mare, by Old Fireaway—and so on through a succession of the Fireaways to Pretender, the sire of the first so-called Pretender himself was a chesnut horse foaled in 1771, by Marske, the sire of Eclipse, out of a mare by Bajazet, a son of the Godolphin Arabian. The dam of the Norfolk Cob, or, as he was afterwards called by Mr Theobald, of Stockwell, the Norfolk Phenomenon, was by Old Marshland Shales.

On the dam's side Phenomenon goes to Lincolnshire, a county now dividing with York the repute of possessing the best weight-carrying hacks. We saw there only last autumn some three or four such, perfectly wonderful for the immense power they combined with good quick light action. It was the aim attained, and, whether thanks to Norfolk or Lincoln, they had all much of the Phenomenon character.

Phenomenon is a beautifully dappled bay horse, with four black legs, standing fifteen hands three inches high, though, from his perfect symmetry, looking at least two inches less. He has a long lean but good head, famous neck and crest, with strong oblique shoulders. He has a round barrel, very muscular back, deep back ribs, and really unexceptionable quarters. He has very powerful arms and thighs, with short legs and good sound feet. If we add to this a beautiful temper, fine action, and "up to any weight," we may well instance "the Dorsley Phenomenon" as a capital sample of a sort that is not now too often to be met with.

Phenomenon, now eleven years old, stands at Cholwell, near Totness, where he serves mares at two  
OLD SERIES.] X [VOL. XLIV.—No. 4.

guineas each. He is in great favour, not only from his own personal recommendations, but the excellence of his stock also. In a district by no means "over-horsed" he ought to be made the most of. Though by no means so much in fashion as they once were, anything of Phenomenon's stamp and character is always sure of a market either in town or country, while the cross rarely fails to tell.

## SPRING DRESSINGS.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

We can hardly direct our attention, at this season of the year, to a more practical question than that of spring dressings. The system of top-dressing our corn crops is but of modern origin: our forefathers, if they spring-dressed their cereals or their pastures, could only do so with farm-yard compost, or perhaps, in a few favourably-situated places, with soot: then came a few attempts to employ the refuse of the maltsters, coal or wood ashes; but all these were of necessity of limited extent—were applications which, as chance directed, so the farmer thought himself "lucky" when the top-dressing succeeded. In our time, however, another and a better generation of agriculturists has arisen—men of scientific attainments—farmers who, combining practice with science, have employed other and more powerful top-dressings. They have brought into existence a new race of manufacturers—the preparers of artificial fertilizers; and these in their turn have excited the inquiries of the merchant and the navigator, by whose efforts there is a stream of manures, or of the materials for their preparation, now constantly flowing towards England, from almost every sea. Whilst the farmer is dwelling on this page, let him pause for a moment, and remember how many a bright sail now whitens the surface of the ocean, bringing riches to his soils—let him think of those gallant ships now rounding Cape Horn, loaded with the guano of the Chincha Islands, the cubic petre of Chili; and whilst these are coming from the Southern Ocean, let him not forget those which are bringing from Norway and other places the native phosphate of lime, for the makers of that superphosphate which in a few weeks will be so extensively drilled with the turnip-seed. Amid all these excellent efforts to bring the riches of other lands on to the soils of England, it may, I repeat, at this season be of some little use if we travel together over a few of the experimental fields which have recently been devoted to the examination of the powers of these spring dressings.

Let us, then, first examine the experiments of the late Philip Pusey upon a wheat field, before we travel northward, and examine, with some equally careful and laborious Scotch agriculturists, their trials upon wheat and upon grass land with the same dressings.

The experiments of Pusey almost always had reference to the testing of some asserted scientific principle, and his last reported researches are not an exception to the rule. They are entitled, "Experiments on the Elementary Principles of Manure, as applied to the Growth of Wheat" (*Jour. Roy. Ag. Soc.* vol. xvi. p. 529). He tells us that, having an experimental field of eight acres, which was exhausted by having produced five white crops in succession, it occurred to him that a most interesting use might be made of it in the separate application of those elements which are supposed to constitute conjointly the efficacy of farmyard dung, and separately to act as fertilizers of the soil. These elements, according to the commonly-received theory of agricultural science, Pusey comprised, to give his own words, under four heads, viz., "1. Nitrogenous substances; 2. Phosphorus; 3. Alkalis and principally potash; 4. That which constitutes the bulk of dung, the strawy matter, or, in chemical language, carbon. The nitrogenous matter employed in his trials was nitrate of soda.

"As the experiment," he continues, "relates to the fundamental principles of agricultural science, I may venture to describe it minutely. It was made by drilling separately superphosphate and peat charcoal with wheat in the autumn, and top-dressing a portion of each lot in the spring with cubic saltpetre. The fourth element, potash, I thought better, from its solubility, to apply also in spring. The question of the efficacy of superphosphate on wheat seemed to me especially interesting, because of its vigorous efficacy when applied singly to the growth of turnips.

"The result of the trial is given in the following table:—

Per Acre.	Bushels of Wheat per Acre.	Ditto, with a top-dressing of 170lbs. Nitrate, per Acre.
4 cwt. of superphosphate	7	19 $\frac{1}{3}$
6 cwt. of peat charcoal..	8 $\frac{2}{3}$	18
Nothing.....	7 $\frac{1}{3}$	19 $\frac{2}{10}$

"It is evident that the superphosphate, though all-important for roots, has done nothing for the wheat, even on this poor and exhausted land. The charcoal would appear in the first column to have done something, but as that result is not confirmed

by the combined trial, the difference must, I think, be accidental.

“The fourth element, potash, was tried by top-dressing an acre of wheat with 1 cwt. of pearlash, which was so evidently inoperative on the crop as to render any separate thrashing unnecessary.

“As far, then, as we can rely on this experiment, carefully made with a soil duly prepared by previous exhaustion, the only element of dung required by wheat is nitrogen, as contained in nitric acid or in ammonia. If this be true in an exhausted soil, where the plant can only find its other elements in the soil as it gradually crumbles down, or in the atmosphere, it must be still more true in practical farming, where they will be supplied ordinarily by manures applied to the other crops of each course.

“I must admit, however,” he observes in conclusion, “that as regards one element of farm-yard manure—the woody matter—the experiment is not conclusive, because, though carbon applied as charcoal did not operate upon wheat, the ligneous matter contained in dung is more easily decomposed, and might be operative; but as between the two leading articles of artificial manure, I mean the two Peruvian imports, guano and nitrate, it seems entirely conclusive, because it shows that the two ingredients which guano does, and nitrate does not contain, whether applied separately, or whether in combination with nitrogen, do not increase the yield of wheat; and this is worth remarking, because there exists still a latent suspicion that the pungent and compound animal excrement must contain more virtue than the inodorous mineral salt. Their effects, no doubt, will vary relatively with variations of heat and moisture; but for corn crops nitrate appears a more certain top-dressing than guano.”

The other trials to which I have already alluded, were made in Scotland, in 1855, by two skilful Scotch Agriculturists, and reported by Dr. Anderson (*Trans. High. Soc.*, 1856, p. 270), with various top-dressings, the following results per acre were obtained:—

1. By Mr. Porter, of Monymusk, on white wheat—

	qrs.	bush.	pkts.
Soil, simple . . . . . produced	3	6	0
Nitrate of soda, 187lbs . . . . .	3	7	1
Sulphate of ammonia, 145lbs. . . . .	4	1	3
Peruvian guano, 224lbs.. . . .	3	4	3

2. By Mr. McLaren, of Millhill, on wheat—

	lbs.	bushels.
Nitrate of Soda . . . . . produced	224	45 $\frac{1}{4}$
“ “ . . . . .	112	39 $\frac{3}{4}$
Peruvian guano . . . . .	268	39 1-12
“ “ . . . . .	134	36 $\frac{3}{4}$
Sulphate of ammonia . . . . .	174	44
“ “ . . . . .	87	37 1-12

With grass, the top-dressings at Monymusk were productive of the following results, an acre of land being in each case employed:—

	tons.	cwts.
Soil simple . . . . . produced of hay	0	15
Nitrate of soda, 187lbs. . . . .	1	5 $\frac{1}{2}$
Sulphate of ammonia, 145lbs. . . . .	1	6 $\frac{1}{2}$
Peruvian guano, 224lbs. . . . .	1	10

At Millhill the result of the trials upon the grass was as follows:—

	tons.	cwts.
Soil, simple . . . . . produced of hay	2	7
Nitrate of soda, 224lbs. . . . .	2	16
“ “ 112lbs. . . . .	2	10
Sulphate of ammonia, 174lbs. . . . .	3	1
“ “ 87lbs. . . . .	2	10
Peruvian guano, 268lbs. . . . .	3	2
“ “ 134lbs. . . . .	2	11

We see, then, that these trials support the conclusions of Mr. Pusey, that cubic petre (and the same remark applies to sulphate of ammonia) is a better top-dressing for wheat than Peruvian guano. For grass lands, however, the converse of the proposition seems to be true.

We arrive, then, at the point to which all such researches for any useful purpose must tend—the question, which is really the cheapest mode of acquiring these elements? It was to this very question that Professor Way addressed himself on a recent occasion (*Jour. Roy. Ag. Soc.*, vol. xvi., p. 534) with as much success as the difficult nature of the problem will perhaps allow. Thus, he remarks of the very important element, nitrogen, “we have three very different forms: in the salts of ammonia, where it is in combination with hydrogen; in the nitrates, where nitrogen is combined with oxygen; and in undecomposed animal matter, such as blood, flesh, &c., where it is united with carbon, oxygen, and hydrogen. We know that all these forms are very valuable, but we cannot yet be said to know the exact relative value of a given quantity of nitrogen in any one of them compared with another. So much is certain, that they differ in immediate availability to vegetation; that salts of ammonia and nitrates produce a more rapid effect than dried blood or animal matter; and for this reason, if we require to use either of them for an immediate effect, as for instance to top-dress wheat, we should choose the two former in preference. But we are not justified in saying that in the long run animal matters supplying a given amount of nitrogen may not be as valuable, or even more so, than an equivalent quantity of ammoniacal salts or nitrates.”

And when speaking of the danger of adopting hasty conclusions with regard to any of these applications, he remarks, “Where the general value is ascertained, the same substance is of different value

in different soils, and especially under the influence of variation of climates. In proof of this assertion, it is sufficient to point to the well-known fact that bones, which require the influence of the air to bring them into operation, have altogether failed in heavy soils, where a ready-formed source of ammonia, such as guano, has produced the best effect.

“Again, certain soils contain a superabundance of particular ingredients of manure; the use of it then becomes unnecessary, and its cost in a manure is not compensated by any advantage from its application. Some of the surface soils of the green-sand, as at Farnham, contain large quantities of phosphate of lime; and it results from the experience of Mr. Paine, whose land is so situated, that the direct application of phosphate of lime to such land is useless. In buying a manure, therefore, he could not afford to pay for this ingredient. Difference of climate is, perhaps even more than variety of soil, productive of modification in the action of manures. In the North, guano is extensively used for turnips; in the South of England its employment for this crop is comparatively limited.”

His conclusions with regard to cubic petre and guano are much the same as those of Pusey and the Scotch agriculturists: he adds—“The value is not the same for all crops. It seems to be proved beyond all doubt by the experiments of Mr. Lawes and Dr. Gilbert that ammonia is the manure for direct application to the cereals; phosphate of lime being properly applied to turnips and other root-crops, but being quite without effect upon wheat. The more recent experiments, however, of these gentlemen on barley and oats induce them to believe that soluble phosphate of lime has in some cases a beneficial action on these crops.

“Now, although a certain quantity of ammonia in a turnip-manure may not only be allowable but desirable, and possibly, on the other hand, a small portion of phosphate of lime may improve a corn-manure, yet their distinctive character for one and the other crop remains and influences the nature of a compound manure accordingly. It is true that manure, when once placed in the soil, may be supposed to remain there for a future crop, but we cannot say that it will then be in the same available condition for plants; and the true policy would undoubtedly be to add to any crop only that manure which it can at once appropriate. Perhaps of all other sources of difficulty in the estimation of the value of a manure this is the greatest—inasmuch as from the very nature of the substances employed in making manure, a more or less mixed product is most commonly obtained.

“The mechanical condition of a manure materially affects its value. The state of dryness, the

size of the particles, the more or less perfect mixture of the various materials, all have an influence on the action of a manure which is not and cannot be taken account of in the statement of its composition; so that a superior value in regard to the proportion of the ingredients may be more than neutralized by their faulty pulverization or admixture, leading to inequality of distribution and irregularity of the crop produced.

“The commercial value of the same substance varies with the source, &c. Ammonia, in sulphate of ammonia, costs at the present price of that salt (£15) about 7½d. per lb., whilst in Peruvian guano, at its present high price of £11, the ammonia costs about 4¾d. per lb. In valuing a manure, which of these two data are we to employ? The reason for the higher price of ammonia in sulphate is evidently that this salt has uses other than agricultural, which regulate its price, whilst guano has only one issue for consumption.

“The price of the same substance in the same form varies continually from a variety of causes. It is obvious that as the supply of manure barely keeps pace with the requirements of agriculture, a variation of the prices of the ingredients of manure may be expected to occur at particular seasons. Accordingly, in the autumn of the year, sulphate of ammonia and other such substances, chiefly used as top-dressings in the spring, will be cheaper than at other periods. Nitrate of soda, which is now largely used as a manure, fluctuates in price not only with the manure market, but with a rise or fall in value of nitrate of potash. Sulphate of potash to a great extent takes its price from that of alum, of which it is an ingredient.”

There is perhaps no way of obtaining knowledge more certain than thus travelling over our fields hand in hand with the practical farmer and the chemist—sharing in the harvest of useful facts which they collect—noticing the beacons which they have set up for our guidance. With the warning “Avoid purchasing your manures of any but first-rate houses, and pay them the price they ask; for be assured they are far the cheapest merchants for you to deal with.” And with a suggestion for the application of these dressings I will conclude. Not only spread these in moist weather (and prefer in the case of guano towards the evening), but try the effect of *dividing* a given amount into two or three portions. In my own trials with guano, sown on grass land in showery weather, at the rate of 150lbs. per acre, the produce of grass was much the greatest where the manure was divided into two portions, and applied at an interval of eight days, in each case advantage being taken of a moist day.

## LAND IMPROVEMENT COMPANIES.

The last witness before the Committee of the House of Lords, on the Improvement of Land, whose examination we have to notice, though not the last examined, was the Hon. William Napier, manager of the Lands Improvement Company, incorporated by act of Parliament in August, 1853. This witness described the company which he represented as being enabled to give to landowners desirous of expending their own funds upon the agricultural improvement of their estate, the power of charging the lands so improved. Secondly, the act of this company enabled a landowner to apply for a loan for a similar purpose. In either case, the landowner having satisfied himself as to the requirements of his property, makes application to the company. This application, together with plans and specifications, is submitted to the Inclosure Commissioners, while at the same time the company undertake the investigation of the landowner's title to apply for the benefit of the act. The Commissioners having received a copy of this application, and having satisfied themselves that the improvements are such as may be granted under the Act, submit the plan and specifications of the proposed works to one of their inspectors. The inspector having satisfied himself that the proposed improvements are such as when properly executed will make an annual return greater than the annual charge to be imposed by the outlay, and having made his report to that effect, the Commissioners then require the company to give evidence that the landowner is legally entitled to apply for the assistance of the company's act, and also that the parties interested in remainder or reversion, or as mortgagees in the lands to be improved, have been served with notice; and also that a notice of it was inserted in a paper circulating in the district. These preliminaries having been duly settled, to the satisfaction of the Commissioners, and two months having elapsed from the date of advertisement of the loan, and notices having been proved to have been given to every party interested in the lands, as far as the act requires, a provisional order is issued by the Inclosure Commissioners, sanctioning the execution of the improvement, either by the company, or under their superintendence. In the meanwhile a contract has been entered into by the landowner, under which he undertakes to execute the works according to the plans, specifications, and estimates, in a certain number of years, and by which he undertakes to allow the general superintendence over those im-

provements through the Inclosure Commissioners' inspector. The landowner then proceeds with the works, and having laid out as much money as is convenient, provided he completes a specific work which will be beneficial in itself, the Inclosure Commissioners then pass an absolute order for such works, and authorise payment to be made by the company, on account of such loan; and the company receive a charge upon the lands for the term and at the rate of interest agreed upon. When the company was first formed, it was intended that they should execute works as we have described the General Land Drainage Company as doing; but after some discussion, it was deemed best that the company should simply be commercial, affording every facility for providing the money and effecting the improvements by the machinery of their Act; but throwing all the responsibility as to the beneficial value and due execution of the works upon the Inclosure Commissioners. The witness particularly begged to point out the facility afforded by this company for owners of entailed estates to lend their own money designed as provision for younger children, and to avail themselves of the machinery of the Company's Act to charge it on the estate. In other cases, when the landowner requires a loan, he can obtain it through the instrumentality of the company.

The profits of the company are derived from a commission for the use of their act—about 5 per cent. If, on the other hand, the landowner employs his own money, and merely avails himself of the company's act, and their intervention with the Inclosure Commissioners, he is charged a commission not exceeding  $2\frac{1}{2}$  per cent. The rate of interest has varied from £4 4s. to £4 11s. 6d. The rent-charges at £4 4s. simple interest are now sold at a loss; but when a time of peace shall come, those at £4 11s. 6d. will be sold at a premium; and the company charge such a rate of interest as they think, on the average of their transactions during the twenty-five years, will bring them round. Their profit is derived from the commission of 5 per cent., or  $2\frac{1}{2}$  per cent., as the case may be. The company are limited by a clause in their Act to an interest of 5 per cent. on the loan. If a thousand pounds are spent on improvements, and the landlord is to keep the rent-charge himself,  $2\frac{1}{2}$  per cent. is added to that, as the Company's commission, and the estate is charged with £1,025; but supposing that it is the case of a loan from the company, the estate is charged with £1,050.

In reply to questions as to the smallness of the company's paid-up capital, Mr. Napier stated that it consisted of 10,000 shares, of £10 each, of which about 4,500 were subscribed for. The company did not wish to have a single pound subscribed for, more than was absolutely necessary, because they do not lend their capital—they obtain for the money lent a security which is always negotiable in the money market; and, therefore, they act simply as agents between the landowner and the public, who have money to lend at a rate of interest which shall bear some relation to the rate of the day. By the original act of the company, they were allowed to reproduce the capital sunk in improvements, by means of debentures to the extent of four-fifths of the money invested; and by an application then before parliament they were seeking further powers to increase this, under certain limitations. They were working with a very small paid-up capital, because paid-up capital was useless, under this system of operations. They make arrangements with Assurance Companies, and other monied capitalists, for a given amount of rent-charges during the year, provided the company shall have them to dispose of. The agreement is of course a contingent one: if there are no rent-charges created, there can be none to dispose of; and, on the other hand, as fast as rent-charges are created, they are passed on to the Insurance Companies. The Lands Improvement Company, therefore, want no more paid-up capital than may be required to make temporary

advances to landowners who require them, and cannot obtain them from a banker, until sufficient work is executed under their contract to enable them to obtain an absolute order from the Inclosure Commissioners. About £20,000 was found to be sufficient, and more than sufficient, for the temporary advances to landowners, while some securities held by the Company are being converted into cash in other directions. The assignment of the securities does not, or ought not, to take more than a week; so that if the company have advanced £5,000 to one landowner in this way, that sum comes back again in another direction, by the assignment of rent-charges, either to Insurance Companies, or to those landowners who are working with their own capital, only availing themselves of the Companies' Act to charge the improvement on an entailed estate. The advantage of the debenture system to the company and to landowners is this:—there are only about 16 or 20 Insurance Companies in London who will take these rent-charges; the market therefore is limited, and the insurance companies might unite to obtain a price upon the Lands Improvement Company; but if, instead of selling these securities, that Company can split the rent-charges, by means of these debentures, into a certain number of parts or convenient amounts, and give them to various persons who have sums varying from £50 to £50,000 to invest for a certain number of years in land, as a first charge at a fixed rate of interest, there are thus a thousand purchasers instead of a few insurance companies.

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### THE NEW BILL ON AGRICULTURAL STATISTICS.

However much the imagination may add to our pleasures, it is as certainly prone to magnify our ills. Nothing grows so surely on the mind as the dread of some indefinite evil. Our ignorance of what this may really result in gives only the greater play to the feelings; and, like another Frankenstein, we tremble before a demon of our own creation. The only effectual remedy here is to close at once with the monster; to meet him face to face, and arm and arm, and so test what his powers are, and what his menaces mean. Let us travel no longer by any roundabout road; but proceed direct across the haunted mead, to find the White Lady but the clear water of some hedge-side stream.

The farmer has just now such a Bogy before him. He has brought himself to quail at the very name of agricultural statistics. It is a great turnip-headed apparition that stands right in his path, and that won't let him go about his

business as he wishes. He is not quite certain what injury it really intends him, and so, as usual, he thinks the worst. Agricultural statistics will raise his rent and increase his taxes; the great aim, if any, beyond this being to make the whole country—his own friends and neighbours more especially—fully acquainted with every bushel of corn he, John Browdie, grows, and every shilling he, the said John, clears.

We put it fairly to our readers, whether this important question has not been too often argued on such premises as these? The promoters of the measure have been allowed credit for little or nothing; while on the other hand they have been attacked as if they inclined only to wrong doing. Instead of a national matter, agricultural statistics was to be received as a class injury. It was un-English, it was inquisitorial, and it was unprecedented. Nay! a respected contemporary

placed in its most imposing type the edict of a gentleman who declared that any such attempt at the collection was flying in the face of Divine Providence! And, hinting something of the Tower of Babel to those who engaged themselves upon the work!

We have said the farmer has been brought to regard the matter in this light, but we should rather write that he has been prompted to do so. A few unquiet spirits, who have since, more or less, confessed that they did not understand what was asked of them, attempted at first to imbue others with that vague terror they themselves exhibited. This per-centage, however, was very small, while it is daily becoming less. We have reason to know that many who sent back their return papers in blank, would now fill in both their acreage and their stock. The information thus afforded is not meant for parish talk or landlord's eyes. It tends rather to some general advantage, in which the farmer himself would be amongst the first to participate.

We have had, before this, occasion to remark on the unanimity of those who have calmly and thoroughly considered the object contemplated. They come not only from all ranks, but all sides. Never, perhaps, has political animus been more completely set aside than in the discussion of this topic. An agricultural question brought again prominently before Parliament might naturally enough revive some of that old spirit of antagonism which has been latterly so happily dying away. But this has done nothing of the kind. We have not merely Ministerialists supporting the Bill at present before the House of Lords, but the Opposition even still stronger in its advocacy. If this Act was ever intended to tell against the farmer, it was the Farmer's Friend who was one of the first to suggest it. We claim the best attention of Mr. Jonas here. On the second reading of the Agricultural Statistics Bill, as reported in our paper of last week, Lord Derby said:—"I have been for a long time fully satisfied of the great importance—to the farmer more especially—of obtaining, as far as possible, accurate statistics of agricultural produce. *I ventured a few days after I had the honour of taking office, in 1852, to write, at considerable length, to my noble friend the Duke of Richmond, urging upon him the great importance of obtaining accurate agricultural statistics, and pressing him to use all the great influence which he deservedly possesses with the various societies throughout the country, in order that by their intervention the farmers might be induced voluntarily to give the information which was required, and I undertook for the Government to give any assistance in its power. I mention this to prove that it is not now*

for the first time, nor solely from having read the report of the committee which sat last year, and the report of the commissioners of 1854, that I come to the conclusion that the obtaining of accurate agricultural statistics is a matter of extreme importance to every one, and to none more so than to the agriculturists themselves. I must confess, too, that, upon reading the evidence given last year before the committee, I have arrived at the conclusion that if we are to obtain such information in England it must be obtained compulsorily. I entirely concur with the opinion expressed by many of the witnesses, that farmers would rather give the required information upon compulsion, and in obedience to the law to which all are equally subject, than to give it voluntarily, without knowing whether the same information would be extracted from their neighbours."

We have here the opinion of the chosen champion of agriculture—one recognized above all others as the especial guardian of its interests. An opinion, moreover, not hastily arrived at, but after years of close attention to the point. We may gather quite enough from this to rest assured that if we had the Country Party in power to-morrow, we should have the establishment of these statistics even more speedily than we may look for at present.

The bill, indeed, before the House has much in it to claim support. It asks for nothing but what is really practicable, and that may be as really useful—the acreage in different kinds of crop and the returns of stock kept. We have never had any very high opinion of "the estimates" to be associated with these matters of fact. At best they can only be but good guesses; and we know from experience how apt these are to vary, and to be *out*. We are by no means certain but that a better notion might be drawn at once from the acreage, with other general bearings and influences known to us all, than from the most elaborate supervision of each several district. With all the manifest care taken by Mr. Maxwell and his coadjutors, the Scotch estimates are already something more than disputed.

It is but right to say that the Lords appear to be pretty generally agreed as to the principle of the bill before them—that it should take in stock and in crop, and that it should be compulsory. In fact, without such a clause it would read and act very like a measure duly passed, ere now, which was all very good as far as it went, but that was found to have no penalty to enforce it! When the producers feel that everyone must make it, and that not by any means necessarily for the information of his fellow, we believe the difficulty will sink to something even less than is imagined. This secrecy, or assumed want

of secrecy, was the great objection with Lord Ellenborough, who otherwise thought the information to be so obtained of the greatest importance. The noble lord, however, cites another "difficulty," for which we allow we were not quite so well prepared. His experience of the farmers, it will be seen, is not too flattering to their intelligence:—"I confess, too, from what little I know of the farmers as a body, I am afraid there will be another difficulty, and that they will fail altogether in making these returns. They will be so bothered by having every year to fill up these schedules under different heads, that I feel confident they will fail to do so, and will be exposed to the penalties in that case provided, not at all from a desire to resist the law, but from sheer inability to comply with it. I should recommend, therefore, that there be two schedules, one relating to the cultivation of the arable land, and another to the stock. It must be recollected that, generally speaking, farmers write remarkably badly indeed. I question if the best farmer I ever

knew could do much more than write his own name, and I believe that on that account much practical difficulty will be experienced. I believe that, if you afford the farmers ample time for writing and for correction, and at the same time insure them secrecy, these returns may be made in something like a satisfactory manner."

We confess, from what little we know of the farmers, that Lord Ellenborough can know very little indeed of them, particularly when he questions whether the best could do more than write their names. Our best farmers now are of a very different class, and we take it his lordship's testimony will be received as little less than a libel. We should not be surprised to see some of those who can "make their mark" enlightening his lordship as to their actual capabilities. At any rate, if Agricultural Statistics do nothing more, they may, with time, teach us to read and write; and here, again, the argument is still for, and not against.

#### "WATER-RIGHTS," AND OUTFALLS.

The subject of trunk drainage is again coming before the attention of the community, and in a somewhat new form. The late discussion at the Society of Arts passed from the laying of pipes to the providing of main drains, and from these naturally flowed into the consideration of outfalls in general. Mr. Denton earnestly commended the subject of our main and tributary outfalls to the consideration of those who, having influence, are willing to exert it in favour of an object of the highest national importance. Although the quantity of land drained is very small, in comparison with that which remains to be so improved, yet so much water has been prevented from evaporating, and is conducted into the streams so rapidly by the drainage already effected, that the consequences are becoming more and more serious every day. What then will be the extent of floodings and mischief, if all or a greater part of the land become drained before the rivers and mill-streams are opened and ameliorated?

It is a hopeful sign that attention is now being particularly directed to the water-mills. Mr. Scott said that, while in Ireland the national arteries of the country have been opened up, "here we impede them by hundreds of petty corn-mills, and there is no immediate sign of these impediments to land drainage being done away with, although the value of the extra produce that would thus be obtained from the lands at present injured by back-water, or altogether excluded from tillage, would probably exceed the value of such water-power," for

which however some compensation to the owners must in fairness be given. Mr. Donaldson alluded to the great difficulties experienced in obtaining outfalls, owing to water rights on the course of rivers, for mill-power and irrigation. Mr. Grantham, C.E., complained that nothing had been done to remedy the defects in main outfalls, although some little time ago the Earl of Carlisle introduced a bill into the House of Lords for this purpose. "This most valuable measure consisted in forming drainage districts, and appointing trustees to superintend them; and he considered that very great benefits would arise to the country if such a measure were adopted, so as to give power to lower bridges and culverts under public roads, straighten and deepen rivers and streams, and deal with the rights which would be affected by such operations over large tracts of country; but, above all, the removal of mills, dams, and other obstructions in rivers, which in many cases do incalculable injury, many times exceeding the value of the mills, by keeping up the levels of rivers, and rendering it totally impossible to drain the adjoining lands. He wished to impress it upon those who are interested in the improvement of land by draining, that they should use their influence to procure from the Legislature, the ensuing session, such a measure as would enable subsidiary drainage to be more effectually carried out." Mr. Davis said that, if we were to go into the midland districts, we should see great injury done by the damming up the water for mills. In the Valley of

the Nene not less than a dozen such mills threw back the water upon the land. Mr. Clutton referred to the very insufficient power at present existing to enable owners to obtain increased depths for the outfall of drains and water-courses through the lands of adjoining proprietors. "The Legislature, from a desire to protect private rights, has not hitherto granted sufficient enabling or compulsory powers for the improvement of the arterial drainage of England; and without controlling and sufficiently compulsory powers many districts in this country cannot be beneficially cultivated." Mr. Denton, in conclusion, announced his belief that there is some prospect of an Outfall Bill being presently introduced into Parliament, stating that "the millers are suffering from two causes. At times of excess, after a considerable fall of rain, and when the miller is injuriously overloaded, the excess is increased by the rapidity with which the under-drains discharge themselves; and as the quantity of water thus discharged must necessarily lessen the subsequent supply, the period of drought is advanced in a corresponding degree. As the millers already see this, and are anticipating increasing losses, they will join in finding a substitute for water-power, upon fair and honourable terms. Although steps should be taken before the evils accumulate too much, it is obvious that every year's progress will make that influential body of men the millers less anxious to retain the water land-owners are gradually ridding themselves of; and thus we may hope that they will think it their true policy to abstain from opposing the passing of a proper Outfall Bill." And, finally, the chairman, Mr. Simmonds, in summing up the remarks, alluded to the collateral advantages of drainage, as "improving the health of localities, by reclaiming swamps, diverting the superabundant waters into proper channels for irrigation, for the supply of mill-streams, and thus furnishing adequate water-power for keeping up canal navigation, river-channels, springs, and reservoirs for the supply of towns." So that an indiscriminate Quixotic slaughter of all water-mills is not needed, their removal in some districts being perfectly compatible with the preservation and improvement of the water-power in others differently situated. In the *Mark Lane Express* for Jan. 7th appeared a letter from Mr. Reveley, C.E., which is deserving of careful attention. Unless we sweep away the obstructing water-wheels which dam up our rivers wherever a foot or two of fall can be obtained (and which may be done by substituting steam-engines), the inevitable result, he says, will be that "we shall be compelled to make use of steam-power, in order to pump out our waste-water and drainage into the ocean." Here is an alternative! Is it

not high time that the nation began to bestir itself in solid earnest for the opening and deepening of our streams and rivers, and no longer wait to see measure after measure brought forward, and each one either quashed in the form of a bill before the Legislature, or rendered nugatory, by the weakness of its own provisions, when passed into an act?

Lastly, we have had a strong protest against, and proposed rectification of, the main evils, from "An Old Norfolk Farmer," on Jan. 21st. "I propose," he says, "that an act of Parliament be obtained, to authorize Government to purchase the whole of the water-mill property of the kingdom, abolish them, and carry out the system of arterial draining to its fullest extent." We need not say that such a sweeping procedure would possess only a little more legality and equity than distinguished the suppression of the monasteries by Henry the Eighth. Even a purely representative government has no claim to interfere with private rights and properties in any way it pleases, but must operate in accordance with law and custom, and confine its acts within its own especial and defined province. But there is no reason why the desired result should not be brought about in another way. If an act of Parliament can enforce proprietors to sell their land to a railway or canal company, it can also oblige millers to give up their property to a purchasing district-drainage company; and the same authority which can forbid the employment of one form, and enjoin the use of another form, of grinding machinery (for the sake of the Excise), has surely the power to interdict the millers' use of a water-wheel, in any situation where it is found to be injurious. And seeing that, in some instances—as in the Rye and Derwent drainage—water-wheels have been actually removed from mills, and steam-engines substituted, the millers receiving compensation from the parties benefited, what is to prevent the passing of an act for a general carrying out of the same improvement? But it must be distinctly understood that localities themselves, and not the central Legislature, are to determine what mill-wheels are nuisances, and to act as they please about applying the remedy; for, in many places, there are water-mills which cannot be charged with occasioning floods and damage—at least, to anything like the amount which would warrant the expense of supplanting them by steam-mills.

What we really want is, a partition of the entire kingdom into drainage districts, self-administering or under the management of representative district trustees, and organized, superintended, and authorized by a central Government commission, empowered by an act of Parliament.

## THE LAMBING SEASON.

It may not be inappropriate to recur to this subject at this season, *i. e.*, the lambing season; although it may prove to be a thrice-told tale, or at best a desultory one. Be that as it may, it is a very important part of the business of the farm, and we need to be reminded of many very common things in the ordinary course of business—it often prevents error, and frequently stimulates to good.

One of the most important things connected with a good lambing season is to take every care that the ewe flock shall be brought into such a satisfactory state as to pass through it with the least danger. To this end it is requisite that every attention should be paid to their management throughout the winter; that their food should be wholesome and plentiful—not superabundant, nor rich; that the greatest regularity should be observed in supplying it. Breeding animals never do well, subject to sudden or violent changes, either in habit, food, or lairage. The ewe flock, beyond all other animals, ought to be kept in an equable, quiet, and somewhat thrifty state, during the whole period of gestation; and their condition at “the lambing time” should be strong and healthy, but by no means approaching fatness. Their food during the lambing season should be precisely the same in character as during the winter, but in somewhat greater abundance. This, however, is not uniformly of easy attainment. It is always necessary to congregate the flock more closely, to collect them into some accustomed field or paddock or fold-yard. When this is the case the artificial food supplied should be made to assimilate to their usual kind as much as possible. For example, it has become an almost universal practice to preserve for the ewe flock at this season an abundant supply of mangolds. Now this is very good practice, subject to some modification. If the flock has not been previously supplied with them, it will be found a too violent change, and flatulency, colic, and scouring will often result. They should be gradually brought to feed upon them, by a little being given to them daily, for a few weeks previously; should this, however, have failed to be done, the best preventive at hand against danger, or the best corrective, should be given with them. Oats, or cut chaff from oat-sheaves, or a very small quantity of barley (of this be very careful) or bean and pea straw, or hay, are all very useful aids. Beans or peas are not desirable in connexion with mangolds, except as meal, and then sparingly. Linseed cake and malt-coombs are both excellent aids. The great thing is to prevent either scouring or con-

stipation, as the latter will frequently succeed the former: in such cases great danger is likely to arise from inflammatory attacks immediately after lambing. “Prevention is better than cure.” Much danger may be warded off, by attentive management during winter, and at this season more particularly. These matters being carefully attended to throughout, a successful season may be fairly anticipated.

The lambing season having arrived, “the ewe’s time being up,” they should be collected into the lambing field. This should invariably be the most convenient and best-sheltered field on the farm; and it should further be provided with a roomy and warm fold, in which to gather the flock at night; this to be well appointed with small lamb-pens of wattled hurdles, in which to put the recently lambed ewe in cold weather or dark nights, to prevent the lamb straying from its dam, as one of a pair will very often do. The shepherd’s house should either be near, or he must have a temporary abode, so as at all times to be within sight or hearing of a “paining” ewe or a bleating lamb, and in readiness to give needful aid as required in any case. His first duty, on observing a ewe “paining,” should be to examine her, in order to ascertain if *all is right*—*i. e.*, the head and forelegs should present themselves so as to be felt by his finger; and in catching her he should be extremely cautious and careful not to hurt her: for this purpose he ought to use a long shepherd’s crook, and instead of seizing a leg, he should catch her with his crook by the neck, and then gently lay her down for examination. This is best done by taking up the hind leg, and drawing it under her towards the chest, and at the same time bending the neck away from him, and turning the head almost round to the shoulder: she will then gently drop down, when he may lay her along on her left side. If all is right, he may almost leave nature to take her course, and by no means to hurry; if, however, the labour is protracted, he must again examine, and act according to his best judgment. Should his assistance be required, he must lay her on her side, and, as she pains, aid her by very gradually drawing the lamb by its two fore-feet; this in a simple case: but if *all is not right*, he must insert his two fore-fingers, to ascertain, if possible, what is wrong, and act accordingly. The most common case is to find the head presenting itself alone, and the fore-legs bending into the lamb-pouch or foetus. The first thing is to try if the lamb can in this state be drawn away without violence; if it does not come easily, the next thing is to try and gently force

the head back into the foetus, and then by the most gentle means endeavour to bring up the fore-legs. If this can be attained, the parturition will then be easy. Should the tail present itself, and the hind legs be doubled backward, the case is a difficult one; almost the only course is to force the lamb back into the foetus, and turn it round; or if that is impracticable, to bring forward the hind legs, so that it may thus be drawn away. This is often done, but it is attended with danger to the passage into the womb, and ought if possible to be avoided. When a leg is brought forward, a cord should be attached to it, so as to prevent its being drawn back, and to give facility to draw it away. A small crook, made of rather thick wire, is a very useful instrument in well-practised hands, to introduce into a confined barren, to draw up a leg, or a dead and decayed lamb. It is sometimes necessary to draw away a large lamb piece-meal, often by main force; but if the shoulders can be cut off, the better. Sometimes the case is hopeless, the lamb cannot be got away; the best way then is to cut through the rim of the body near the flank, take out the lamb alive, then kill the ewe and dispose of her as may be best. In all cases of very severe parturition, a dose or large tea-spoonful of laudanum should be given, and subsequently a posset of gruel or milk sweetened with treacle, and the next day a dose of salts with a spice of ginger, and the utmost endeavour used to keep her from paining. Her food should be given sparingly. As soon as the lamb is brought forth, its mouth and nostrils should be cleansed, and every attempt be made to enable it to draw breath; as soon as it has well recovered itself it should be suckled, taking care to free the ewe's udder from wool, so that none can pass into the stomach of the lamb. Constant attention for some days may be requisite, and great watchfulness must be exercised in the earliest stages, or many lambs are lost. The shepherd ought to have with him at most times a warm bottle of milk, and a phial of gin, to give a draught to every poor feeble lamb likely to require either. In cold stormy weather, a mouthful of gin-and-milk will often restore a nearly starved lamb; but the best way to heat a starved lamb is to take it at once to a good fire, and for an instant to hold its mouth near, so as to cause it to breathe hot air for a short time, and then cover it down till it recovers.

As the ewe lamb they should be separated from the general flock, and placed upon the best pastures, or upon some nutritious food likely to increase the flow of milk; this is very important. Lambs in the early stages of their growth must have their requisite supply of milk, or they soon shrink into skeletons, and are seen about the fields with their backs up, and all their legs drawn together, the

very personification of infantile helplessness; and which state they rarely overcome with profit to the breeder. The plain fact is this: ewes must be supplied with plenty of good and proper food during the first few weeks of suckling their lambs, be the expense ever so great, or the flock is lost, or nearly so. It is true that many poor starved lambkins may exist through the summer; but their constitutions are so injured that even during the summer, on a flush of grass, many die from scouring; in the autumn many die by the transition from grass to winter-keeping; and in the stormy, cold, rainy weather of winter, or its still more fatal snow-blasts, they die by wholesale. But if, on the contrary, the lambs are well suckled, they soon become fat and healthy, and are well qualified to contend against all the vicissitudes with which they have to encounter: the happy result is, that they may go on progressing from their birth to maturity, and thus leave a satisfactory return for the attention and good management of the breeder.

In severe and untoward seasons it frequently happens that the flock of ewes generally are short of milk, and in many individual instances entirely without. This gives rise to many anxieties on the part of the breeder. The great resource is to cow's milk, and the richer the better; but skim milk, sweetened with sugar or treacle, and a very slight thickening with fine oatmeal or wheaten flour, will be of great service; and as the lambs get stronger, a little linseed or oilcake porridge is an excellent substitute. The shepherd or his assistant should be constantly perambulating the field with a warm bottle-full or two of these aids to milk in his pocket or budget, in order to suckle every lamb requiring such help. The bottle should have a suitable appliance in place of the cork, through which the lamb can suck, and as nearly like a teat as possible.

The period of castration highly deserves attention, not only as respects the age of the lamb, but the manner of performing the operation. *As to the lamb*, it is absolutely necessary to the success of the operation that the lamb be in a healthy and thriving condition when operated upon; and this being the case, the age is not of such material consequence. The safest time will, under all circumstances, be found to be between the age of 14 and 21 days; but it may be deferred somewhat longer, providing the weather is unsuitable; for it should be borne in mind that the operation ought never to be performed in severe weather; cold bleak winds or cutting night-frosts are alike very detrimental to their safety. The most suitable weather is the mild sunshine, with occasional showers. Slight rains are not very injurious; but cold heavy rains are almost certain death to numbers.

The mode of operation is this: The lamb is held upon the left shoulder, in order to give the operator more scope for his right or knife arm. The assistant takes the lamb under his arm, gathers the four legs together, a fore-leg and hind-leg in each hand; he elevates the lamb to his shoulder, holding the back or rump firmly against it, and pressing the body a little forward, at the same time extending or drawing the legs backward or wider, so as to give room to the operator; this done, the operator seizes the purse and examines it, to see if both testicles are right, and present no obstacle to their extraction; he then cuts off such a portion of the skin of the purse as may be requisite to enable him readily to lay hold of the testicles; he then applies the knife to cut through the inner covering of fleshy skin, when the testicles will generally protrude; these he lays hold of with his teeth, and draws them gently and very gradually away, so as to leave, if possible, no part thereof behind. This is the chief aim; for if any fleshy portion is left, it not only retards the healing, but is very often attended with fatal consequences. The purse is then slightly drawn down, by taking hold of it with the fingers of both hands. A flock mark is mostly put upon one of the ears; the tail is cut in length according to taste, and the lamb is turned off.

The ewe lambs are merely marked with the customary flock mark on the ear, and their tails shortened according to the breeder's taste. As they are very liable to collect dung and dirt in winter, it is very desirable to leave them not more than four inches in length. The proper marking of lambs at this season is an important consideration with ram-breeders and others who desire to retain

the correct pedigrees of their flocks; and many breeders pride themselves upon their accurate knowledge of these matters, and rejoice to trace up a pedigree to some noted specimen of his kind. It was said of the late Earl Spencer that he knew the pedigrees of every animal amongst both his flocks and herds. To a breeder of male animals for hire, this knowledge is in reality necessary, in order to enable him to vary in some degree the crosses of his animals, to suit his customers' flocks or herds, so that their proximity in blood may be known and acted upon, if required.

The medicines usually administered in "lambing time" are very simple. In a case of fever, about one ounce of Epsom salts is a suitable dose for a ewe, and a small teaspoonful of castor-oil plenty for a lamb. Laudanum, as before-named, should be given after a severe and protracted labour; a tablespoonful is quite sufficient, to be followed in about twenty-four hours by the Epsom salts, or an ounce of castor-oil, to be repeated at discretion. Bleeding may be resorted to, in cases of great danger, but due caution must be used. The ewe flock is not often in that high condition at lambing-time to render bleeding very desirable, or to allow it to be done with safety. Restoratives or cordials are very conducive to the recovery and strengthening of an exhausted ewe. Gruel made of flour and milk, or with water, and well sweetened with treacle or coarse sugar, often revives a sinking ewe, and in such case a little ale might be added with good effect.

Applications for gangrenous affections or symptoms are of very little avail. Warm fomentations and emollient poultices, where they can be applied, are to be preferred to anything else.

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## PROGRESS.

By AN OLD NORFOLK FARMER.

Of the importance to mankind of the cultivation of the earth there can be but one opinion. It has not only the prestige of the highest antiquity, but the sanction of all ages of the world to support its pretensions. It has been ennobled by the examples of many potentates, and its praises have been sung by poets, philosophers, and other great and learned men, of every nation, ancient and modern. Its advancement and protection have been the subject of Legislation with every civilized people; and laws have been enacted, and still continue to be so with some, to give it a preponderance over every other branch of industry. Nor is this care and attention bestowed upon a subject unworthy of it; for although there is reason to believe that had man continued in that state in which he was created, the labour of tilling the ground would have been rendered unnecessary by the

spontaneous production of whatever was essential to the preservation and prolongation of his existence; and, moreover, that labour was entailed on him and his posterity as the curse for disobedience; that curse has been turned into a blessing, by the innumerable advantages resulting from its practice; whilst the practice itself has become an honoured and honourable condition in the estimation of mankind.

Recent discoveries have demonstrated that the creation of the earth was not, as was formerly believed, coeval with that of man. The opinions commonly entertained on the subject of the Mosaic account of those events are now shown to be fallacious, and that an indefinite number of cycles must have flowed, to effect those changes revealed by geology in the structure of the earth, by which it was at length fitted to be the

habitation of the last and noblest of creation's work. In this respect, the age of the human race, the nearly six thousand years through which man can trace the genealogical history of his species,\* is but a brief episode, an infinitesimal epoch, in the duration of the planet he inhabits, or of the system of which that planet forms an integral portion. That it was formed expressly to receive him, and that all the arrangements and changes that have taken place in its structure and on its surface, and the graduated scale of animal and vegetable life unfolded by scientific investigation into the arcana of primeval nature, have been effected for, and made subservient to, his welfare, does not admit of a question. Whatever ignorance may have heretofore prevailed on the subject, we now know that there is not a single arrangement in the constitution of the earth, a single production in nature, a single fact in science, but what is conducive, if properly applied, to the well-being and happiness of man.

Such is the view we have taken of the position of man in relation to the habitation prepared for his reception; which may, with the strictest propriety, be called "his mother earth;" for out of it, so far as his mortal part is concerned, was he, in common with the rest of the animal and vegetable tribes, created. In this respect, his humanity can boast no higher origin, no more refined means of sustentation, no nobler destination, than the "brutes that perish." Like them, from the earth he sprung, and to it will he return. Like theirs, his mortal remains must dissolve into their original constituents, and mingle with the surrounding masses of inorganic substances, hereafter to enter into new combinations, and re-appear in new forms of grace, beauty, and utility.

We have, therefore, a three-fold tie, to attach us to the earth; and may we not conclude that it exercises a secret but constant influence over us—that it will account for that eagerness displayed by the generality of mankind to be the possessor, or at least the occupier, of a portion of it? The passion for agrarian life and rural pursuits is, we believe, common to all, whose tastes have not been vitiated by the artificial excitements of condensed society. It is said, with truth, that "God made the country, and man made the town;" and although man is a gregarious and social being, that condition, in the extreme form in which it now exists amongst us, is forced upon him, in most cases, by circumstances, and is submitted to, amidst secret longings for that primitive, quiet, and healthy state of existence which a country life confers. Thus, a provision is made, in the very constitution of human nature, for the perpetuation of the cultivation of the earth, independent of its necessity. The love of the country and a taste for its pursuits is a general inherent principle, however few comparatively may have the opportunity of indulging it. Moreover, a divine sanction has been enstamped upon it, by a promise that "seed time and harvest... shall not cease;" by virtue of which, the husbandman both "ploughs and

sows in hope." This promise alone imparts nobility to the profession, and gives the lie to those who would degrade it into a mean and grovelling employment.

Agriculture may be described as a series of scientific operations, little understood hitherto by those who practise it. Notwithstanding the high antiquity of its origin and the celebrity which has ever attended it, the secrets of its processes and results have but very recently been revealed. Perhaps in this respect it has been in the rear of all the other civil arts of life; and the cultivator of the earth has been the last to yield himself to that progress in knowledge which characterizes the present age. Until the present century, the farmer has been, generally speaking, the least intelligent of the middle class; and the farm labourers stood so low in the scale of moral and intellectual acquirements as in a great measure to justify the contemptuous epithet bestowed upon them, of "straw-yard savages."

The causes of this long continuance of defective knowledge of the art he was practising we shall presently endeavour to define. But we would first inquire whether the agriculturist is, in reality and comparatively, so much behind the man of science in point of time in intellectual attainments suitable to his profession? If we look at the progress made in physical science up to the beginning of the eighteenth century, we shall find that the same slowness of apprehension, and the same indistinct and defective comprehension of truth, characterized the professors of its various departments. Take, for instance, that of chemistry. When this term was first used, it comprehended the whole range of science then known. Next it was applied to the working of metals indiscriminately; then to the transmutation of metals; afterwards to the preparation of the panacea or universal medicine for the cure of all diseases, and the perpetuation of human life; and it was not until the seventeenth century that the dreamy assumptions and absurdities of the alchemist were exploded by the development of real science\*—still in its infancy, it is true—and chemistry placed upon that solid, because true, basis on which it is destined to stand until the end of time.

Yet the man of science (exclusively) has ever been essentially a man of reading and reflection. With no laborious manual occupation to distract his attention or fatigue his bodily powers, he leisurely conceives and follows up an idea to its results. He can, at his ease, compare the various phases which present themselves, and draw his conclusions, to be noted down and reconsidered and reflected upon, until he arrives at that point which demonstrates the correctness of his conclusions, and he is enabled to take them as the basis of a theory.

How different in this respect were the position and condition of the agriculturist! Shut out, by the local and fixed character of his occupation, from that free and

\* Allowing 30 years to a generation, the following is the result. Age of the species: 5,860 years divided by 30=195 generations since the creation of man.

\* Van Helmont was the last of the alchemists. He boasted that he could prolong his life indefinitely by the use of the universal medicine; but his death, in 1644, at the age of sixty-seven, completed the disgrace of the professors of the order of alchemists. Bucher had, in the previous century, arranged the principles of chemistry, and reduced it to the science it is at present known to be,

constant intercourse with society which the man of science enjoys—engaged from early dawn to a late hour in laborious and frequently harassing pursuits—with a mind continually in a state of anxious suspense as to the success or failure of his exertions—he had little leisure, and less inclination, to dive into the more abstruse branches of knowledge, or by reading at all, to cultivate his mental powers. A few master-minds, like that of Tull, might overcome the difficulties that lay in their path; but, as in his case, it is always found that such men are in advance of their age, and that the adoption and further development of the principles they have enunciated are left to after-times. If, then, a period of *nearly six thousand years* passed away before the true nature of physical science was understood—if, with all the means, appliances, and leisure for study at command, the men of science have only so recently as the last hundred and fifty years understood *their* calling, we must not be surprised that, following in their wake, the agriculturist, with his life of isolation and laborious toil, should have been slow to adopt the novel, and to him dubious, fact that *his* occupation too is based upon scientific principles, and that he who best understands those principles will prove the best farmer, and produce the largest results.

If we consider the last eighty years as the period during which agriculture has struggled to overcome its difficulties, and emancipate itself from the ignorance in which it was previously immersed, and then compare the progress it has made with that of its precursors, the Physical Sciences, we may rather wonder that so much has been effected, and may justly come to the conclusion that the agriculturist is not that devotee to ignorance which he has been represented to be.

Agriculture is the embodiment of all the physical sciences, which until recently were an unravelled mystery to the world. If the agriculturists have been slow to apply these principles in the practice of their art, the same may be said, with less excuse, of the men of science, who have, in some instances, allowed many years to elapse before the discoveries they have made were applied to practical uses. For example, the fact of the existence of sugar in most, if not all, of our European plants, was discovered by Margraaf, in the middle of the last century; but it lay dormant, as a merely curious subject, for upwards of fifty years, until necessity compelled its adoption in the neighbouring kingdom of France, where, as well as throughout the whole continent, its manufacture has since become an extensive and important branch of industry. Again, the principle of the electric telegraph was discovered by a Frenchman\* about the year 1790, but no progress was made in bringing it into practical use, and it was in fact forgotten, until sixty years after, when it came out as a new discovery. We cannot therefore be surprised at the slowness the agriculturist has evinced in the adoption of principles, as a rule of action, which go to upset all his preconceived ideas, handed down to him from his father

—probably a successful farmer—and based upon traditional experience.

Whilst however we feel disposed to “wink” at these by-gone times of ignorance, we can by no means justify or extenuate their continuance in future. If, up to a certain period, the mind of the agriculturist has been chained by adverse influences, by the paucity of the means of knowledge, and by a life of isolation and local fixity, to a course of unreasoning routine in the prosecution of his calling, the excuses we have alleged for him no longer exist. During the present, and the latter end of the last, century, a host of men of mark have sprung up, who have gradually developed the scientific character of agriculture, and enlisted in its service all the new discoveries, by which the career of science has been distinguished; the laws by which Nature is regulated in the production of plants and animals have been discovered and explained, and her most occult operations investigated. It is to the men of science, the Davys, the Ures, the Boussingaults, and many others, that agriculture is indebted for the unravelling of the arcana of Nature, and for demonstrating that she not only acts upon one uniform plan or system, but that that system embraces the application of the whole cycle of physical science, independent of which an ear of corn or a blade of grass can have no existence.

Nor can the agriculturist any longer assign, as an excuse for his ignorance, that the knowledge of these things is hard to attain. On the contrary, the discoveries that have been made have been freely disclosed, and by means of the Press are brought within the reach of any one who will be at the pains to seek them. Works, not only theoretic, but of experiment and practice, abound, in which the application of scientific principles to the art of agriculture is followed up to its results. Chemistry has unfolded those principles, and defined the elements and influences essential to the production of vegetation; and what chemistry has thus revealed has been published to the world by the discoverers, with a plainness and simplicity that any one with common understanding may comprehend them. Knowledge has thus been universally diffused, and the terms “ammonia,” “carbon,” “phosphate,” “nitrogen,” &c., &c., are now “household words” in almost every farmer’s homestead in the United Kingdom. Agriculture, therefore, no longer can remain a traditional art, entailed with all its dogmatic routine, and handed down from father to son, alike applied in all seasons, to all kinds of produce, and on all soils. The husbandman may now, with common inquiry, learn how to adapt the three grand elements of production—soil, seed, and manure—to each other, so as to obtain not only the largest but the most certain results, so far at least as the fortuitous circumstances of seasons, and other casualties, admit of.

The body of agriculturists are not unaware of the advantages of science to their profession. On the contrary, an immense progress has been made within the last few years, and knowledge is diffused with no niggard hand. Societies have been established in every part of the kingdom, at whose meetings talent has been

\* M. Thomond. See “Travels in France, by Rev. Arthur Young.” Vol. I., p. 25.

elicited and intelligence displayed, which show that the present race of farmers, at least, have read to some purpose. By these means, mind is brought into contact with mind, and by the collision a flood of light has been thrown upon every important branch of agriculture, which, by means of the periodical press, is quickly diffused throughout the kingdom. The consequence is, that prejudice is fast giving way in every direction, mere routine is becoming subordinate to science, frugality is exchanged for economy, and agriculture is beginning to assume in earnest that character which Nature has all along striven to impress upon it; but which ignorance and dogmatism have hitherto held in abeyance, with scornful contempt—a system founded on the immutable laws of science, by which all its operations are regulated, and its results obtained.

In accordance with this change in the views and opinions of the agricultural body, the great discoveries of the age are now freely applied in the various departments of practice in their profession. Thus the thrashing machine has superseded the flail, and more recently the steam-engine the horse-power, in its application. The American reaper performs its task at one-half the expense of the sickle and scythe, besides shortening the period of harvest in an equal degree—an object of no small importance to the farmer: and soon we expect to see the plough itself yield before that monster power, which is daily being applied to new operations, and always with ultimate success. On the other hand, the principles of fertility, or the laws by which vegetation is governed, have been investigated; and that subject which was started by Tull at the beginning of the last century, involving the perfect pulverization of the ground as a preparation for the reception of the seed—but which, for want of that knowledge which every practical farmer has now the means of acquiring, he was unable to explain—is now well understood. Tull may be said to have “seen men as trees walking,” or, in other words, to have been groping in the dark, or with that glimmering of light which admits not of identification. Of the principles of vegetation he could know nothing, because chemistry, upon which they are founded, was, in his day, an embryo science. To this ignorance alone are his errors to be ascribed; and we may with truth assert that had he lived in the present day, he would have revelled in that flood of light which real science has shed upon his favourite profession.

It is to Professors Davy, Liebig, Way, &c, that we are indebted for the full enunciation of the principles of which Tull had that indistinct apprehension, and for placing upon the sound and eternal basis of science the practice he so imperfectly understood, and so erroneously reasoned upon. From henceforth the nature of vegetation, and the mode by which the growth of plants is accelerated, is no longer a mystery. The principle of absorption from the atmosphere as well as the soil, and the combination of inorganic, in the production and composition of organic, substances, are now facts familiar to the mind of every intelligent agriculturist. We trust they will soon be disseminated throughout the entire body of the cultivators of the soil.

This diffusion of light and knowledge amongst the agricultural class has not taken place too soon; for never was there a period in the history of this country when the importance of this branch of industry was more deeply felt by those who take a broad view of the subject. With a population increasing at the rate of half a million per annum, and that increase itself growing in a compound ratio, the experience of the last ten years shows the necessity, both for extending the cultivation of land to those tracts still lying waste, and for increasing, by every means and appliance that science can suggest, the produce of our fields. With regard to the latter object, much has been done of late years by the use of condensed artificial manures—more especially the introduction of guano, by which an amount of produce has in some instances been obtained that would have been considered apocryphal even thirty years ago. By these means, the entire average produce of wheat in the United Kingdom is increased at least one quarter per acre; and we are far from supposing that production has yet reached its maximum. Notwithstanding, however, this increase, which amounts in the aggregate to four million quarters per annum, we still require an importation of five million quarters, to supply the wants of our teeming population. We must, therefore, go forward in the application of those means by which the produce can be carried to its utmost limit. When that limit shall have been reached—when agriculture shall have become an *intelligent* series of scientific operations, and the farm itself the laboratory of a practical chemist, England will again be an exporting instead of an importing country.

It is the promotion of these objects, so important to the body interested in them, that the writer of this paper has had at heart. In early life he was for many years a practical farmer, bred up in the Holkham school of agriculture, and consequently early initiated in those liberal opinions in regard to progressive improvement which were so well advocated, so powerfully supported, and so efficiently carried out by the great men of that school and period. Connected indirectly in after-life with the agricultural interest, and with all his sympathies, tastes, and inclinations in unison with it, he has watched its progress with unceasing attention, and witnessed with the greatest pleasure the rapid advances it has made in emancipating itself from ignorance, prejudice, and mere routine, and in the substitution of useful knowledge, enlightened inquiry, and rational experiment, leading to practice based upon scientific theory. The impetus thus acquired cannot be stayed, nor the progress of investigation obstructed, or become retrogressive. Like the thirst superinduced by the use of ardent spirits, the desire for knowledge increases with every fresh acquisition; whilst the prosecution of one theoretic truth to a successful result stimulates to further experiment. The mental powers increase in vigour and activity in proportion to their exercise, and thus provision is made in the constitution of the human mind for that progressive enlightenment which is as illimitable in its range as the realm of Nature itself.

Whilst we thus remind the cultivator of the soil that

duty as well as interest lays him under an obligation to render this bright and beautiful world—beautiful even in its wildness and desolation—as productive as possible, thereby to increase its wealth, and with it the temporal happiness of his species, we would at the same time suggest that this must be done in subordination to still higher claims, arising out of the twofold nature bestowed upon him. If the material portion of that nature owes its origin to the earth, and is destined in a brief period to repay the debt, by returning its component parts to the congenial masses from which they were derived, the second and immaterial principle within him, which emanates from a far higher and more refined Source, exterior to the material creation, is alike destined to return to that Source when the mortal part decays.

This principle, which the infidel dares not attempt to ignore, whilst he seeks to divest it of its essential characteristics, is what distinguishes man from the inferior creation around him, and gives him the entire dominion over it. That dominion has not been bestowed upon him for mere purposes of personal aggrandizement and the accumulation of wealth, nor without involving obligations of a serious nature. We are each of us parts of a system, which embraces a consideration both of the present world and of a state of being beyond it, of which we can have as yet but an imperfect conception. It is not, however, the less real or certain for our defective knowledge of it; and it behoves us to make this ques-

tion, so intimately connected with our final destiny, the first consideration in the arrangements of our time, thoughts, and course of life.

Neither must we forget how entirely helpless we are in regard to the results of our best-arranged plans and most efficient operations. The husbandman, above all other classes, must feel his ultimate dependence upon a power superior to all human efforts; and, that when he has done everything that the wisest and most enlightened policy can suggest, a blast of the hurricane, a night of severe temperature, a breath of poisonous miasmata, may neutralize his best efforts, blight his fairest prospects, and dash his hopes for the season to the ground.

Whilst, therefore, every nerve must be kept in motion, and the powers of body and mind employed, as if everything depended upon his own efforts, let the cultivator of the ground work in humble and hopeful dependence upon that Being who absolutely commands those elements upon whose agency his success rests. Let him rejoice with grateful acknowledgment when his prospects are crowned with a favourable result, and bow with submission when reverses attend them. Let him, above all, cultivate that spirit of contemplative and intelligent piety his profession is so eminently calculated to promote, which is always dignified and graceful—which will secure happiness under any transition of fortune in life, and constitute the best and most worthy preparation for the final termination of his earthly labours.

## CULTIVATION OF THE SUN-FLOWER AS AN AGRICULTURAL PLANT.

Some inquiries having been made as to the propriety of cultivating the sun-flower as a field plant in Ireland, for the purpose of producing a cheap food for poultry and the production of oil, we give the following summary of its character, products, and cultivation.

The sun-flower (*Helianthus annuus*), though a highly ornamental plant in the flower garden and the shrubbery, possesses much more valuable and profitable qualities than it generally gets credit for, and from its utility and hardihood, in many instances, may be profitably cultivated in the field. The stalks, when burned for alkali, are reputed to yield 10 per cent. of potash; the green leaves, when dried and reduced to powder, and mixed with bran, according to some French writers, are excellent food for cows, and greedily consumed by them. In Portugal the seeds are made into meal and bread, and in America they are roasted and substituted for coffee. But their chief value, in a commercial point of view, is in the great quantity of a very pure oil which may be expressed from them, which is reputed little inferior to olive oil, and suited for table use, burning in lamps, and for the manufacture of soap. The seeds are also greedily devoured by birds, and yield a cheap food for poultry, with the further advantage, it is said, of rendering the hens prolific, and the cake produced after expressing the oil is excellent for cattle feeding.

¶ The produce must vary considerably with the soil and other circumstances, but it has been found to yield 50 bushels of seed per statute acre, producing about 50 gallons of oil, and 1,500 lbs. of oil cake. Though the plant seems to flourish in any soil and to require but little care or attention, that which is most suitable for it is dry, deep loam, and rich in alkaline matter. Fresh sea-mud makes an admirable manure for it, and if the soil be heavy, may be advantageously prepared by dressing with shell, sand, limestone, gravel, or any other opening calcareous matter, but it should be well worked and finely pulverized. The best time to sow is early in March, in dry weather, and as the plant bears transplanting admirably, the seeds may be either sown permanently, where they are to

remain, or in drills, 18 inches apart, in a nursery, for future transplanting, the proper time for which will be, when the young plant has perfected its fourth leaf. They may then be planted out in rows about 18 inches apart, and at 12 inches plant from plant in a row. If sown where they are to stand, drills should be drawn by the hoe, about an inch deep, 18 inches apart, and the seeds scattered thinly along it, and covered up, or what is better and more economical, the seeds may be dibbled in in rows at the above distance, three or four inches apart in the rows, and when of the size above described, thinned to 12 inches apart. The thinnings, if carefully lifted, may be transplanted as above directed, if required, watering the plants if the weather be dry. Keep the land clean of weeds by the hoe, putting a little earth round the plants for about six weeks, when the leaves will so cover the land as to smother all weeds, and will require no further care till the crop is fit for gathering, saving that in our climate it may, and no doubt it will, be found necessary to remove all the secondary flowers, which, if left on, would only tend to rob the primary flowers of the nutriment required, and retard their ripening. When the heads are ripe, or nearly so, the plants should be cut down near the ground, choosing dry weather, that no wet may stick or remain in the flower heads, and remove them to a dry, airy shed, where they are to remain till quite dry, when the seeds may be extracted. As they are particularly susceptible of moisture, which is injurious to their keeping quality, they should not be left on the ground, but be stowed away in a dry, airy place, where vermin cannot get at them.

Hitherto the cultivation of sun-flower has been chiefly confined to gardens and shrubberies as an ornamental plant, where it flourishes without much care or trouble, in the most ordinary soils, except merely sowing the seeds and keeping down weeds, and we can safely recommend its culture as a field plant, but only on a limited scale, till we get more practically acquainted with it, and until its uses are better developed.—*Irish Farmer's Gazette*.

## THE MODERN LANDLORD.

If the establishment of agricultural societies throughout the country had only resulted in promoting and cementing that good understanding which now so happily exists between many *landlords* and *tenants*, they would have done much. They have not only done this, but they have been the means of teaching both their respective duties toward each other and to their common country. "Property has its duties as well as its rights." The country expects the proprietors and occupiers of the soil to exert their best energies, talents, and skill, to provide the population with the greatest possible amount of food from it, and at the cheapest rate. "It is their imperative duty to do it: it is a great moral and social crime not to do it: it is a great wrong done to society to neglect to do it."

The landlord and the tenant are the parties required to do this; they ought to act in concert, with the view of enhancing the productive powers inherent in the soil to the very uttermost—neither can do it alone. The landlord can neither himself, nor by his agents, enter so fully into all the minute details of the business of the farm, or conduct it with such economy and profit, as the intelligent plodding tenant. There is no one who can produce so much surplus produce for the want of the community as the enterprising industrious tenant. The small proprietor farming his own land will return as much produce, but he consumes more; the community is not so highly benefited. The tenant is compelled to provide supplies for the market, to meet his rent and other various engagements; the proprietor is more at ease, the obligation to sell may not be great, and the pleasure of business rather than the profit the rule with him.

The landlord and tenant, then, are the ostensible parties to whom the community must look for their main annual supplies of the chief requisites of life, *food* and *clothing*; *i. e.*, meat, flour, vegetables, wool, &c. By what means then can these supplies be obtained in the greatest abundance and with the least cost? My object in writing this paper is to endeavour to show this so clearly that both landlord and tenant may see it to be of mutual advantage to accommodate and help each other. The tenant must be encouraged to expend his capital in the culture of the many crops of every kind to which he can by any means adapt his land: the landlord must give him every facility and security of tenure for that purpose; in return the tenant must pay to the landlord a reasonable additional

rent for such accommodation, and see to it that the fertility of the soil be kept up, or there is an end to the mutual good understanding. There must be a great and judicious outlay of capital by the tenant if he expects to obtain an unusual amount of produce or a greater number of crops; and this expenditure judiciously applied will not only keep up the fertility of the soil, but will of necessity enhance its productive powers. He cannot pursue a heavy course of cropping without; he is positively necessitated to do it, or give up his onward course. There is no limit to be prescribed to the productive powers of the soil: it is for the cultivator to bring out those powers to the very utmost. This he is on the highway to accomplish, backed as he is by the scientific researches of the age; and he is a tyro in agriculture, or a traitor to his country, who refuses, under a good and considerate landlord, to adopt such improvements in his practice.

*The Landlord.*—What are the more especial duties of the landlord under an improved modern husbandry? First, to give security to the tenant by *lease*. I take this position for a starting point. All lands to be leased shall be in, or supposed to be in good husbandlike condition, or to be let subject to such condition; the reverse, or land which is out of condition, shall, of course, be let at a corresponding rent, subject to the proviso that it shall be left in a proper state of cultivation and in a good husbandlike condition at the close of the lease. Such being the case, I am of opinion that the principal and almost only necessary clauses in the lease will be to confine the tenant to cultivate in a truly good and husbandlike manner, without reference to customary rotations, and to prevent the conversion of grass lands into tillage without permission. The landlord to have power of entry, in case his agents or competent valuers chosen by both parties shall certify as to gross mismanagement, or in case of insolvency. The tenancy, it must be borne in mind, is one of mutual good understanding between landlord and tenant, and should either party infringe the rights or property of the other, competent valuers or their umpire shall be called in to decide between the two. This or a similar arrangement might be made so as to give security to the tenant and a safeguard to the landlord, *i. e.*, encouragement to the tenant while protecting the rights of the landlord.

The landlord should provide every reasonable requisite for the permanent occupation of his farm. All *farm buildings* should be erected by him, and

be on a scale commensurate and applicable to the requirements of the farm under the modern system of husbandry. All *fixtures* should be put up at his cost, *i. e.*, steam apparatus and machinery, thrashing works, chaff-cutters, cake-breakers, corn-crushers, and the like, being fixtures, pumps and irrigating machinery; indeed, every farm appendage partaking of a permanent character required by the tenant for the more profitable working of the farm, and for the use of which he shall pay an additional rent proportionate to the outlay and the wear and tear of the machinery, &c. The landlord should also undertake all the drainages of the farm, and keep such in good working order, for which a separate and additional rent or interest should be charged to the tenant. This may seem to entrench upon the tenant's duties in the farm management; but it will be found that where the landlord executes the works of drainage, they are more effectively done and at less cost ultimately. The landlord should also keep the farm buildings, fences, and permanent machinery in proper repair. This may also appear to be the tenant's duty; but independently of its being better done by the landlord, it leaves the tenant's capital all free, to be employed in the cultivation and management of the farm in all its various departments, for which, as I have pointed out in a former paper, he may find ample employment. The landlord should permit all inferior grass lands to be converted into tillage. Nothing is more unprofitable than grazing poor grass lands;

such land under the four-course shift will carry much more stock, besides yielding two corn crops in the course. The last thing I name as the landlord's duty is to free the farm from useless hedge-rows and timber, and reduce an excessive amount of game, so far as to prevent its being really injurious to the tenant.

The true principles then of the modern course of husbandry should be based upon mutual aids. The landlord should provide every permanent requisite for the tenant's use and every facility for his encouragement; the tenant, in return, shall fairly and justly pay a rent and interest respectively for all such outlay. He will then have his own capital free, to expend in making the largest return of produce of which the farm is capable; and this he is in duty bound to do in good faith, because his capital is left free for such purpose. The farm, with all its appurtenances of necessary buildings, machinery apparatus, and effective drainage, is let to him thus, in order that his capital may be unfettered; and, as he will have to pay not only a rent for the land, but interest on the landlord's capital expended in the machinery and drainage, &c., it will not only be to his interest, but he will be compelled to make a corresponding effort to enhance the production of his farm; and thus the landlord, the tenant, and the community will be benefited by the modern system of husbandry, carried into active operation by the capital and proper co-operation of "The Modern Landlord."

#### THE FORM OF FARM AGREEMENT ADOPTED BY DUKE OF NORTHUMBERLAND.

Every one is desirous of adopting the most profitable course of agriculture; but as soil and climate differ so widely, no one system can be laid down that will accomplish it. That mode, to a certain extent, will be proved best that has been longest practised in a district, and under certain modifications will be found, in nine cases out of ten, the most profitable that could have been pursued.

It is not so much upon the mode of tillage, as upon the rotation of cropping, that success will mainly depend; but the first-mentioned has generally been rendered subservient to the latter; and knowing previously what is sought to be attained, the preparation necessary to secure it will be carried on accordingly. In many districts white-straw crops, consisting of wheat, barley, or oats, are not permitted by the covenants of leases to be taken in succession; and this restriction at a former period was doubtless necessary, to prevent the tenant scourging his farm. No external aids could then

be found to replace the exhaustion of ammonia from the soil by the successively growing of white straw crops; but now, provided the land is in good tillage, and free from weeds, it becomes a matter of expenditure only, seeing that the tenant can obtain the amount of stimulant necessary to produce the crop, and at the same time continue to maintain the land in a high state of productiveness.

The large quantity of guano annually imported, in addition to the immense supplies of artificial manures manufactured, represent the production of grain that shall be more than their equivalent in value; and therefore if tenants continue to be restricted by covenants from so employing it with advantage to themselves, the benefit that would accrue to the public is removed, and so far as their interest is concerned it might have remained in the position it had for so many centuries occupied. Land itself should be viewed merely as a machine, by which the process of raising corn is to be ef-

fect; the manure applied as the raw material entering into its composition; the well-arranged processes of skill and management as the adaptation of both to the final result, and the profit or loss dependent, in accordance to a judicious limitation of expenses and increased amount of produce, in a ratio as the means and skill have been applied.

Upon certain descriptions of soil white straw crops may be taken in succession, provided the land is properly tilled and sufficiently manured, without the slightest injury ultimately to the soil. Upon other descriptions of land the taking off a root crop would be attended with twice the amount of damage that would have been produced by the taking off another grain crop. On heavy land a crop of barley after wheat would not effect more injury, if previously manured with 3 cwt. of guano to the acre, than would under a similar application of a like quantity be the case had Swedish turnips or mangold wurzel been taken.

But it was not our intention in the first instance to dwell upon these points, except so far as they might illustrate the opinion we are about to offer upon a subject that has recently obtained great notoriety; arising from leases proposed to the tenants upon the estates of his Grace the Duke of Northumberland—and the imposition of which has led to such resistance on the part of Mr. Wetherell, one of the chief tenants, as to induce him to quit the farm rather than attempt to comply with the covenants that he considers himself totally unable to carry out.

It is very true that the Duke, in the words of one of his congeners, "has a right to do what he pleases with his own;" and if Mr. Wetherell, or any other tenant, objects to the terms, he will be at liberty to quit his farm. But as the mere exercise of prerogative would not constitute a good king, so the feudal exaction of authority will not constitute a good landlord; and it would be well, if his Grace is desirous of handing down to posterity that inestimable blessing, "a good name," that he would meet the many worthy tenants, and remove such of the objectionable clauses attendant with such great damage to their interest, and which are equally injurious to his Grace's reputation and estate.

Take, for instance, the clauses objected to seriatim, and first as regards No. 3. Why restrict the tenant to bestow twenty loads per acre of well-rotted dung upon the fallow land intended for

turnips? As the tenant is restricted to expending all the dung arising yearly upon the farm, it seems everything it might in that respect be desirable to attain, without binding him to a system that would prevent his growing turnips by guano or artificial manure; and would enable him to expend his farm-yard manure with greater advantage to himself as well as to the farm.

Then the restriction as regards potatoes is totally unnecessary, for, provided that the tenant is prevented growing beyond a certain quantity, without manuring the additional quantity with extraneous purchased manure not the production of the farm, the object would be better attained.

The succeeding covenants up to the 23rd are of such a nature, and are also expressed in such provincial terms, as not to be very easily understood; but, upon the whole, they are of such a nature that a tenant might readily comply with. But that and the succeeding covenant, the 24th, which *compels* the out-going tenant to sell his crops by valuation, upon quitting, to the landlord or his representative the in-coming tenant—and in case of disagreement of the valuers the *agent of the landlord is to fix the amount to be paid*, and which amount is to be *paid over to the landlord* or his representative—this, we venture to assert, is the most extraordinary specimen of landlord autocracy, that has ever appeared in any covenants of any lease in this kingdom; and the tenant, we feel, is fully justified in resisting it, as an attempt to overthrow the independence of the tenant farmer, and to destroy every principle of honourable feeling that ought to exist towards his landlord. Such a system in point of severity as could hardly be imagined to exist even under the government of the Dey of Algiers.

We hope to be excused if having written in any spirit of unkindness, or of having remonstrated unnecessarily upon this subject, which we trust will never be imitated by any landlord of the kingdom, and of which we hope and believe his Grace cannot have weighed the importance. Dukes are, however, but men, and equally fallible as the humblest individual. But they should think and feel the injustice and degradation they thus inflict upon their tenants, by imposing harsh conditions that are not in accordance with the liberality of the times, or the circumstances under which they are imposed. He who contemns public opinion must sooner or later reap the fruit of that which he has perhaps so inadvertently sown.

## THE WORK AND HOW TO DO IT.

About a year ago there appeared in the *Mark Lane Express* a series of papers entitled "Cumbered Ground," in which were detailed the successive steps by which, under the beneficent influence of a young man, a neighbourhood was transformed from a degraded to a more hopeful state.

I described how he found a district given over to the vice of intemperance in all its hideously distorted forms, and how, by personal example and silent teaching, he wrought in a comparatively short space of time a very marked reformation. I described, too, how, finding an ignorant populace, he set about, with ardent zeal, to enlighten it; tempering his zeal with discretion, winning rather than forcing people from the haunts of darkness. I described the warm interest he evinced in the family relations of the poor around him, how he encouraged and strengthened them, and ennobled them in their own eyes by insisting upon the true nobility of work.

We also saw the establishment of the adult evening school, and the mode in which the various classes were conducted. The success of those efforts could not have amazed, more than they pleased us. What I saw of the work convinced me that it merited the publicity I sought to give it, because of its intrinsic soundness; for were all our rural districts blessed in like manner to the village of — in the possession of a man with a heart to design, and a power of will to execute, such as characterised my friend Mr. S., England indeed would have reason to rejoice.

It was with the hope that such a bright example might induce the slumbering Howards, and Frys, and Chalmerses, and Nasmyths, and Wilsons, and Nashes, and Walkers, and Shaftesburys of our rural districts to arouse and bestir themselves, lest their day and opportunity to advance the civilization of the world be past before they were aware of its advent—it was with this hope that I made the facts of this experiment public. The same hope likewise induces me to endeavour to detail the fresh experience of my friend, who continues to work with enlarged means upon the now fertilised soil of the same field.

It is most gratifying to observe with respect to the adult classes, for we will give a minute to them before passing to the consideration of fresh schemes, that the numbers are not only maintained, but greatly increased. The average attendance is fifty-four; and the instances of temporary absence, and unpunctuality, are less than they were the year previous.

The progress made by the men and boys is eminently encouraging. They are highly delighted with their growing acquisitions, and bend themselves to their studies with an ardour truly heroic. Amongst other matters, the maps of Great Britain and Europe have been placed before them; and these they have mastered so thoroughly that questions are answered with the greatest readiness, even down to the minutiae of small towns, and their staple manufactures, &c. Geography is taught by two sets of maps, of which one is blank, and the catechetical exercises are founded upon the latter, of course. In conjunction with the map of England a great part of the history of our country is taught, giving a "local habitation" or abiding place to many a fact, that, but for such a retentive point, would slip from an undisciplined memory.

The *Carpenter's* auxiliary boys' evening school, which he established by his own desire for the purpose of preparing those boys for the adult school that were not admissible on account of age, begins to tell admirably upon the character of the village; and it affords my friend a most valuable assistance.

The evenings continue to be apportioned as usual:

Time.	Monday.	Tuesday.	Thursday.	Friday.
7 till 8	Reading	Reading	Reading	Less'n on Com- mon Things.
8 „ 9	Writing	Arithmetic	Dictation	

Dictation seems to be an extremely efficient exercise: almost a Royal road to the acquirement of spelling, writing, and instruction in the subject dictated, at one and the same time.

In theatrical parlance, the "Lesson on Common Things," to which Friday evening is given, "draws immensely." Women desired to be admitted to it; and so the scene is diversified by a great many bonnets: and bonnets, too, that manifest an unmistakeable concurrence with the sentiments and facts produced by the speaker.

It will be well here to insert an extract from a letter lately penned by my friend Mr. S.:

"You are doubtless looking for some tidings with respect to the success of our Friday's lesson on 'Common Things.' It is, as you know, sometimes given by Mr. —, who affords me his aid. Certainly we are encouraged; for our room is crowded, and the information we seek to diffuse is telling upon the habits and economic arrangements of the cottagers. Mr. — has given a very interesting series of lessons on food, and the manner in which, in its various forms, it alimnts the body and repairs

the hourly waste going on. He has also talked to them about manufacturing subjects. Once he took the subjoined tabular form from Babbage's 'Economy of Manufactures,' and based a lesson upon it that very much astonished the natives :

	£
Lead of the value of £1, when manufactured into	
Sheets or pipes of moderate dimensions.....	1.25
Ordinary printing characters .....	4.90
The smallest type.....	28.30
Copper worth £1 became, when manufactured into	
Copper sheeting, worth .....	1.26
Household utensils .....	4.77
Woven into metallic cloth, each square inch of which contains 10,000 meshes.....	59.23
Bar-iron worth £1, when manufactured into	
Agricultural implements, became worth.....	3.57
Barrels (musket) .....	9.10
Blades (razor—cast steel) .....	53.57
Blades of table-knives.....	35.70
Door-latches and bolts .....	from 4.85 to 8 50
Files (common).....	2.55
Horseshoes .....	2.55
Saws (for wood) .....	14.28
Needles of various sizes .....	from 17.33 to 70.85
&c., &c.	

“The enquiry suggested was as to the value of labour, compared with that of the material, in manufactured products; other instances, of a domestic kind, without number, coming of course into the category.

“For myself, I wished I were the veritable M. Soyer, so that I might have had a cooking class. You would scarcely believe it; but mothers of families have no idea of this art, the knowledge of which is essential to the happiness of home. Their ignorance in this respect leads to miserable extravagance and waste of *materiel*. A culinary *artiste* might get fat where these poor folks starve. As, however, my own education is defective on this point, I have been obliged to satisfy myself with approximating as much as I could to my desire. With this view, I have taken some of the following subjects to descant upon: ‘The Loaf of Bread,’ ‘The Cottage Fire,’ ‘Preserved Meat,’ ‘Fruit,’ ‘Malt and Hops,’ ‘How to make the Most of a Rood of Land,’ interspersed with lessons on ‘Truth and Falsehood,’ ‘Industry and Idleness,’ ‘Sobriety and Drunkenness,’ ‘Honesty,’ &c. Very possibly you smile at my subjects. I do so myself; for I little could have imagined myself, some time ago, learnedly discussing the practice of breadmaking or the concoction of beer. To be useful, however, in our day and generation, is the grand thing; and to be so, we must frequently deviate from the usual line.

“Beyond this, we have established a reading room, a lending library, and a savings’ bank. Within the compass of this letter, however, I cannot give you the information with respect to these new features of my plan which I know you are anxious to possess.—Yours, &c.”

Where my friend stops, it will be well for me to stop; for, although I have already received intelligence about the savings’ bank, it is too long to be now laid before my readers.

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No. II.

In accordance with my promise, I hasten to lay before my readers the letter with which Mr. S. has just favoured me.

F. R. S.

“My dear Friend,—What a preposterous state of things is this we are in! Although there are upwards of thirty-two millions sterling in savings’ banks, and benefit societies are wide-spread, still the great bulk of the labouring classes of this country live from hand to mouth, without any store whatever on which to fall back, in the event of sickness or a time of depression.

“This is no fact that disproves the efficacy of savings’ banks, but it proves how prejudicial is that course of legislation that distrusts and supplements the providential habits of the people, an illustration of which is afforded by the poor-law.

“An absence of prudential habits characterizes the lower classes of this neighbourhood in a very great degree; and I thought that nothing could be devised that would so soon produce a natural and proper state of feeling as a savings’ bank.

“With a view to obtain their co-operation, I visited many of the principal gentlemen, and I was fortunate in obtaining the concurrence of as many as is necessary.

“Having done so much, it seemed advisable to inform the people as to the character, object, and effect of a savings’ bank. Bills were posted about, advertising the delivery of a lecture on the benefit of savings’ banks. The evening arrived; the place of assemblage was very crowded, and I had to fill the vacuum that before me was represented by the open mouths of some and the glistening eyes of others of my audience. I will give you my remarks pretty much in the order they occurred:—

“‘You are perfectly aware, friends—at least, many of you—that I have never taught you to look away from yourselves for the means of helping you to a better position in the world. Several of you have repeatedly heard me use these words: ‘Without the co-operation of your own virtuous endeavours, there seems no possible way of doing you good, nor of helping the labouring classes upward from a lower to a more secure place in the commonwealth.’ Such of you as have read the early portions of the history of our country will remember how our British ancestors hunted wild animals and ate earth-nuts, and lived in a very miserable manner, over those vast stores of iron

and coal that lay bedded underground. The Romans came and taught us their use; and from that time we have gradually been rising to our present proud eminence in the world. These Romans, you see, brought us no wealth: they merely pointed out those hidden riches we did not know we possessed. Just in the same manner it is that those who, like myself, wish to free the poor from that distress that bows them down, point them to the diligent acquirement of such habits and use of such resources as are within their reach.

“It is customary for men, in times of depression, to look towards their employers, with ill-disguised feelings of hatred, as though they considered themselves at the mercy of capitalists. And now I am about to say something that will probably arouse the adverse feelings of many here. The cause of the sufferings of the poor does not lie in the want of protection from the Government, or the want of kindness from masters, but in the want of prudence and economy among themselves. I tell you the truth, and will prove it.

“Let me first have an answer to this question—What is the cause of your distress?’ Three or four men replied, ‘We don’t get enough wages.’ ‘And why, my good fellows, don’t you get enough wages?’ ‘Because they won’t give it us.’

“There may be, I allow, some little truth in that last answer, but not much. Selfishness is, I know, the order of things, and the employer will rarely give more for a day’s work than he is obliged to do. Now, if this question be properly considered, it will be seen that it is the workmen who have the command of this mighty element, not the capitalist: I mean, they have the fixing of the price of labour. When men are plentiful, employers make their own terms; when men are scarce, the workpeople have the advantage on their side. So that, from one view of this question, the depression of wages seems to turn upon the quantity of hands to do the necessary work. But employers have nothing to do with increasing or decreasing the number of workpeople. No: the regulation of the supply of labourers rests with yourselves, and yourselves only.

“If you are so imprudent, and so wanting in proper feeling, as to encourage premature marriages, and to connive at the vice of illicit intercourse, you must expect to endure the lamentable effects of an excess of labourers. One of the effects of this excess is low wages—and here begins what may be called a self-destroying process. To make up your thus reduced wages, you call in your children and wife to help, making them competitors with you in the bitter struggle for life. And in case such a course is generally adopted, this excess of labour supplies the market with more commodities than

are wanted; and all this re-acts upon yourselves, for labourers are thrown out of employ, and wages are still further reduced.

“The effects of this over-work show themselves most distressingly, perhaps, in very populous districts, where the poor operative, in eking out a subsistence for his family, overworks; and by this miserable effort adds to the hopelessness of his condition. The claim of nature forces him to put forth greater exertion, and this additional exertion but lengthens out his period of distress. He seems to gather with his own hand the materials of his own wretchedness. He annoys the earth by overwhelming her with the multitude of his commodities; she regards his offerings as an offence rather than an obligation, and refuses to sustain him.

“I wish you to see that low wages result from a superabundant supply of workpeople competing with and underselling one another in the labour market. Then you must own that, in as far as wages are reduced by this cause, you, and you alone, regulate the scale of your own remuneration; for certainly you must be responsible for the supply of labourers.

“Besides this cause of your distress, there is a general want of providence and prudence that I observe in the management of your affairs. Scarcely a man or woman in this room ever systematically strives to lay by anything of the week’s wages. You nearly all live up to, or beyond your income. ‘This is all very well,’ you would say; ‘but how can we do otherwise when it is so small?’ Without the habit of saving, your condition never can be improved; but with it I can insure you against a great portion of the distress from which you now suffer.

“A workman’s frugality ensures him a little capital, and this capital will act as a barrier against that cruel necessity which gives such advantage to masters. Suppose you present yourself, a starving man, with a starving family at home, before a farmer or a manufacturer, can you refuse to take two shillings, even though the current wages is half-a-crown? No! you are even glad to get to work without a word about pay. But imagine yourself, by your own prudence, possessed of a little capital; you can afford to stand out against a miserable wage. You work in your allotment or your garden. Fancy that it is a period of general distress, and that many in a neighbourhood are able to live upon a former accumulation, while they work moderately, or cease to work altogether; the period of wretchedness is shortened, suffering is much less severe, great stocks of commodities have time to drain away, an increased demand springs up, and a better remuneration follows. Oh! if you could only afford to lie by, sometimes,

through such periods as these, what a blessing it would be, both to yourselves and to your employers! It were indeed delightful to see the lower orders, by dint of foresight and economy in good times, thus enabled to weather the depression of bad times, and to limit the period of it by refusing to work for a miserable remuneration.

“Probably you persist in saying, ‘But we have nothing to put by.’ Well! I own that there is some truth in this fact. Still I must ask you to remember that past improvidence and folly have done much to land you in your present unpleasant position; and that you must be ready to make a sacrifice, in order to escape from it to a better. Before I can believe that you cannot lay by anything, I must see less of those beershops that are entirely supported by your earnings: I must see that the sale of tobacco forms a less considerable item of profit to those licensed to vend it. I am very much inclined to think that there passes into the hands of the workpeople of England the means of an entire subsistence; and that, had they but the prudence, and virtue, and wisdom to husband and direct it, and to regulate their own conduct, there would be no inconvenient excess of labourers, no fall of wages below the par of human comfort, or a fall that would be immediately counteracted by the foresight of a sober and well-conditioned people. The cruel necessity of over-working, which feeds the mischief of glutted markets, and which can only be felt by those who live from hand to mouth, would be avoided: there would be an advancement of steady, virtuous, and religious habits amongst the working classes; and instead of being the victims of every adverse movement in trade, they would become its most effective regulators.

“Such a desirable change as this cannot be produced at once; but nothing can hinder its immediate commencement. Every child sent to school, every deposit in a savings’ bank, brings us nearer to it.

“You met me this evening, expecting that I should tell you about savings’ banks. Well! I intended to do so; but some other and very necessary remarks have occupied all my time. We must discuss the bank that we are about to establish in the next lecture. Remember, then, early marriages lead to an excess of labourers and low wages; while virtuous and provident habits quietly settle the question of wages in favour of the workman.’

“This, my friend, is merely the outline of my first lecture. I employed a good deal of illustration that will readily occur to your own mind, and which, therefore, it was hardly necessary for me to trouble you with.”

## No. III.

The second lecture upon Savings’ Banks has as much to commend it to the reader’s approval as the first; I shall therefore take it from the correspondence of Mr. S., for the benefit of those to may interest.

F. R. S.

“When I last spoke to you on this subject, my friends, I closed, you will remember, with these words:

“Remember then, *early marriages lead to an excess of labourers and low wages; while virtuous, provident habits quietly settle the question of wages in favour of the workman.*”

“These sayings are not the results of my own wisdom; if they were, I should not desire you to give so much heed to them; but they are more than this—they are the essence of the experience of the labouring classes, and of the observation of the middle and other classes, extending far back over several centuries. It is in this consists our chief difference from the insect and animal classes: that we gather together the experience of each past year, each generation mounting upon the accumulation made by the one that went before it, and so successively ascending in the scale of civilization. The insect tribes never make any progress; the ant works as formerly, and the bee builds its many-chambered mansion in precisely the same manner as did the first bee which returned laden with the golden reward of industry.

“But man thinks and reasons. When potatoes were first introduced into England it was not known at what period to plant them. Experiments were made. They were doubtless sown at all times; men reasoned on the results they obtained, and came to the conclusion that the spring of the year was the best time. You don’t try all these experiments over again; you profit by the knowledge others have gained; you never by any chance therefore sow potatoes in July. This is growing wise by the experience of others, and this is how nations progress.

“And when this experience assures us that early marriages, improvident habits, &c., are unfavourable to the well-being of the working classes, heed should be given to it. Suppose I come into your garden, and observe you vigorously pulling rhubarb of the first year’s growth. If I say positively, ‘Do you know that you will utterly destroy your bed? Rhubarb should not be touched the first year, and only sparingly used the second,’ you will, ten to one, take my advice without asking a question. Here my single experience is enough for you. In the other case there is the concurrent testimony of centuries, and your own sense, I know, to back it. The thing only wants thinking about. The one

kind of advice does not involve trouble, thought, or persistency: the other does, and that is partly the reason why it is urged in vain. I do very much want to bring you to think about subjects connected with your own interest, however; because, as I said before, I thoroughly believe that without the co-operation of your own virtuous endeavours, there is no possible way of helping you upward or doing you good. And how are you to co-operate if you do not understand the mode and the object of the work you engage in?

"We will now talk a little about this Savings' Bank; and I hope, when you go away, it will be with minds fully made up, from the information you have gained, to make a speedy and a constant use of it.

"Savings' banks came into being at the commencement of the present century. Some benevolent individuals, struck by the enormity of the tavern bill for the operative class, and anxious to devise some plan by which they might be helped to avoid the great temptations that surround them, of which intemperance was one, instituted some modest banks, where the poor could lodge their smallest saving, having the power to withdraw it at any time. The security offered was the names and characters of the individuals who directed the bank, and the interest paid on the deposit was very tempting. The scheme answered admirably. Many a broken-spouted teapot yielded its covert accumulations; many a secret hiding-place was spoiled of its little heap of silver and copper; the stitches that confined many a bank-note as a lining to the stays were cut; the dead came forth as it were to life, producing life within life.

"These banks at last became so famous, and so popular, and so important—for millions of money found their way into them—that they were taken up as a national affair, and this name was given to them: 'National Security Savings' Banks.' All the money received by them is now sent to the Bank of England, where it bears one uniform rate of interest upon it, no matter what ups and downs there may be in the money market, that rate of interest being £3 5s. per cent.

"Depositors are thus afforded the best of all securities—namely, that of the *whole British nation*; while the National Savings' Banks are enabled, after paying all charges upon their establishments, to give a considerably higher rate of interest than the ordinary banks, or even than the greater part of private savings' banks allow on deposits. Sums are received from one shilling to £200. No individual can deposit more than £30 in any one year, and when the sum amounts to £200 it receives no interest. Beyond the large and un-

varying rate of interest paid to depositors, a benefit exclusively enjoyed by the working man, compound interest is given on the sums lodged in this Bank, that is, the interest due to him at the end of the year is silently, and without any trouble on his part, added to and considered as a part of the principal, on which interest is to be given in future.

"Besides, most wise and effectual provisions for the management of these institutions are made. Each bank must have a certain number of trustees and managers, all of whom give their time gratuitously for the benefit of depositors, and all paid agents are required to give good security during the time of their official attachment; in fact, every advantage is given, and every possible security offered, to those parties who invest their money.

"And now let us say a little about the good that these banks have done.

"Under the old and new system, the money deposited in them reaches to the astonishing amount of nearly £40,000,000. In 1840 the sum deposited was rather more than half as much.

"To give you an illustration of the manner in which they may affect and raise the character of a neighbourhood, I will relate an incident that came to my personal knowledge.

"Travelling in the north not long since, I stopped at a town famous for the manufacture of nails. Always on the alert to pick up knowledge, I obtained an introduction to one of the workshops. After I had made my observations, I remarked to the master-workman who accompanied me, upon the respectable and thrifty appearance and manly energy of the people engaged. 'You wouldn't have complimented us on our appearance sir,' he replied, 'some years ago, particularly if you had chanced to step in amongst us on a Wednesday or Thursday. All our wages were swallowed to put out a spark in our throats. To see a sober man was a miracle. How our families existed I don't know, and can't think; we were in a wretched state. But the good work did commence; and it commenced here, sir, thank God! Our place was bought by two gentlemen who set their faces against drunkenness. One of them called at my floor, one Wednesday, when I chanced to be getting round. I thought by the manner of him he'd come to say—'You need not make your appearance again except for back wages,' and I felt I did not care a nail; but he didn't. He talked serious to me, he put his hand on my shoulder, brotherly like, and said: 'My good fellow, I want to regard you as a rational and an accountable being, but I can't while you go on thus. Your own heart tells you that these ways are ruining you, body and soul; be a man, shake off the habit, think of your

suffering family.' Not another word did he say : he left me to think it over. He recognised me as a man and a brother, however, fallen being as I was, and that was enough for me. I determined to honour his advice. Some days after, he called me to him, and without alluding at all to our former meeting, he said : 'To-morrow's pay night ; if you please to leave a shilling or sixpence with me, I will take care of it ; do this when you like, and you may have it again when your rent is due.' Do you think I missed this opportunity, sir? Not I : I left half-a-crown. I didn't measure myself that night, but I must have been several inches higher, if I was what I felt. All the hands were so spoken to, and nearly all became depositors. We improved so rapidly in circumstances, and external signs of comfort, that other shop-masters were induced to take the same course. The monies thus given in charge of different firms became so considerable that it was thought wise to establish a bank. It has succeeded wonderfully, and has totally changed this town ; the work-people, from being the most tippling and idle I knew, have become the most orderly and thrifty.' I further gained these facts from the same source : 'This nailery consists of three shops, each accommodating four workmen. Among the twelve persons employed in these shops and two junior members of one of their families, there are nine open accounts ; the number of deposits has been 351, and the amount deposited, including interest, £61 15s. 10d. The repayments do not amount to one-half, so that there is a fair balance remaining for each depositor.'

"Thus a lesson was given to me which in turn I give to you, hoping you may thereby be impressed with its force, and here again profit by the experience of your fellow-workmen.

"We were speaking the other evening about the way in which the possession of a small capital enabled the labouring man to refuse a miserable wage,

to lie by in fact, and thus, by avoiding over-work, to shorten considerably the period of distress. My eye chanced to fall the other day on a case that would have admitted of such a remedy.

"In 1817 there was a great depression in Leicester. Mr. C. was applied to, by the township of Smeaton Westerby, for work for some of their people. It was found at 5s. per week, and the township was to make up the deficiency according to their families. A man from the hosiery manufactory informed Mr. C. that immediately on the importation of these mechanics, he and several of the regular men had been dismissed. This was done largely. The excess of men competing with each other for work caused great distress. They had no fall back, and were forced to work at any price. A melancholy reduction of wages was the result. In one parish the wages sustained a decline at the rate of £20,000 per annum ; 5s. 6d. was the highest wage ; and in the case of a man, wife, and two children, it was made up by the parish to nine shillings. The glut of the market under these circumstances became oppressive to the manufacturer and operative. A fund was at last raised for maintaining a large portion of men either in idleness, or at other work, and trade revived. The whole sum by which this restoration was achieved amounted to £9,000, and this did not exceed 12s. per head for every one in Leicester engaged in the stocking manufactories. These weavers, as a united society, might have had a deposit to this extent in the savings' bank from each, and so have delivered their whole body, by supporting in idleness, or at other work, a certain part of them ; or they might have effected the change single-handed, without uniting at all, and this latter mode is by far the best. Thus, instead of being the victims of every adverse movement in trade, &c., you have it in your power to become its most effective regulators."

## THE USE OF THE SUFFOLK CRAG IN THE IMPROVEMENT OF LAND.

The permanent improvement of land, by the use of earthy admixture, is a practice that we conceive to be deserving the more serious attention of many of our readers. This being the season so well adapted to the carting of these heavy dressings, we recur to the subject as one well worthy of our present consideration. And when we say this, we do not mean to allude to the greater use of marl and clay, or chalk (although we feel that much yet remains to be done with these soils), but to the extended examination, practical and chemical, of the strata of earth which are on very many farms to be found,

either close to or so near the surface as to be profitably available. That many a fertilizing stratum now lies neglected, from an ignorance of its enriching powers when spread over other strata, we need not question. It is almost within the memory of some of the farmers of the east of England when "the crag" was first used in this way. It was not many days since, that we saw the skilful farmers of the Suffolk crag busily engaged in carting this earth on to their fine turnip and barley lands ; and we could not see them thus employed without wishing that farmers from other coun-

ties could observe these operations. There is little or nothing in the *appearance* of this crag (as one of their excellent ploughmen remarked to us) to indicate that there is "any good in it." It is true that in the crag obtained from many pits there are numerous small fragments of sea-shells; but, on the other hand, in the produce of an equal number of these pits, there is nothing to all appearance but a bright red sand—one of the most unlikely-looking dressings for a turnip soil that can well be imagined: and yet the large excavations on the farms of the eastern banks of the Orwell, and other places, show pretty clearly that this course of agricultural practice is not of very recent date. This sand is evidently a grateful soil to plants; for, on closely examining these enlarging pits, we were able to mark the considerable depths to which the roots of the grasses and the wheat plant had penetrated. With such small indications, however, of possessing any "good" as a manure, we need not feel surprised that the Suffolk farmers slumbered for ages over the earthy treasures hidden beneath their farms. Accident, it seems—for no one thought of spreading so apparently unpromising an earth over his land—at length led to the discovery of its powers; an occurrence which the late Philip Pusey described, in one of his many useful papers which are to be found in the "Journal of the Royal Agricultural Society." The story is the more worthy of abridging and inserting in our columns, because it may incite some of our readers to make careful and varied trials of the strata of their own farms, which may look as poor and unpromising as the sand of the Suffolk crag. The accidental discovery arose, it seems in this way: A person was carting some of this crag for a garden walk, and in conveying it over a black barren soil the cart broke down, and scattered the contents; the driver, instead of collecting the crag, spread it over the soil. The field was after this prepared for turnips in the usual way, and, much to the surprise of the occupier, there was a good crop of full-sized turnips where the crag had been spread; while the rest of the field afforded only a miserable crop of stunted

growth. By this accident, says Captain Alexander, was the application of crag first made efficient; and it is almost impossible to calculate the increase added to our agricultural produce by this discovery in the crag districts. It is, indeed, one of the many happy results of trying the effect of rather unpromising applications. The farmers of North Hampshire, who first chalked their thin clay soils resting immediately on chalk, could hardly have had a better instructor than some accidental observation of its effects—some trial as little guided by theory as that of the carter of the crag.

The visitor to the crag district of Suffolk will do well to take the east side of the Orwell, and keep as close as he can to its picturesque shores. He will there find much to interest him. He will not only witness, at this season, the spreading of the crag over those well-cultivated soils, but, if he proceed by Nacton to Felixstow, he will speedily be in the locality where the coprolites are collected in such abundance for the makers of superphosphate of lime; he will meet with some of the finest teams of the noble Suffolk-punch breed that England can produce; and there will find more than one excellent herd of Suffolk cows in the neighbourhood of Ipswich, such as that of Mr. George Badham, which are well worthy of the breeder's careful attention. In the trials to which we have alluded the aid of the chemist will be most useful in the choice of different earths, but much valuable knowledge will be obtainable without his examinations. Just as in Saxon times our forefathers learnt the use of marl and chalk—and, moreover, by some happy chance trial, found that there are chalks of varying fertilizing qualities—the use of blue gault by the Lincolnshire peat farmers, and the calcareous sea-sands of the West of England by those of Cornwall and Devon, may have originated in a similar manner—that is, by some chance trial. It is true that the hints given to us by the close observance of nature are the most certain; but it is not always that she offers us this kind of knowledge.

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#### AIR! HOW INVALUABLE TO THE SUCCESSFUL HUSBANDRY OF THE SOIL AND ITS PRODUCE, ANIMAL AND VEGETABLE.

From time immemorial agriculturists have been familiar with the fact that an abundance of fresh air is essential to healthy vegetation and fruitful fields. Long before the discoveries of Cavendish, Priestley, Watt, and Lavoisier, relative to air and water, drill husbandry, dibbling, and thin seeding were advocated, for the purpose of admitting the free circulation of the atmos-

phere to remove noxious confined air in contact with the soil, and to bring to it and the leaves, stems, and roots, a fresh supply from above. All the early agricultural writers believed in its fertilizing influence; and if farmers generally did not then adopt the necessary means to profit by it, it was because the force of habit was stronger than that of progress. Observation, too,

had taught them that thunder showers and heavy dews drained the atmosphere of fertilizing substances, then believed to be "volatile salts," crops after such showers growing of a luxuriantly dark-green colour, similar to what takes place after a rich dose of liquid guano in modern times. Randall, in his "Semi-Virgilian Husbandry," published in 1764, devotes, for example, two whole chapters to the atmosphere and "manner of recruiting worn-out land" by its "treasures," distinguishing between the products of nitre, sulphur, bitumen, naphtha, and maltha—this latter defined to be a kind of naphtha, whose properties, according to "common observation," he says, is to adhere closely to the internal superficies of the pores of soils; that "water thrown upon it does but the more inflame it;" and that, absorbed by the roots of plants, it increases the circulation. Chemists, he adds, call these "volatile spirits, sulphur, and saline particles, the active principles; but water and earth they call inactive principles." We may perhaps feel disposed to smile at this; but it shows, nevertheless, an active mind, conscious of existing facts, laudably endeavouring to give an intelligible account of them. Platt and Evelyn, who wrote more than a century before Randall, taught the same atmospheric doctrines, advocating deep culture and setting or sowing in rows, so as to give the plants the full benefit of the atmosphere and treasures with which it is loaded, so did Roman and Greek writers before them.

The atmosphere is principally composed, as our readers are aware, of two gases—oxygen and nitrogen, mixed together in the proportion of 21 per cent. of the former, to 79 of the latter by volume. In other words, 21 gallons of oxygen, mixed with 79 of nitrogen, make 100 gallons of air; or 23lbs. of oxygen, and 77 of nitrogen, make 100lbs. of air.

Air, however, is nowhere to be found in this pure state, being always loaded with various other substances, such as vapour, carbonic, nitric, and other acids, ammonia, &c. In the sandy and cloudless deserts of Arabia, where vegetation and combustion are in their minimum state, its purity is very great; but even here it is loaded with the "balmy incense" of a thousand aromatic plants peculiar to the climate, no doubt giving to it much of that exhilarating character which it is said generally to possess. In other countries, again, where vegetation is superabundant, the atmosphere is so loaded with exhalations as to be unfit for respiration; while in the immediate neighbourhood of active volcanoes, it cannot fail to be tainted with the immense volume of gases continually being discharged.

The purity of our own atmosphere is principally affected by evaporation, gases emitted from living animals and vegetables, and the dead remains of both, when undergoing decomposition, and from fires and manufacturing processes. A very superficial glance at these three sources will satisfy our readers that the air we breathe contains something more than a mixture of oxygen and nitrogen.

The degree of humidity or hygrometrical state of our atmosphere is far from being uniform, being generally more rainy and moist along the west coast and in

Ireland than along the east or opposite. This arises from the prevalence of westerly winds, and proximity to the Atlantic. Along the seaboard, on both sides, and to a considerable distance inland, again, it is sensibly felt as affected by saline and other substances from the ocean, arising partly by evaporation at low water, and partly by the decomposition of oceanic products, gases thereby being liberated, given off from the surface, and wafted on shore by sea breezes.

Again, the amount of carbonic acid and other gases given off from the lungs and bodies of animals, and leaves of plants, and from decomposing animal and vegetable substances, is very great. In the vegetable kingdom it is greatest in the low-lying lands and valleys, and least in elevated districts and mountain tops. Highland shepherds, for example, feel a sensible difference when they leave their mountain walks for marshy and fenny lands, at the confluence of rivers with the ocean; and we can hardly reasonably conclude that the impression is otherwise on the respiratory functions of vegetables. In the animal kingdom, again, if a hard-working man expires ten ounces of carbon in twenty-four hours, and a horse or an ox six times as much, how much carbonic acid is given off from the lungs of the whole population and number of animals in the United Kingdom? In a word, the bulk of the animal and vegetable kingdoms finds its way to the atmosphere sooner or later.

The last source is from fires and manufacturing processes; and when we calculate the quantity of smoke of our large towns, brick-kilns, lime-kilns, iron works, &c., &c., it will readily be seen that the purity of the atmosphere is greatly affected thereby.

From the immense volumes of foreign matter, therefore, which are daily being poured into the atmosphere from these three sources, our readers will understand us when we call it "*a very molley mixture*;" and the more our population and number of animals increase, and the farther we progress in steam culture, liquid manuring, manufactures, and chemical processes, the thicker will it be, or the greater will be the quantity of foreign elements it contains.

The analysis of the atmosphere at any one point, it will thus be seen, from the character of the foreign matter floating in it, barely furnishes an approximation of its constituent elements. This arises from the fact that it is not a compound of uniform character, but a fluid mixture having a thousand compounds floating in it of very different specific gravities, exemplifying, very possibly, just as many strata as there are compounds. To take a handful of earth from any one geological formation, and say that the analysis of that one handful was a fair representation of the whole formations of the globe, would not be more absurd than to say that the analysis of the atmosphere at any one point was a fair index to the whole; or that the atmosphere of towns was as pure as that of the country, or even one farm compared with another, as we shall subsequently show. In a word, from the height of the atmosphere, its analysis is beyond our reach; all that we can do being confined to the investigation of that in which we move.

The brief conclusion at which we arrive, then, is simply this—that every farm has its own atmosphere, and consequently that every farmer should make the most of it he can.

There are, however, exceptions from all rules, and so is there from this ; for winds blow my atmosphere on to my neighbour's farm, and his on to mine ; while ascending vapours, falling dews, rain and snow, and fleeting clouds, play a part in the meteorological world more easily imagined than described.

The field on which we have entered, therefore, is broader than the limited area of acres to which the stipulations of a lease bind us. It is a sort of conjunct and several concern—a national *omnium gatherum*—into which all pour the chemical results of their labours, leaving Nature to divide the gross proceeds as their respective merits demand ; and it is no less interesting than instructive to contemplate the individual merits of the agricultural body, upon which success and national wealth so much depend.

Were the atmosphere perfectly calm and free from agitation, the foreign substances thrown from the surface of the earth into it would occupy certain definite zones or regions, the one above the other, according to their specific gravities, supposing no solution to take place ; and even agitated as they are, they would have, under this hypothesis, a natural tendency, by the laws of gravitation and fluid pressure, to occupy their respective regions, so that for all practical purposes their formation in the meteorological structure of the atmosphere may be admitted to exist, at least hypothetically, for the sake of argument.

The query is, however, how far solution, or a perfect mixture of the whole, takes place, forming a homogeneous body. That such would be the ultimate result is more than likely ; but unfortunately, when sulphuretted hydrogen (sp. 1,777) and carbonic acid (sp. 1,520) are found standing in caves and pools, or rolling on the surface of the ground before the wind, and clouds of various densities floating in the atmosphere at different elevations, the practical question arises, When and how far does solution take place ? The specific gravity of common air being 1,000, let us take the following gases for an example so as practically to illustrate our proposition :—

Nitrous acid gas	..	..	2,427
Sulphurous acid	..	..	2,193
Sulphuretted hydrogen..	..	..	1,777
Nitrous oxide	..	..	1,614
Carbonic acid	..	..	1,520
Muriatic acid gas	..	..	1,278
Nitrous gas	..	..	1,094
Carbonic oxide	..	..	960
Phosphoretted hydrogen	..	..	870
Steam	..	..	690
Ammoniacal gas	..	..	590
Carburetted hydrogen	..	..	491
Chlorine	..	..	470
Hydrogen	..	..	74

Here are fourteen gases out of a great many more ; and chemists who manufacture them must be aware that less or more of each is thrown into the atmosphere besides what are naturally formed there by lightning,

&c. Query, do they arrange themselves inversely, in the order stated, into as many regions ? or do they become mixed together into a homogeneous body before they have time to do so ? or are they partially mixed, and formed into regions according to the state of the weather—as to whether it is calm, windy, hot or cold, or agitated by electrical currents and similar phenomena ?

Again : snow, rain, and dew drain the atmosphere of nitric acid, ammonia, &c. But this being fact, it will also be true that the vapour arising from the earth must carry up with it all the above gases through which it passes, depositing them in the clouds in regions according to their specific gravities, inversely in the order above stated, or mixed together. If the former, it would account for the first rain which falls containing the greatest quantity of nitric acid, that being the heaviest ; but if it does so, then the last of the shower which falls ought, for a similar reason, to contain the most ammonia. Query, does it do so ? If answered in the affirmative, have we a galvanic battery of clouds ? If the latter, then the first and last of the shower should be alike both in ammonia and nitric acid. Query, again, are they so ? No doubt the first rain which falls—it being the bottom of the cloud—would bring down with it all the ammonia and carbonic and nitric acids between it and the earth ; but this can only be true for the first few minutes, so that afterwards if the carbonic acid, nitric acid, ammonia, &c., carried up with the vapour in the formation of clouds are uniformly mixed together, the rain at different periods of time, or parts of the cloud, should contain like quantities of each. Query, does it do so ?

The more important questions, however, are—the quantity of food plants and animals receive from the atmosphere, and the condition both soil and they should be in, to derive the greatest benefit.

The first of these is far from a settled question, much diversity of opinion existing on the subject. All, for example, now admit that nitric acid, ammonia, and carbonic acid are obtained from the atmosphere ; but the quantity of nitrogen obtained from this source is rather a problematical question, some believing that it is obtained from the nitrogen of pure air, while others doubt the soundness of this conclusion. There need, however, be no doubt on the subject ; for it is a well-known fact that the oxygen of the atmosphere is worked up within the pores of the soil, in the decomposition of animal, vegetable, and mineral substances, while its nitrogen is set free. On the other hand, the oxygen of the water is used for the same purpose, and its hydrogen consequently set free. We have here, then, not only in all healthy working soils, but also in the crevice of a rock, or any soil where oxygen acts, free nitrogen and hydrogen, the elements of ammonia. Query, therefore, why should not ammonia be formed ? If ammonia is formed during the decomposition of animal and vegetable substances in the soil, the decomposition of water and air being necessary in the process, why should not the nitrogen and hydrogen disengaged during this process increase the quantity of ammonia thus made ?

It will thus be seen that there is no necessity for the absorption of pure nitrogen directly from the atmosphere or indirectly through the medium of water, since plenty may be had from the soil in the shape of ammonia, provided that soil is of a proper quality to make it of air and water with its own organic and inorganic elements.

Again, if the leaves of plants inhale atmospheric air (nitrogen and oxygen), and only exhale oxygen during the day, what becomes of the nitrogen? We are aware that the oxygen thus exhaled may partly be that inhaled along with carbon, the carbonic acid being decomposed in the interior of the plant; but the conclusion that the quantities of oxygen at issue correspond, and that all the nitrogen inhaled is also exhaled, wants proof: and also the conclusion that the *stomates* of the leaves have the power of rejecting the nitrogen of the air, and absorbing only its oxygen and carbonic acid. In a word, will plants luxuriate in an atmosphere devoid of nitrogen? Do they use oxygen and nitrogen for mere functional recreation?

The objection, that if nitrogen is obtained from either of those atmospheric sources, poor soils ought not to produce stunted crops, falls to the ground, on the plea that poor soils and stunted plants both want the condi-

tions necessary to the healthy decomposition of air and water, so as to procure nitrogen from this source. For a time seeds vegetate and plants luxuriate in very poor soils unable to bring them to maturity. During this time they (soils) have the conditions at issue, and their plants the vitality and constitution necessary; but first the one fails, then the other: and hence the result. Whereas rich soils continue to perform their functions, enabling the plants they yield to do the same. In a word, it is absurd to suppose that rich soils and poor are in a condition to perform certain chemical processes alike.

To the cultivation, seeding, and cropping of land, so as to procure the greatest benefit from the atmosphere, there is less division of opinion. But to this part of our subject we must beg leave to return with more time and space. Suffice it to say at present that deep culture, aëration, moisture, heat, manure, healthy seed, and plenty of room for plants and animals to grow, are essential requisites; and that, giving modern chemists credit for all they have done in the way of experiment, much more has yet to be achieved before many questions connected with the atmospheric food of the animal and vegetable kingdoms can be satisfactorily settled.

## ON THRASHING BY STEAM POWER.

This mode of thrashing grain has become all but universal, and the facilities for effecting this operation are very great in every district. Fixed engines are very numerous, and tall chimneys begin to show themselves in very many farmyards all over the country: but the greatest marvel of the present day, in this department of farm business, is the astonishing number of portable engines which are everywhere to be met with, and they are still rapidly increasing—so fast indeed, that every manufacturer throughout the kingdom is fully employed, and the orders on hand are constantly accumulating.

As to a comparison of the precise merits or the relative economy in the use of fixed or portable engines, I cannot now enter upon: much must depend upon the position and conveniences of the farm premises. On many farms of even moderate size, there are commonly found two or more farmsteads, for the convenience of leading corn and manure, &c. In such an arrangement it may be most economical to use a portable engine; but in all cases where the farm is of any extent, and only possesses one set of farm premises, it is cheaper to use a fixed engine. If I might presume to give an opinion upon this question, it would be this: that it would be economical farm management to erect a fixed steam engine upon every farm containing 200 acres of arable land. Some competent judges have

told me that all farms exceeding 100 acres of arable land ought to be provided with fixed engines—this I cannot think a correct estimate of capabilities. Steam engines are expensive implements; therefore for all smaller occupations than 200 acres I should prefer the use of a portable steam engine, and these have been latterly so surprisingly improved in their portability and general apparatus for thrashing and dressing the grain, that a couple of stout horses will move an engine some miles' distance in a morning, and be so quickly set down and got into work, that it will then accomplish the thrashing and dressing of for market from 40 to 60 qrs. of wheat in a day.

I recollect the first portable steam engine ever exhibited, and intended as a locomotive along common roads. It was at the Bristol Meeting; and examining it, in company with one of the most eminent manufacturers of the day, he said he thought it a great novelty, but subsequently told me that they could never be brought into general use with advantage; that their nice adjustment of parts would be so continually out of order, and the expense of repairs so great, that no good could possibly arise by their introduction for farm service. At this time, this same manufacturer is turning out his hundreds of such machines annually, capable of doing perfectly any reasonable quantity of work at a very moderate

cost, and with but few trifling repairs: indeed, a worn-out engine would now be as great a novelty as was the one first exhibited at Bristol.

Portable steam engines, then, have been at length got up to great perfection, and can be used without much danger or impediment or expense. They can readily be moved from place to place without damage, and they will effect the thrashing more economically and much better than the ordinary horse machines, and dress up the corn into the bargain. Besides, a new order of agriculture is "looming on the horizon," and I am sanguine enough to believe that at no distant period the portable steam engine is destined to do much of the work of the farm, to supersede the horse-power in cultivation, as much as it has done it in thrashing—the problem is solved, it is only a question of expediency and time. Taking this prospective view of the use of portable steam engines, I demur to the erection of a fixed one on my own occupation, and prefer the use of the portable one; besides, my farm has the advantage of two farmsteads, with every needful business requisite attached, which makes it more convenient and advantageous to move it to either place as required, and to keep up a regular supply of fodder and litter for the stock; for this is one of the disadvantages—in such wholesale thrashing, some waste is sure to be the consequence. In thrashing by that antediluvian machine, the flail, all the straw and pulse (cavings) is certainly made the best of, from the regularity of its consumption by stock; but when a large bulk is thrashed together, it requires great care and good management to avoid loss in consuming the fodder, and which in districts not abounding in strawy crops is of no trifling moment.

My own practice is this—I generally *thrash abroad* (as they say in Norfolk), *i. e.*, the machine is set to the stack, taking care that the steam engine is as far from it as the length of the driving-strap will allow. The engine is of six-horse power, and provided with the recent improvement for dressing, &c. One *man* and a *lad* on the stack, with a *woman* or a *lad* to untie for the *feeder*, is the assistance above; below is the *man* to fork the straw from the shaker, the *two* "jack-straws" to carry away the straw to the *stacker*, the *man* to carry the corn into the barn; the *man* to carry, in a chaff skep, the cavings and chaff up, to be stacked in with the straw for better preservation for fodder, to assist in chaving, &c., and to attend to the dressing; the *lad* to fetch water, and the *engineer* constitute the force below. With this force we can thrash and dress from 40 to 50 quarters of reaped wheat per day, at a cost

of 1s. 6d. to 1s. 9d. per quarter, including coals. The same thrashing apparatus ("barn-works") will thrash peas with great facility, but it will require the aid of one or two extra hands. Barley and oats are also readily thrashed by it; but beans are not so easily done, the length and strength of the haulm retard its passage into the thrashing cylinder, and cause the work to proceed slowly, though it is well done. A proper bean-drum is best to be employed.

Great care should be observed that the grain be well thrashed out, and that none should escape in the straw, also that the machine should not split or injure the grain. This may be prevented by properly regulating the feeding parts, which should be so adjusted as to suit the condition of the grain to be thrashed. If set too wide for thrashing a damp or badly-grown crop, much corn will remain unthrashed; and if set too narrow for thrashing a full-eared well-grown crop, the grain is very likely to be injured or split. The same will apply if the engine's true velocity is too great or too slow respectively, or if it is driven too fast or too slow. Much in this respect will depend upon the engineer, whose attention should be constantly on the watch to ascertain how the work is going on, and to keep the steam at an equable pressure, which, of course, will mainly depend upon the attention given to maintain an equable heat or fire, and to see that the working parts are all in order and properly supplied with oil.

The great fault, in working these *new* thrashing machines, is in endeavouring to effect too much. The six-horse-power engine is made to do the work of eight or more. This of course involves wrong somewhere, and the farmer has often to complain of his work being badly done; but, if due caution and judgment be exercised in the management throughout, there cannot remain a doubt respecting the benefit derived and the decided advantage gained by thrashing with steam power.

In the locality from which I write, everybody thrashes by steam. Many honest, hard-working men are obtaining very comfortable incomes by pursuing steam-power thrashing as a business; their little capital is in their engine, which they let out to the smaller farmers. It has also been taken up by men of capital; some of these speculators have several engines, one as many as eight, which are let out for hire at a certain price per quarter, which averages about 1s. per qr. for all kinds of grain.

I am obliged by your correspondent's request upon this subject, and hope the above will be satisfactory to him.

P. F.

## PATENT-OFFICE REFORM.

We have not unfrequently drawn the attention of the readers of the *Mark Lane Express* to the importance of the Patent-office to agriculture as the source of practical science, to the great improvements effected by the Patent-law Amendment Act, and to the farther reforms necessary to meet the more chemical and mechanical position in which the British farmer is yearly being placed; and at present we have to review the valuable assistance of Sir Joseph Paxton and the Society of Arts in the same national cause. It was, as our readers are aware, through the unwearied exertions of the above society that the Patent-law Amendment Act, just mentioned, was wrung from the Legislature in 1852; and we hope they will again persevere, until the necessary reforms are obtained, and something like justice done to the pioneers of chemical and mechanical progress.

The facts to which we refer are briefly these: Sir Joseph Paxton, as Vice-president of the Society of Arts, has just drawn the attention of that influential body—*first*, to the increasing surplus from Patent-office fees now being paid into the Treasury, in amount contrary to what is contemplated by the statute. In 1854, for example, this surplus amounted to £15,000; from 1855 to 1859 probably £60,000; and after the latter date, £100,000 and upwards annually! The Legislature never contemplated such a surplus. *Secondly*, to the impolicy of taxing inventors to support the State. *Thirdly*, to the just claims which inventors have for cheaper patents. After 1859 the gross annual revenue of the Patent-office is estimated at £135,000, while the expenditure is only £35,000; so that the exorbitant fees thus wrung from this unfortunate class may be reduced to one-fourth of their present amount. *Fourthly*, to the national disgrace of the present establishment in Chancery-lane, in an architectural sense, and to the necessity of something like a proper building being erected for her Majesty's Commissioners of Patents and their staff. And, *fifthly*, to the policy of the Society of Arts interfering as they did in 1850-1 and 2, it being their bounden duty to rescue this increasing surplus from the thankless hands of the Treasury.

To this demand the Council of the Society of Arts responded in the affirmative, appointing a committee to take into consideration the subjects embraced by their Vice-president's letter, and to report thereon. This committee have just held their first meeting, at which they unanimously passed the following resolutions:—

"1. That this committee concur unanimously in the importance of saving the surplus from absorption in the general public revenue, and that a deputation of patentees and others seek an early interview with the Prime Minister for that purpose.

"2. That it is highly desirable to place the Patent-office upon a footing correspondent with the permanent industrial position of the country, and that steps be taken to press upon the Commissioners of Patents, upon the Government and the

Legislature, the propriety of having the surplus arising from Patent-fees appropriated to that object.

"3. That a report founded on the foregoing resolutions be addressed to the Council of the Society of Arts, inviting the Council to exert all its influence in obtaining the practical realization of the object therein proposed.

"4. That a sub-committee be appointed to consider the present scale of fees, and the details requisite to be carried out for placing the Patent-office on a footing of efficiency worthy of the nation.

"5. That the thanks of the meeting be given to Sir Joseph Paxton, M.P., for his letter, and that he be requested to continue his exertions in behalf of inventors and the advancement of practical science."

With upwards of forty projects on steam culture under patent, and in the course of passing through the Patent-office, and with the urgent necessity of something further being done to stimulate the exertions of inventors in this important, but not very promising field, than has yet been done, our readers will readily join us in thanking the Vice-president and the Society of Arts for the assistance we are receiving at their hands. Of the £15,000 surplus paid into the Treasury in 1854, and probably £60,000 last year, something like £12,000 are from the pockets of farmers, millers, and implement makers—a sum which, in the hands of the Royal Agricultural Society of England at present, would place steam culture harmlessly beyond all the bugbears of the past generation! Why, then, not have it? The question is a practical one, coming home to every reader; for our pioneers of progress are actually, on the one hand, now paying into the Treasury £10,000 annually, and will continue to do so until 1859, beyond which time this exorbitant tax will be increased to £16,000! while, on the other hand, we are proposing subscribing some £10,000 to £16,000 to enable this unfortunate class to bestow upon us a benefit of something approaching to "£50,000,000" annually! Such is the anomalous position in which the Vice-president has discovered the agricultural public, patentees, and the Patent Office. Let us glance at his five propositions somewhat more in detail, principally confining our remarks to the interest of our readers.

*First*, as to the surplus: Our agricultural patentees are now paying into the Treasury the sum of £10,000 annually, a tax which will be increased upwards of one-half when the third instalment of fees is paid. On taking out a patent, for example, the sum of £25 is paid, at the expiry of three years £50 more, and at seven years £100. The *first* instalment yields a surplus of £15,000, the *second* £60,000, and the *third* £100,000; or respectively £2,500, £10,000, and £16,000, by the agricultural interest! Now there cannot be a doubt but that we have a just and legitimate claim here upon the Treasury for this surplus, to assist us in carrying into effect steam culture; and, therefore, the question arises, why a deputation from the Royal Agricultural Society of England should not immediately

apply for it? since all classes of society are nearly as deeply interested in the success of steam culture as farmers themselves. Were it an isolated question, in which some individual section of the body politic was exclusively interested, the case would be very different; but when our manufacturing and commercial towns are equally interested with our provinces, then "*England obviously expects the Society to do its duty.*"

*Second.* We cannot admit the soundness of the doctrine that patentees should be taxed some £35,000 annually, as proposed by the Society of Arts, much less the surplus of £100,000. For example, the items of the £35,000 are thus stated by Sir Joseph Paxton—

	£
Lawyers' fees . . . . .	10,000
Patent Office salaries . . . . .	4,500
Compensation for abolished offices . . . . .	4,500
Printing Specifications . . . . .	12,000
Rent . . . . .	4,000
	35,000

Now, why tax patentees to pay for abolished offices £4,500? Just as well call upon them to pay the National Debt, or any other extravagance of a past age. Legitimately, again, the first, second, and last items, amounting to £18,500, obviously belong to the Executive, the public interest in them being as nine to one with that of patentees, they seldom receiving ten per cent. of the benefit they confer upon their country—their country receiving the ninety per cent. In other words, why tax the man who confers the benefit, and not those who receive it? Of this £35,000, £300 has been paid for patents on steam culture. If success has been obtained, a benefit of "£50,000,000" may be the result; while £100,000 is, perhaps, the outside patentees will receive. Whether should the public—including the patentees, who receive the £50,000,000—pay this £300 of a tax? or the patentees themselves, exclusive of the public, who only pocket £100,000? As to the specifications, again—ought they not to be worth the expense of printing (£12,000) to the public? In a word, we cannot subscribe to the principle of taxing the pioneers of practical science for conferring the important benefits a thankless public is annually receiving—chemical and mechanical benefits, too, which have elevated England to that proud position she occupies among the nations of the world. And least of all are agricultural patentees able to pay such a tax.

*Third, Cheap Patents.* Has any harm been sustained from the increase of patents since 1852? None, but the contrary; and this would be true were this increase ten-fold greater than it is. The printing and publishing departments of the Patent Office, if properly controlled, will soon dissipate the groundless prejudices which have long existed on this subject relative to useless patents standing in the way. And here we have much pleasure in saying that rapid progress is being made; so much so, that very soon we hope to see in every county town a copy of the indexes and specifications of patents, free to the inspection of the public, and the balance of specifications sold in quantity such as to cover the expenses of printing. But we must return to the anomalous character of this

branch of our subject, with more space. Meantime, as the interests of the patentee and the public are one—cheap patents—it is hoped the sub-committee of the Council of the Society of Arts will deal honestly with "fees." It was, no doubt, a wise maxim on the part of Crown lawyers, in framing the schedule, to keep themselves safe; and now the Society of Arts have to fill up the other side of the picture by extending like justice to inventors.

*Fourth and Fifth.* The Patent Office buildings are certainly a disgrace to the nation; while it is the imperative duty of the Society of Arts to rescue the surplus from the Treasury; but we hope what has already been paid will be refunded, and expended by the Commissioners in the printing of old specifications (*minus* £10,000 for steam culture), which we believe is their desire; and that inventions will be taxed, and not inventors, to pay for the erection of new buildings. We readily subscribe to the soundness of the principle that a revenue should be derived from inventions sufficient to cover all expenses in connexion with the Patent Office; and a very small tax on patented articles would effect this, without being felt by the public: but to tax inventors, the greatest benefactors of their country, as they are now taxed, obviously shows a want of legislative prescience such as to enable our Senators to "put the saddle upon the right horse." We most respectfully draw the Vice-president's attention to the great principles of political economy here sacrificed; for if patentees pay the stamp duties imposed by the statute—viz., £5 for the *first* period, £10 for the *second*, and £20 for the *third*—it is all, and more than all, they should be called upon to pay: and even this would cover the ordinary expenses of the Patent Office, or nearly so, thus leaving a small quota as a tax on the public, who pocket the lion's share of the profits arising from inventions.

This important movement on the part of the Vice-president and the Society of Arts, which we have thus briefly surveyed, merits the most cordial support of the agricultural interest. We have only to cast an eye across our provinces, and observe the large quantity of antiquated rubbish of ploughs, &c., now still in use; to listen to the imperative demand the progress of things is making on farmers, to adopt without delay the most improved description of machinery and implements; and to glance at the indefatigable exertions our implement-manufacturers are making to supersede that most antiquated of all machines, *the horse*, to be convinced of the truth of this—that Patent Office reform is absolutely necessary to meet the exigencies of the farmer. Hitherto, he may have entertained any idea of the utility of a patent he pleased, the "Hanaper Office" and "chaff-waxing" being a long way beyond his reach, generally speaking; but the times are greatly changed of late, and now they must be brought within his reach, and he within the threshold of the Patent Office, let old-fashioned people argue as they may to the contrary.

NOTE.—Since writing the above, we have heard from a semi-official source that the lion's share of the surplus Patent-office fees for last year have been paid for pa-

tents for the public service. But the principle is not sound, as it is equivalent to paying the national debt. The sound principle is obviously to encourage invention, and £10,000 to steam culture would do so, by ef-

fecting combinations, &c. Moreover, when steam supersedes the horse as a motive power in agriculture, it will do so also in the army, and other branches of the public service.

## WHAT IS POLITICAL?

It is impossible to avoid making a continual comparison between the line of conduct severally adopted by the National Agricultural Societies of England and Scotland with regard to agricultural statistics. It will be at once admitted that both these bodies have been instituted and organized with precisely the same object. Without any attempted disparagement, one may, indeed, be said to be formed after the model of the other. To benefit, advance, and develop the resources of agriculture is alike the first grand duty of either. Into whatever ramifications this leading principle of action may extend, we must never forget the authority and liability we have thus imposed upon ourselves. However willing a man may now be to march onwards, he naturally looks to his own chosen organ for the signal—Shall he, or shall he not?

And here we find that remarkable difference in the proceedings of two otherwise so congenial associations. The Highland did not for a moment hesitate. From the time when first applied to, it announced that it would not only do all in its power to forward the collection of these statistics, but that it would do the all itself, and collect them. Few need be told how true the Society has been to its promise. "So far as we recollect," says a writer in the new number of the "Highland Journal" now just out, "we do not think there was a single dissentient voice to the Society's taking up the question of the collection of statistics at first. On the contrary, every member thought it was a legitimate part of its duty which it was called upon to discharge, and the public generally approved of it as conferring a great benefit on the country." Contrast this, as we involuntarily must, with the reception accorded to the scheme by the Royal Agricultural Society of England. "At first," and we may begin again here, it would simply have nothing to do with the matter. So far, in fact, from "every member" being agreed to the good policy of the measure, some of those most intimately connected with its direction publicly proclaimed their disinclination to such a movement. The official silence of the Society, however, was yet more ominous; and while it was known that the Highland would do everything, it was as

clearly understood that the English would do nothing. The effect of this was just what might have been expected. In Scotland the Government was introduced to the best means and machinery by those best qualified to recommend them. In England, on the contrary, they were left to stumble on whom and what they could, without a word of advice or the least assistance from those who could have so effectually afforded it. The result is, that in Scotland the experiment was a great success, and in England as signal a failure.

Still, after all this, is not, perhaps, the question at issue—has an agricultural society any business with agricultural statistics? Is it the duty of such an institution to cold shoulder and smother their collection, or to encourage and establish the system? Further than this, however well disposed, would it not be dangerous to the welfare of the Society to meddle with such proceedings? Might it not tend to divert the attention of the management and officers from its more legitimate uses, and so impair its really beneficial influence? And, worst and most terrible of all, would it not involve the Society in the discussion of political topics?

So far as we can, we must give the best possible answer to these grave doubts—that of experience. "Feeling a deep interest in the proceedings of the Society," continues the paper we have already quoted from the Highland Journal, "none would have regretted more than ourselves if its connection with statistics had impaired its efficiency as a national agricultural society, or led it to depart from its 'original and special objects.' To satisfy ourselves on this point we subjected its proceedings, before and since it became connected with statistics, to a rigid review, the results of which we present with pleasure to our readers. We are prepared to show that the Society has been more engaged during the last five years in initiating and successfully carrying through measures of importance to agriculture, and *has had a larger addition to its members*, than during any other period of its existence of equal duration. In place of triennial it has four shows on hand for succeeding years, has established new features for these, originated an industrial museum;" and so on. So much for

the danger of the step to the welfare of such a society. As to the political impediment we have very little doubt, but if faithfully observed, this clause in the charter of the English Society might stay that body from doing anything at all. Fancy the weight and importance of an agricultural society which dare not touch on the politics of agriculture—that is, on any question which has or is likely to come before Parliament. Why, all the fundamental improvements of agriculture are, so to speak, political. Draining, to begin with; and we go to Parliament for drainage acts and grants. Manures, again; and the Royal Agricultural Society itself has, if we mistake not, been to Downing-street *in re* guano, and so forth. The position and claims of the tenant, which Mr. Pusey, as editor, maintained in the pages of the Society's *Journal*, and followed up by bringing a Bill into Parliament on the subject. How often the Society has been committed on that very clause it would be difficult to say. No doubt, however, the Council have the discretion to interpret it as the curious of old did the dubious edicts of the Delphic Oracle—that is, just as it suited them best.

There is the one great question still:—Has an Agricultural Society any business with agricultural statistics? Would their establishment do anything to advance and develop agriculture? Could they in any way tend to benefit the agriculturists themselves? Everybody says in reply all this is next to certain—that agriculture would be thereby further developed, and agriculturists benefited. The Lords' Committee have said as much in their house. The farmers have said the same over and over again at their Club. The very *Journal* of the Society now *proves* as much in its own pages; and it remains but for the Council to decide whether they will continue to go hand-tied by a rule that every sound man feels need not in this matter embarrass them at all, and which they by their own acts have often ere this gone clean through with impunity. Let them rest assured that they may do so again, and that their only danger will be from craning too long at a place which, with a little heart, they may get well over.

Do not let them be satisfied with our word here. Let them trust not merely to the experience and honours of the Highland Society. There may be some difference in the habits of the two people. But still do not let it be said, as it has been said before this, that the Scotch have all the spirit and intelligence, and we only the prejudice and apathy.

Let them gather counsel from the farmers themselves—from those who at length are beginning to “see no harm in it,” and so on, to others who see something very like definite good in it. We may point our remarks with the opinion of one who should have some attention from the Royal Agricultural Society of England—a practical farmer of high position, and one of the best Judges the Society ever enlisted in its service. It is Mr. Owen Wallis, of Overstone Grange, Northampton, who within the last month has thus forcibly expressed himself—“He saw no reasonable objection to a correct and well-arranged system of agricultural statistics; and thought that, so far from injuring, it was more likely to benefit the farmer. Exaggeration was, he believed, the general rule, with regard to reports of a forthcoming harvest. Wherever the rumour prevailed that it was to be short or productive, there was always unnecessary exaggeration, and in either case mischief was the result. The year before last, when they had a very fine harvest, prices were so depressed that, at the conclusion of the harvest, a great deal of wheat was sold in his neighbourhood as low as 44s. per qr.; yet, in less than a month from that time, the price rose to 70s. Who was the party injured in that case? The producers, of course. But if they had had a correct return of that harvest, coupled with a return of the unexhausted stocks of the previous harvest, there would have been no occasion for the depression in the first instance, or the great rise in price which followed. He firmly believed, then, that the farmer had nothing to fear from any returns that he might ever be compelled to make. The farmer could have no secrets. His farm was open to everybody's inspection; and he had no reason whatever to be ashamed of the amount of his produce, unless he had had crops in consequence of pursuing a bad system of cultivation. He could not be injured by having correct information, instead of the vague and idle rumours that were circulated daily in newspapers by commercial travellers riding about the country, and even by Mr. Caird himself.”

Mr. Wren Hoskyns gives us a similar illustration in his *Journal* paper. Much of the national importance of the Society depends upon the manner in which this article is received by the Council. We have only to hope that an ill-considered, altogether impractical and obscure passage in the charter will not be suffered to outweigh the calls of advancing intelligence and the country's requirements.

## THE FARMER OF THE NEW SCHOOL.

In my last I drew attention to the farmer of the old school—the old British yeoman—and attempted some portraiture of himself and his doings as a farmer. I now propose showing in friendly contrast and in similar portraiture the farmer of the present day.

In making this attempt, I wish to say that if my sketch appears too highly coloured, the outline too strongly drawn, it is not necessarily incorrect, but the colouring is owing to the prejudices of the class. We have still too many farmers who favour *the old school* by their tardiness, their reluctance to adopt the practices and the *costs* of modern agriculture; hence their antipathy to the new order of things, and their idle ridicule, as cast upon the intelligence and aims of the race.

But the days of the old class, the old school, are doomed: Knowledge is surprisingly extending everywhere and upon every subject: the whole world seems intent upon its acquisition in some department or other: the periodical press teems with it, on all sides; and none is more indefatigable than the agricultural press, nor conducted with greater zeal and ability. Questions of culture, of cropping, of drainage, of manuring, and of general management of land; or, again, of breeding, of fattening, and general management of stock; or, again, of tenancy, farm buildings, farm implements, and the many minor subjects connected with the occupation and cultivation of the soil, are constantly before the public, and undergoing the freest discussion and the keenest criticism. This must of itself ere long force its way triumphantly; ignorance, prejudice, indifference cannot exist amidst so much light: they must and will be superseded by general intelligence and by the most enlightened practice. This is, in fact, the case. It is adopted and pursued by almost every modern farmer, whose mind has become fully awakened to the importance of a judicious scientific practice of agriculture; such a modern farmer I shall now endeavour to portray.

**THE MODERN FARMER.**—I shall not attempt any description of the personal appearance or domestic habits of the modern farmer, further than to say that his respectable gentlemanly bearing and intellectual acquirements fit him for any society, and that his home is generally fitted up with many comforts and in a style frequently of simple inexpensive elegance. His mode of living is plain and liberal, but not costly; his establishment usually consisting of two female servants, a groom, and cow-boy. In his stable are his riding-horse and

his gig-horse, both necessary appendages to his station and the requirements of his business, often so kept to be in proper training for sale. His habits of business are regular and systematic. In the early morning he is up, and in readiness to meet his farm labourers, to apportion to each the labour for the day; and his pleasure as well as duty is to superintend their operations throughout it, as circumstances admit.

Follow him in the various departments of his business. In his arable culture he adopts an enlightened practice. His seed, either of grain or smaller seeds, is selected from the many varieties of each kind to suit the condition of his soil and his habitual practice; and the whole is put in with the greatest nicety and care: nothing slovenly or doubtful may intrude here. Is the soil poor? then he enriches it by applying some one of the almost innumerable varieties of manures, chemical or otherwise, whichever he deems most suitable; and he selects his seed accordingly—the plant of moderate growth to the rich lands, the plant of free growth to the poor lands; and all is encouraged by the most watchful care and subsequent management in the hoeings, the weedings, and the many other ways which his intelligence dictates from time to time. The modern farmer, then, derives much benefit from his careful selection of the various seeds required for his farm.

In the culture of his land he adopts a truly scientific practice. In the autumn it is all broken up by his Bentall, Biddell, Coleman, &c., &c., to receive the benign influences which the atmosphere charged with vegetable effluvia may deposit upon it, as also to facilitate the vegetating of all seeds of weeds. The repairs of his subsoil drains are all carefully attended to, so that no obstruction occurs on the approach of winter and its floods. The mangolds, carrots, potatoes, &c., &c., are all carefully graded in early and proper time, so that no hurry in finally covering them safely down need arise. In the preparation of his land for wheat he acts wisely, taking care to get much in readiness, and put it in at the proper time which his experience from the knowledge of his holding shows to be right. On rich soils he applies a scanty seeding; on the poorer soils he regulates it according to its fertility and the condition of the soil at the time of sowing. This also applies equally with his spring seeding.

In his fallowing and preparation for his green crops, which are the foundation of his management, he is almost regardless of expense—good crops he must have, or no food; no food, no manure; no

manure, no corn, or to be purchased artificially at a great sacrifice. His first aim is to obtain a deep friable mould, cleanly and not too dry; he manures this in ridges for swedes and mangolds, and on the flat for common turnips, &c., with a good dressing of richly-made farmyard dung, covered in as quickly as possible, that no ammonia may escape; the roller is run over, and the seed is invariably drilled in with some artificial or chemical manure, and occasionally in a liquid state. As soon as the plant is in broad leaf the hoeing commences, and never ceases till it arrives at a good maturity.

In the management of his stock he greatly excels. Is he a breeder? he selects from the best herds and the best flocks. The produce is carried on from birth as equally as possibly to maturity: no retrograding is permitted, or is rendered unavoidable; all is nicely calculated, and so well arranged as to keep the young animals continually progressing, which is a great secret in successful breeding. Is he a grazier or feeder only? the same course is pursued: continual onward progression is the great aim; to accomplish this, a liberal, almost profuse, expenditure is pursued. Cake, corn, meal of beans, peas, barley, linseed, Indian corn, and various compounds are resorted to with the most satisfactory results. In this way the modern farmer is benefited surprisingly. His quantity of stock is greatly

increased by such methods, and they in turn by their manure-deposits add astonishingly to the fertility of his farm.

In the selection of his implements he exercises a judicious liberality. The introduction of steam is a new feature in his management, but he is not slow to adopt it. He thrashes his grain and seed, cuts his chaff, breaks his cake, his bones, and his coprolites, grinds his corn, crushes his beans and peas, and bruises his oats, &c.; he steams his potatoes, mangolds, and other roots, and occasionally his chaff. His field implements are many, and suitably varied for admirably effecting the best orders of culture; and the names of Ransome and Howard, of Hornsby and Garrett, of Crosskill and Cambridge, of Cornes and Ashby, of Tuxford and Clayton, of Stanley, of Chandler, and others are "household words."

In his farm buildings he stands pre-eminent. They are adapted for every purpose of cattle management and for economising manure. The first is his engine house; then there are byres and boxes, warm sheds, and airy stables; piggeries and calf places fit for human dwellings; chaff houses, cake houses, gear houses, steam houses, root houses, corn barns and straw barns, granaries and hay-lofts, implement sheds and wood sheds, and many more to match.

## LAND DRAINAGE.

Wet weather at this season affords a favourable opportunity, in the field, of estimating the efficiency of drainage. Public lectures and discussions at our club meetings and scientific institutions, &c., are invaluable as a means to an end; but as the author of the "Book of the Farm" lately told us, more progress must yet be made in the field before either science or practice can safely arrive at satisfactory conclusions; for there facts speak for themselves, proving beyond doubt that the most fruitful source of divided opinion amongst us arises from inattention to what they say.

The question we have just raised may, perhaps, be better understood if stated in other words; thus: What is the amount of drainage required to produce the greatest effect upon a given field? The field has been drained according to certain specifications: required to know, experimentally, if the greatest effect has been produced? Would a less amount of drainage have proved equally effective? or would an increase add to the amount of produce in harvest? There is a second field adjoining, equal in every respect, geologically, geographically, and agriculturally. Double the amount of drainage, or a drain between every two, has doubled the increase of produce, and upwards. Would a similar

increase double the amount of produce in the one at issue?

The question, it will thus be seen, is purely a practical one, such as can only be answered by experiment. Logic is excluded, with the long list of opinions so common in drainage controversy. Rain, for example, has been falling freely yesterday and to-day on a grass field of 20 acres in front of the house in which we are writing. The actual quantity which has fallen we cannot tell, not having a rain-gauge, which alone can answer the question practically as required. The field is not drained artificially; but being incumbent on a gravelly bottom, at least for the most part, it is drained to the ditch at the bottom, so that little water is to be seen flowing on the surface. Were the rain, however, to continue for another day, it would doubtless then, as it has often done before now, appear on the surface, as it is not being removed from the field so fast as it is falling. When dry weather shall succeed the present wet, the water will nevertheless continue to flow for several days as it has hitherto done, the stream gradually growing less and less. Now the facts here are manifest; but not being ascertained (*i. e.*, no steps having been taken to make certain the quantities of water), no

practical conclusions can be drawn. We may suppose so-and-so; but hypothetical deductions cannot be received by Experimental Science, nor even close approximations to the truth, nothing being admitted by her but fact.

It is therefore no easy matter complying with the demands of modern agricultural science so as to furnish an accurate record of the facts of the case, in a field naturally but imperfectly drained by means of a gravelly bottom, the gravel being partially mixed with soil, and even tenacious clay, in some parts; and if we drain the field artificially, by means of parallel drains, the number of facts will multiply upon our hands, and the task of recording them increase accordingly.

In order to exemplify this, let us suppose the field in question drained—the pipes at the depth of 4 feet below the surface, the drains 60 feet asunder, and the field 500 yards long. Now, under such conditions, the rain-gauge would indicate the rain-fall as formerly; but the quantities of water in the other cases would be very different, while new circumstances would demand consideration. Enumerating them, we would have—1, the rain-fall as indicated by the rain-gauge; 2, the quantity of water which falls on an area of 10,000 yards, removed by each drain, 5,000 being on each side; 3, the different quantities of water which flow through different parts of each drain, the greatest quantity being at the bottom of the field, and the least at the top; 4, the size of the drain or pipe; 5, the discharge; 6, the percolation of the water to the drains; 7, the hygrometrical state of the soil at different periods; and 8, increase of produce.

Now a very cursory review of these, separately, will show their importance, and the necessity of attending to them experimentally in the field, in the operation of draining.

1. In order to remove rain-water by means of underground drains, provision must be made for the greatest rain-fall. Scientifically, this is so self-evident as to require no amplification, much less proof; but practically, in plastic tenacious clay soils, although the truth of the proposition is unquestionable, its reduction to practice is what few have yet succeeded in accomplishing, the affinity of such soils for water being greater than its force of gravitation through them, as will be shown under the sixth head. In the field before us, drains 60 feet apart remove the water, according to hypothesis, as fast as it falls. This hypothesis, we must observe, however, is far from correct; for, although this distance asunder would drain the greatest area of the field, yet many places would require six times the amount of drainage, and not be so effectually dried when done.

2. Under this head the field before us is a regularly inclined plane, so that with the drains running directly up the acclivity, 5,000 yards on each side would thus be drained by each pipe; but when the surface is not regular, which is more frequently the rule than the exception in many undulating districts, how difficult is this position of the drain to be complied with! and how seldom, on that account, is it attended to!

3. When drains run from end to end of the field, and when they are of considerable length, pipes of different diameters should be used; the greatest diameter being placed at the bottom, where they discharge themselves into the main drains. It frequently occurs, too, that the lower part of the field is more level than the top; a circumstance which demands a large-sized pipe, because the velocity is less, but the discharge equal. By inattention to these facts, we have seen numerous instances where the water rose to the surface, and even flowed in the furrows towards the bottom, when the opposite end of the field was comparatively well drained. To relieve the small drains, when of equal diameter throughout their length, cross-main drains are commonly used; but the expediency of the practice may be queried in some soils, either where the water is liable to sink in crossing any part of the field, or where the parallel drains are liable to silt up for the want of a sufficient flow of water in them.

4. The depth of the drain is the diameter of the pipe; the depth of the soil above it forming part of the length of the drain. Now, the actual size of the pipe in every part of the drain should be such as to pass freely the greatest rainfall through it. At the mouth, for example, it should discharge all the water drained from the 10,000 yards of soil *without being entirely full*; so as not to counteract percolation, subsequently noticed; and at the middle, or half the length of the field, that from 5,000 yards. On lands nearly level the diameter will require to be greater than on those of considerable inclination, for reasons already given. This is a practical question of far greater importance than is often attended to; for in not a few cases the same size of pipe is used for all inclinations!

5. The discharges, both when the rain begins to fall and after it is fair, will depend upon the affinity of the soil for water. In some cases the drains begin to flow nearly as soon as the rain begins to fall, and ceases to run immediately on its becoming fair; whereas, in other cases, the soil will contain several hours or even days' rainfall, thus protracting the flow at the commencement, but lengthening it out for several days, it may be, after the weather has become dry. Great caution, therefore, is necessary in coming to hasty conclusions as to the amount of rainfall from actual discharges at any given time, or *vice versa*, to measure the discharges by the rain-gauge.

6. The percolation of water through the soil is the most important branch of our subject, and probably also the most difficult to investigate, from being in a great measure beyond the reach of observation. From the great diversity of soils, its comprehensiveness is far beyond the limits of a single paragraph; so that all we shall attempt at present is to notice a few heads, postponing consideration of the body of the subject to another opportunity.

Soils, as to drainage quality, may be divided into three classes—*First*, those through which water percolates freely. Rain, for example, falls in drops, and these percolate to the drains without interruption, the one drop following the other in succession. The rain

drops now falling on our window furnish an apt and convincing illustration of this fact. *Second*, soils which part with their water on the principle of a sponge, so to speak. In other words, they are capable of retaining within their pores a certain quantity of water: add a drop more at the top, and you destroy the equilibrium, when they part with a drop at the bottom to the drain, to restore the balance. In this manner drop after drop is given off to the drain, or some larger duct leading to it, as drop after drop falls upon the surface. And *third*, impervious clay soils, whose affinity for water is greater than its force of gravitation through them. During the winter months they absorb a large quantity of water, become soft, often approaching to a semi-fluid state, and only part with it by means of evaporation, becoming rent into fissures and baked into bricks, under the solar influence of spring and summer, when exposed to it.

Of the *first class* a large area requires no artificial draining, and the examples which do so are easily made dry, where there is a proper inclination for the removal of water. The *second* are also easily drained, generally speaking. Where incumbent on a wet bottom, the drains require to be at as great a depth as possible, and sometimes at no great distance between, in order to counteract capillary action; but when even such is the case, the work of drainage is seldom surrounded with any great difficulty. It is otherwise with the *third class*, for here perfect work is yet the exception, while practices and opinions are greatly diversified. Into these latter we shall not enter at present; suffice it to say, that although naturally impervious, this, by the action of the sun, atmosphere, and fissures, is to a certain extent overcome in the generality of cases, especially in our southern provinces, water always finding its way to the drains through the changed soil which these agencies thus give rise to. During summer, for example, plants strike their roots to a great depth in the fissures of the soil, while the oxygen of the atmosphere reduces the adhesiveness and tenacity of the clay form-

ing their sides; consequently when they close in winter, they form thin spongy strata (soils of the second class), through which water ooses slowly to the drains. From the passage however being inadequate, it seldom carries off a heavy rain-fall, the greater portion of which is absorbed by the active soil to the depth of the plough furrow. In autumn this is often an incredibly large quantity; but as the season advances, this soil becomes more and more consolidated, being frequently by spring nearly as impervious as the subsoil, consequently it no longer serves as a reservoir to feed the fissure-ducts leading to the drains; hence why they discharge less water in spring than in autumn, while a larger quantity is carried off on the surface by means of the furrows.

7. The hygrometrical state of the soil can only be experimentally ascertained by the well-known chemical process of drying—the loss of weight being the degree of moisture. The grand object of draining is to reduce this degree in winter, and increase it in summer. In the former season and in spring, soils requiring draining are generally too full of moisture, to the exclusion of the atmosphere, while evaporation from their surfaces carries off the heat of the sun, thus keeping them at too low a temperature; hence the familiar expression, “wet, cold soils.” In summer again, they become baked, preventing the free circulation of the moist atmosphere of night, so refreshing to plants in well-drained and pulverized land.

8. Under this head we shall not speculate, in a world of opinions, although doubtless the amount of produce might be doubled, and more. The great mistake generally fallen into is to suppose that the mere putting in of drains is all that is necessary; whereas it is only the first step in a long series to that end, the intermediate steps depending upon special circumstances almost exclusively applicable to individual cases.

Such are a few of the facts connected with draining. How simple are they, when examined by themselves! and how important, both in a scientific and practical sense!

## THE LONDON, OR CENTRAL FARMERS' CLUB.

### FARM AGREEMENTS.

The usual monthly meeting took place on Monday evening, March 10, at the Club House, Blackfriars; Mr. Wood, of Ockley, in the chair. The subject appointed for discussion stood in the name of Mr. G. Jackson, of Tattenhall Hall, Chester, and read on the card in the following terms:—“The form of farm agreement best calculated to give a stimulus to agricultural improvement.”

After a few introductory remarks from the CHAIRMAN on the importance of the question, not merely to farmers, but also to landlords, and indirectly to the whole community,

Mr. JACKSON said: Mr. Chairman and Gentlemen—Distance and duties having made me a comparative stranger

at your gatherings, I must bespeak your kind indulgence while I attempt to deal with a subject so vast, with aspect so varied, and nature so complex as “The description of farm agreements best calculated to give a stimulus to agricultural improvement.” When I proposed it to our worthy Secretary, I had no intention myself to introduce it; for when at the last December discussion Mr. Baker dealt so ably with “The Management of Estates, so as to ensure their utmost development and improvement,” it was not difficult to discover that it would be unpopular to advocate here an auxiliary, much more a rival system to that of leasing land for a term of years; and while few will doubt, and probably none dispute the danger of determining important agricultural principles by popular prejudice, I at least could have wished that the discussion had been introduced by some one whose name

would have secured for it the ear and the confidence of the landlords and tenants of Great Britain. Many questions of high agricultural importance have been discussed by this Club with large practical effect; but for the one I have this evening the honour of proposing, I claim precedence of them all. While the population of the three kingdoms have an interest in it as a knife-and-fork question, it forms the great door to the temple of agriculture, and I hope to-night we may throw this door wider open—the pillar on which the noble fabric mainly depends; the heart by whose action the streams of agricultural life are to be kept in healthy exercise. It is pre-eminently a landlord's question; and as there is "a time for all things under the sun," the time must come, and come we may hope shortly, when the landlords and tenants of England will no longer doubt under what form of agreement the soil will be to the greatest extent improved. The great importance of the subject of tenant-right may be inferred from the time the House of Commons has, during the last eight years, employed in discussing it; but if we are content to fold our arms till Parliament has framed a bill that shall settle the rights of landlord and tenant, under all varieties of soils and circumstances, we shall not be a whit more wise than the Yankee farmer, who, while surrounded with desolation and sterility, felt "quite encouraged because a canvas chap for Congress had promised him a bounty on growing wheat and potatoes!" But, though the wisdom of St. Stephen's has not yet compounded a life specific for the agricultural ills of Ireland, it has by its "blue-hooks" done the first duty of the skilful physician, viz., laid bare the nature and extent of the wrongs under which tenants generally are suffering. As I am less intent on offering for your acceptance any conclusions of my own, than of bringing under review facts from which sound inferences may be drawn, I shall make no apology for drawing from sources equally within your reach; while I omit not to thank our Secretary for sending me a copy of his "Digest of Evidence on Agricultural Customs, in respect to Tenant Right," and at the same time express my gratitude for the obligations I am under to those gentlemen who have so kindly tendered me communications on the subject. In endeavouring this evening to solve the great agricultural problem, "The description of farm agreements best calculated to give a stimulus to agricultural improvement," we stand on a fine elevation between the past and the future. Experience has lit up for us many valuable beacon-fires to warn us of danger; and science, our Trinity House, has provided us with many aids for future navigation. Without advanced age, our recollections carry us back to the period when agriculture lay apparently neglected in the cradle of its infancy, as though unconscious of its destiny. The babe was, through the ignorance of its nurses, kept in the dark, lest the light of dawning day should cause it to squint; ricketed with tight bandages, for fear it should begin to "step in life" with crooked legs; but, like a second Whittington, catching prophetic inspiration from the nursery jingle—

"There was an old woman, and what do you think?  
She lived upon nothing but victuals and drink,"

it was, in spite of bad nursing, roused into being, and the "bairn" lives, but has sadly out-grown his legal attire, except in the estimation of a certain Northumberland dame, who fancies he could be improved by tight-lacing, and strut nicely if his feet were forced into a pair of old-fashioned ladies' shoes, fresh imported from the Celestial Empire. Time was when

"thumb-screws," "manacles," "proscriptions," "pains and penalties," were implements of agriculture not unbefitting the feudal condition of serfdom and slavery; and had it not been for "Moore's New Edition of Vox Stellarum," we were in danger of concluding that these noble engines of antiquity had all been consigned to the "Old Curiosity Shop" in the "Tower," and that the march of intellect and modern science had invented better legal instruments for causing two blades of corn or grass to grow where only one grew "in the olden time." From the evidence taken in 1843, by the Commons' Committee on Tenant Right, it appears that a large portion of the land in England is let on yearly tenure, with only verbal agreements; and our first inquiry will be, Are verbal agreements, or, in other words, agricultural customs, best calculated to give a stimulus to agricultural improvement? From the evidence given by various witnesses before the Committee, it appears that a system of compensations for improvements has within the last twenty or thirty years grown up into a custom in parts of Lincolnshire; and that this, combined with tenant right agreements, has in those districts almost magically changed the fens and rabbit-warren wilderness into fruitful fields. The following is from the evidence of Major Francis Brown, landowner, occupier, and tenant farmer:—

"Lincolnshire, in my early period, was in a very bad state of cultivation indeed; in short, one-third of the whole county was entirely uncultivated; the four-field system was gradually introduced, and artificial manures were introduced also; and then, after a lapse of time, when tenants had to quit their farms, valuers began to make allowances to them. It was a very gradual thing in its early progress; it was fought very stoutly against, but it is now, I believe, universal."

"And the state of agriculture in Lincolnshire has become highly improved?"—Very much so."

"You spoke of the improvements in Lincolnshire having taken place very gradually. Some fifty years ago it was in a bad state?"—In a wretched state; and I do not mean to say that the improvements have progressed gradually. I think we have made a very rapid stride. The introduction of the right of the out-going tenant to compensation for artificial manures and under-draining was very gradual in its establishment."

"And that probably has been raised, comparatively speaking, with the draining of the land?"—We began to drain in Lincolnshire before we began the system of artificial manure."

"Would the draining become general if the custom to pay, by the incoming tenant, was established as you have named?"—Gradually. There was a great fight, and it was a long time before it was fully established. It is now fully established."

"And it became established by the improved system: that is, draining is part of the improved system?"—It became established from the wisdom and the justice of the measure; and the more it was investigated, the more it was found to be just."

I have given this evidence thus fully, that it may appear how improvement and *security* (the incitement to improvement) have gone hand-in-hand, even without security of tenure; for there appear to have been few leases. In portions of Kent and Surrey, and a few other favoured spots, custom offers some inducement to improved cultivation; but with these few exceptions, the replies of the witnesses led to a different conclusion. "In many counties there was found to be scarcely custom of any kind; in others, it is the custom of districts only; in many, the custom merely of certain estates. In some, again, as in parts of Kent, no custom is allowed unless it is stipulated for by agreement, although spoken to as

the common custom of the county, which is generally supposed to act in the absence of agreement. Taken generally, they are, in the words of Mr. Stewart (barrister-at-law), very conflicting, and difficult to define; and, both from their uncertainty and the limited nature of their allowances, are a serious impediment to the advance of agriculture." It is, from the evidence, easily demonstrable that, while verbal agreements depending on custom give rarely any, and generally *no* encouragement to the improving tenant, they act as a premium on foul and bad farming, and cannot fail to be so regarded by all proprietors who at their own cost are improving their estates. If a farm in high condition comes into the market to be let on verbal tenure, a good tenant declines it on the score of its being over-rented; not so the bad tenant, for, feeling that he is tied to no conditions, except rent, he does not fear that he can save himself, either by getting a reduction of rent, or by reducing the condition of the farm and giving notice to quit. This latter determination is of course kept secret until the condition of the farm reveals it. In districts with large pasturage and "spring cutry" the discovery to the landlord comes too late; he has only two courses—to lower the rent, or get rid of the tenant. In the latter case all sympathy between the parties is gone, and the tenant determines either to strip the farm before the first half year's rent is demandable (29th of September), and start for the diggings, as many have done; or, if he is not inclined to bid his native land adieu, he pays the rent, and before winter sells off his stock, crops, and fodder, and turns up some of the best turf for his "away-going share of wheat." The proprietor has received back his farm foul and exhausted; then looks out, perhaps, for the respectable tenant who before told him the rent was too much, and lets him the farm at a fair rent, and with a liberal agreement. Doubtless, many bright instances of agricultural advancement have taken place under, but not in consequence of, verbal agreements and yearly tenure; just as many houses were well lighted and ventilated under, but not in consequence of, the infamous tax on light and ventilation. There are some "old-school" farmers who will coolly tell you that they prefer a verbal to the most liberal "black and white" agreement. Their father, and grandfather, and great grandfather, they will tell you, had no agreement; and they want none. Of course they do not; they have no capital invested in the improvement of their farm which—come death, or come what will—they fear to lose. Nor are verbal agreements less congenial to the antiquated notions of unimproving landlords. Take the case of the young man full of the desire to make improvements, who asked his landlord for permission to remove some obnoxious hedge-rows, and got the reply, "Why, my dear sir, I would not have them touched for all the world: I am nearly eighty years of age, and I want to leave my estate as I found it." On the 26th of January, 1856, a proprietor of a considerable Cheshire estate commenced a letter to the *Chester Courant* newspaper as follows:—

"Sir,—There is a general move being made all over the county, by the more enterprising tenant farmers, for the purpose of drawing up some form of an agreement or lease between landlord and tenant; and, without entering into detail, I wish to call the attention of landlords and tenants in general to the fact that it is by the more enlightened or scientific farmer that the movement is chiefly made."

This gentleman writes to put landlords and tenants in general on their guard against this dangerous class, and says, in effect, to the tenantry, "Serfs, take care that you do not

become 'enterprising,' 'enlightened,' or 'scientific.'" He concludes thus:—

"As to any set form of agreement vexatious and inquisitorial, applicable generally to this county, I believe it to be unjust and detrimental; and as to a *lease*, it is a one-sided instrument—perfectly safe to the tenant farmer, but calculated to cut a landlord's hands off."

Fortunately, "the schoolmaster is abroad," and landlords and tenants are being put to the "*new school*," and to both the verbal agreement is giving lessons of experience. The landlord who at his own cost is improving his estates wants some better security for their improved condition than a mere verbal understanding; while, on the other hand, the improving tenant is unwilling to suspend the capital he invests in improving his farm on just one-half the thread of life. For let the scythe of Death\* cut either the landlord's or tenant's "silver cord," and what is the investment worth? (Hear, hear.) Talk about confidence between landlord and tenant! it is a beautiful gourd; but who can tell how soon it is to wither at the bidding of a "worm"? I shall next bespeak attention to the "restrictive and prescriptive agreement," with its concomitant "pains and penalties." Your minds will naturally turn to a fine specimen of this order which has recently appeared in a northern county, and become an object of agricultural wonder. I am not aware if it pretends to be *ante* or *post* diluvian. If the latter, we may hope that the inventor of so wondrous an agricultural machine may obtain for it "the royal letters patent." Yet, like many other clever inventions, the first trial may not have justified the fond anticipations of the inventor. Certainly it rather ludicrously reminds us of the old donkey-race, "*Cabbage v. Cudgel*." [Exhibiting a copy of the Northumberland agreement.] Here it is, gentlemen! Examine it, and see if it contains a particle or element of persuasion in it. Observe how it is jagged with £50, £10, and £5 penalties. But with such "a persuader" the noble winner of the cabbage throws up his heels and refuses to contend for a prize, saying, "I am not thine ass." We may charitably hope that experience has *here* lit up a beacon fire, to warn all future laud-agents of "the Northumberland rock," telling them, unmistakably, that good husbandry, like "the quality of mercy," is "not strained." I am rather sanguine that the restrictive and prescriptive agreement will find no supporters *here* (Hear, hear). The description of farm agreement best calculated to give a stimulus to improve, is of course that which conveys to the occupier the ownership or freehold. *This*, as our friend Mr. Mechi will tell us, is the *best* inducement to improve, for there are no consents to ask or penalties to fear. Here is perfect fixity of tenure; entire security for investment. But there are two things which preclude the possibility of this being the description of farm agreement best calculated to give a general stimulus to agricultural improvement: First, few farmers have the capital wherewith to purchase land; and, secondly, only a small proportion of English freeholds ever come into the market for sale. If, however, perfect fixity of tenure and perfect security for investment form together the highest inducement to improve, does it not follow that the next highest inducement to improve is a long lease?—ninety-nine years if you like. Formerly "long leases," and leases for one or more lives, were frequently given.

\* A curious illustration of the uncertainty of life was mentioned by Mr. Jackson; his own landlord, Mr. Cralow, died suddenly, during the time this paper was preparing, and consequently only a few days previous to the meeting.

Some of the latter even in my own neighbourhood are not run out; but I never knew an instance in which they were renewed at rack rent. And I think we may assume that leases of this kind have become obsolete. To what I have thus far advanced there is, I apprehend, a pretty general assent; while we may all doubt whether long leases will ever become general. Many may, and in reference to holdings of from 500 to 1000 acres probably do, believe that leases for twenty-one years, with few restrictions and tenant-right clauses, are "best calculated to give a stimulus to agricultural improvement." If we compare such leases with tenant-right agreements, I think we shall find that their single advantage is fixity of tenure or certainty of occupation for a given term. This undoubtedly secures to the lessee both the pleasure and the profit of his improvements for the period; but it must be kept in mind that the *profit* in improvements is made *more secure* to the tenant by agreement, or even by tenant-right custom, where it has kept pace with improvement, as it has in some favoured spots—for example, in parts of Lincolnshire; because compensation is then calculated from the date of improvement, while in the other case the term may be too nearly run out to allow of a return. The value which fixity of tenure gives to leases diminishes, of course, as you shorten the term. The system of leasing land for lives and long terms is, as I have before remarked, ancient; and I think it will not be denied that as agriculture has progressed, such long leases have disappeared. Except in newly reclaimed districts, the term now rarely exceeds twenty-one years, and is often terminable in seven or fourteen years; and as leases seldom give the lessee compensation for improvements, we may assume that where there is much prospect of the option terminating the lease, *little* encouragement is given to increased cultivation. As regards the motive of attachment to locality, it has been wittily said, "You punish an Englishman by sending him from home, and a Scotchman by keeping him there." If this be true, it is also true that we, south of the Tweed, are less enterprising and intelligent than our northern neighbours; and that in proportion as those qualities have risen with us, has fixity of tenure been less cared for. Doubtless the memory of many present can recal instances in which a larger, a better, or a cheaper farm has broken the spell that bound the tenant to his native soil. Certainty of occupation has a higher value than local attachment, as by it alone can the farmer carry out to completion his own schemes, and realize and enjoy the pleasure and profit of his own improvements. But even to this, poetry may lead more importance than prose; for experience points to frequent cases in which the pleasures of improvement, like the pleasures of sporting, are more in the excitement of the pursuit than in the enjoyment of results. This alone accounts for the rapid strides which agriculture has of late made, even in districts where tenure has scarcely been worth a year's purchase. There is, perhaps, no vocation so seductive as farming. Year after year the enterprising tenant, though he "suspects himself a fool" for investing capital without security, discovers that this field wants draining, and that wants subsoiling; and so he goes on, sighing over what he would do if he only had security. Of course the answer will be, he wants a lease! But I can concede to leases for a term the full swing of the benefit that fixity of tenure gives, without admitting that they form "the farm agreement best calculated to give a general stimulus to improved cultivation." First, because it may be reasonably denied that tenure is more certain under twenty-one-year leases than under agreements that give compensation, or even

custom, as in Lincolnshire. On this point, let me refer to question 7455 of the report of the committee: "Do the tenancies in Lincolnshire go on from generation to generation, in many cases?—Yes; and in Nottingham, too, they are remarkable for it: and that is the reason why no leases are wanted or expected." Another Lincolnshire witness is asked, "Have you, as agent, ever been asked for a lease?" to which he replies in the negative. I am aware it may be contended that certainty for a given time is better than uncertainty for double that time; as under the former the tenant can calculate up to a given date, whereas under the latter he cannot calculate at all. But it must be borne in mind that we do not contend, on behalf of the lease, for the "profit" of the outlay—that has been conceded to agreements—but only for the pleasure and enjoyment; and as these are *brighter in anticipation* than in retrospect, I do not see how we can refuse to concede, in reference to agreements and Lincolnshire customs, that on a bush so well birdlimed two birds are better than one. Mr. White, Mayor of Warrington—and our secretary will tell you he is a very good authority—writes to me as follows: "In the West Riding of Yorkshire, where I spent the first twenty-one years of my life, tenant-right was legalized by long custom; and the effect of it was to induce farmers to get their farms into good condition previous to quitting, that they might have a good valuation." What a contrast to the termination of a lease under which the prospect of a new bargain has long made the lessee's heart sick of improving! 2dly, I do not think leases preferable to agreements, because leases for a term seldom prove satisfactory to the owner and occupier. Of all the farm leases which I knew when a lad, not one has been renewed. Whether tenant-right clauses would prove satisfactory to lessees is very questionable; for they would still feel that if they farmed high to the end of the term, they might, through having their farms valued in that state, have much more to pay for the next twenty-one years in the shape of additional rent than the compensation would be worth. Thus the evils of out-cropping at the end of the lease—so graphically described to the Commons' Committee by Mr. Hutley, of Essex—would remain untouched. Mr. Hutley says: "I have no doubt that every acre of land would be capable of growing a good crop every year, if compensation for all improvements was given; and some of it would grow half as much again as it does now *at the latter part of leases.*" Again, in replying to the question, "Would the recognition of that claim to compensation increase the employment of agricultural labourers?" he says—"A very great deal indeed." And he adds, in answer to another question, "Nothing is so profitable as labour, well applied." To the truthfulness of this picture the other witnesses assent. 3dly, In consequence of the fluctuating value of agricultural produce, many landlords will not give, and many tenants will not accept, leases for a term of twenty-one years. Nor would "a corn" sliding-scale "rent" meet the case, especially in dairy districts. We even find Mr. Gray, of Dilston—while advocating, at the Tyaside Agricultural Meeting, *large holdings and long leases*—telling the members of the Hexham Club that "what is called a corn-rent had not proved generally satisfactory to the tenants; for when prices were low little remained for his profit, and when they were high he found himself giving a high rent to his landlord, and making much less for himself than his neighbours were realizing." Certainly it frequently happens that dearness of produce is caused by deficiency of crop, and the increased price does not compensate the producer; and

therefore, by a scale having reference to price and not to produce, the rent would frequently rise when it ought, in fact, to fall. For the last two or three years prices of produce have ruled high, and those who five or seven years ago took leases at fixed rents have at present cause to rejoice in the success of their speculations. Who in his senses would take a lease at a fixed rent, based on calculations of wheat at late prices? Knowing that the sea of agricultural commerce, like all other world-wide seas, has currents and tides, and that the *highest tide* is ever succeeded by the *lowest ebb*, who will pretend to divine that the price of wheat will not in a comparatively short period descend as much below 35s. as it has ascended above 70s. the quarter? In which event, those spirited competitors for "large holdings and long leases" at fixed rents—so cracked up by Mr. Gray, at Tyneside—may learn that large holdings and long leases at fixed rents are *not* the description of farm agreements "best calculated to give a stimulus to improved agriculture." 4thly. The taking of a farm, like the buying of a horse, is to a considerable extent an untried speculation. If all farms were to be let on lease for terms sufficient to secure an outlay on permanent improvements, many, in these days of competition for occupying farms, would be taken at rents ruinous to the occupiers; and a ruined tenant is but a synonym for a ruined farm and a ruined landlord (Hear, hear). When agriculture was depressed, such cases were very common; and the only sensible way of dealing with them was to release the tenant from his unsuccessful speculation. Lessons of experience like these teach landlords that leases are no security for rent or good farming when times grow bad; and when times are good, I think our Cheshire proprietor, who is a well-intentioned and kind landlord, has reason for saying—"As to a lease, it is a one-sided instrument, perfectly safe to the tenant-farmer, but calculated to cut a landlord's hands off." But a better authority is Mr. White, of Warrington, who writes—"Leases are what most tenants prefer, but are generally less satisfactory to the landlord than to the tenant; and there is always the difficulty, in leases, of fixing a rent that shall be fair to both parties." 5thly. Because the advocates of leases admit that the successful working out of a lease for 21 years depends mainly on the energy, skill, and capital of the lessee. As the uncertainty of human life places it beyond the power of the landlord to calculate whether a wise man or a fool is to work off the lease, so the tenant is equally in the dark as to whether the lease is to prove to him and his family a *blessing* or a *curse*, a *mercy* or a *mill-stone*. 6thly. Because those who recommend leases are ever saying—"Look out your men carefully; see that they are men of responsibility, men of capital and talent; and when you have found such men, give them a lease." We are told that when Lord Derby gets hold of a good man, he gives him a lease. This is very like Dr. Kitchener's instructions for cooking carp—"First, catch your carp." But carp are shy fish to catch, and so are tenant farmers to whom it would be wise to offer a long lease. At our last December discussion, Mr. Mechi told us that "the best tenantry are those that can command landlords; and that in his own county there were persons known as agricultural improvers who were sought for by landlords, and could command almost their own terms." Now if leases are only to be given to such men—and it would be sheer folly to give them to any other—we of this generation may despair of long leases becoming general in our time, "the description of farm agreements best calculated to give a stimulus to agricultural improvement." In what I have advanced, I

desire it not to be understood that I deprecate leases; for I repeat what I said at the December discussion—"Where there is a mutual desire for them on the part of the landlord and tenant, they might of course be granted; but it should be borne in mind that while leases had in some instances done immense good, they were open to objections on both sides." In opening this discussion, I felt it to be incumbent upon me to give "the pros and cons," feeling that I had to address myself to gentlemen who would soon break any rope of cobweb which I might twine. Mr. Ramsey, of Newcastle, writes to me thus—"You must be aware that when the evidence was given before the House of Commons that there was a majority of farmers against leases, I was not; as I hold that security of tenure is the foundation-stone of capital." I have put the following question to a number of eminent agriculturists in different parts of the kingdom—"Are leases more general with you than they were ten years ago?" and from none have I received an affirmative answer. Let me here allude to what Mr. Ker Seymour, M.P. for Dorsetshire, recently stated at a meeting of agriculturists in his own county. That gentleman said "he voted against the Tenant Right (Ireland) Bill because it proposed to give compensation for so-called improvements, about which the landlord had never an opportunity of saying he wished to have them or not—a principle which was, in his opinion, entirely inconsistent with the rights of property, and to which he would ever be opposed." He added that he supported a bill for the purpose of enabling landlords and tenants to make mutual arrangements for giving security for any unexhausted improvements, that security to be extended beyond the life of the owner of the land. In other words, supposing that a person who held an entailed estate wished to make arrangements with regard to permanent improvements, he was for affording compensation to a tenant in the event of death. "It appears to me," said Mr. Seymour, "that tenants should be entitled to remuneration for unexhausted improvements. That, I think, is a sound principle, and I regret that the bill did not pass. It was introduced by as good a friend to agriculture as ever lived—Mr. Pusey—and it died with him. Still, I hope it will be brought forward again. If so, it shall always receive my cordial support. And, although I would not say one word to destroy the confidence that happily exists between landlord and tenant, yet I must say, speaking for myself, if I were a tenant, knowing that life is uncertain, and that properties change hands, I would not go to any great outlay beyond good cultivation, unless I had security that my family should receive the benefit of that outlay." The principle here advocated by Mr. Seymour has been conceded in the Land Drainage and Improvement Act, and in the act of 1851, on "Agricultural Tenants' Fixtures," and therefore cannot consistently be repudiated in this instance. When we reflect on the immense breadth of land, the owners of which have only a life interest in the estate, and the occupiers of which have at present no positive security for their capital invested in permanent improvements, the question assumes an aspect of great public importance; and I think that, before we separate this evening, we should at least express an earnest hope that some Elisha will be found to catch Mr. Pusey's mantle. There is also another legislative question connected with our subject, and one in which I think we may well give the Chancellor of the Exchequer a hint for his benefit and ours, especially as the penny postage and the penny receipt-stamp have already taught him the value of the

retail maxim that "a nimble penny is better than a slow shilling." As the law at present stands, every agreement which states that one party is to give, and the other to take, possession of land, requires to be stamped as a lease, whether it be for a year or a course of years, the consequence of which is that probably 99 per cent. of such instruments are never stamped. Now, if the 2s. 6d. agreement stamp were made applicable to all agreements and leases for land, is it not certain that the Exchequer would profit largely, and landlords and tenants have the comfortable feeling which the possession of a complete, instead of an incomplete, instrument creates? (Hear, hear). This brings me to the consideration of the best form of agreement, with which I shall trouble you—namely: The farm agreement that recognizes the rights of landlord and tenant, and that gives to each, if I may so express myself, a full "pound of flesh," but not one drop of either's "blood." I experienced great satisfaction on finding that this question had been taken up by the Cheshire Agricultural Society, and placed, as it deserved, at the head of the list of subjects selected for discussion at the Town Hall, Chester, on the 9th of October, 1855—the day preceding the annual show. The subject created no ordinary interest. The room was crowded with gentlemen from a distance; and I think I may say that the kindred topics, "farm agreements," "drainage," "laying down land for pasture," and "manures," were treated with an ability the effects of which extended beyond the confines of the county. Ultimately, a committee of six landowners, eleven land-agents, and seven tenant-farmers was appointed, to whom was referred the further consideration of the form of farm agreement submitted by P. S. Humberston, Esq. I verily believe that that gentleman, who is himself a zealous improver, felt at first that "the wish" had been "father to the thought," and that he had gone further in concession than a committee so constituted would be likely to sanction. I entertained a totally different opinion, and told him that, if he would consent to the committee, I believed they would improve on the plan, even in his own estimation. But I am free to confess I did not expect that such a coalition committee would enter on their duties with so earnest a purpose as was evinced to merge all minor differences for the common good. The sittings of the committee occupied considerable portions of three days; and the effect was, to widen the sphere of the tenants' liberties and increase the period for compensation, beyond all our anticipations; and although we naturally cling to our own progeny (and I think I have not much cause to be ashamed of mine), yet I do not hesitate to adopt the society's bairn. The following is a copy of the agreement here referred to, with the schedule thereto attached:—

TERMS AND CONDITIONS FOR LETTING AND OCCUPYING  
A FARM AND LANDS SITUATE AT \_\_\_\_\_ IN THE  
COUNTY OF CHESTER, COMPRISING \_\_\_\_\_ STATUTE  
ACRES, AND DELINEATED IN THE MAP DRAWN AT  
THE FOOT OF THIS AGREEMENT.

CLAUSE 1.—The tenancy to be from year to year, commencing as to all the lands and the garden (except a boozey pasture, to be appointed by the landlord) from the 2nd day of February, 185 \_\_\_\_\_, and as to the house, out-buildings, and boozey pasture, from the 1st day of May, 185 \_\_\_\_\_, to be terminated by either party giving the usual six months' notice to

quit, on or before the 2nd day of August in the first or any subsequent year.

2.—The rent to be £ \_\_\_\_\_ a year, payable by equal half-yearly payments, on the 29th day of September and the 25th day of March in each year. The tenant, after any second day of August, if required by the landlord or his agent, to pay all rent that shall be coming due the 29th day of September, and the 25th day of March then next ensuing, or give satisfactory security for the same, and on non-payment thereof, or failing to give such security, the landlord to have power to distrain for the same, as if it had been then due and in arrear. And before entering the premises to pay the off-going tenant for any manure over \_\_\_\_\_ tons; also for all compensations claimed by the off-going tenant under Nos. 1, 2, 3, 4, 5, 6, and 11 of the schedule. And the additional rent of £ \_\_\_\_\_ per cent. on the outlay in bone expended upon any land which may be boned at the expense of the landlord. Also £10 a year to be paid for every statute acre of land ploughed, broken up, or cultivated, contrary to the conditions hereinafter contained, £10 for every load of manure which shall be sold or carried away from the premises; such additional rent to be payable half-yearly, on the days and in the manner hereinbefore appointed for payment of the said reserved rent of £ \_\_\_\_\_, the first payment thereof being made on the first of such days which shall happen next after such boning shall have been done, or such additional rents for improper cultivation have been incurred, to be recoverable as rent in arrear, or in an action at law as liquidated damages. In addition to the rent the tenant is also to pay the land tax, and all rates, taxes, chief rents, and other out-goings (except the landlord's property tax and tithe rent-charge), which may become due or payable in respect of the premises or the occupation thereof during the tenancy.

3.—The tenant is not to assign, under-let, or otherwise part with the possession of the premises, or any part thereof during the tenancy, without the consent of the landlord first for that purpose obtained in writing.

4.—The tenant is not to plough or have in tillage any of the lands, excepting the lands numbered \_\_\_\_\_ on plan, and coloured brown on the same plan, or to mow any of the land numbered \_\_\_\_\_, or any lands which may hereafter be boned by the landlord (without the consent of the landlord or his agent in writing for that purpose first obtained), nor to have more than \_\_\_\_\_ acres in tillage in any one year, including fallows.

5.—The landlord shall forthwith put the farm-house, buildings, and premises into repair, according to the specification of \_\_\_\_\_, and this being done, the tenant is, at his own cost, thereafter to keep and leave the farm, buildings, and premises, with their respective fixtures and appurtenances, and all the gates, gate-posts, stiles, rails, platts, and fences in and upon the same in good tenantable repair and condition. The landlord is to find all necessary materials for such repairs, and the tenant is to cart the same to the premises.

6.—The tenant is to cultivate and manage the land in a good husbandlike manner, keeping the same in good heart and condition, in a perfectly clean state, and under a proper and systematic course of cultivation.

7.—The tenant is not (except on the breaking up of fresh turf) to take or have two white straw crops in succession on the land, without the consent of the landlord or his agent in writing first obtained. And is not to sell or carry away from the premises any manure made thereon, but is to use the same upon the premises in a husband-like manner, and shall, on quitting the farm, leave \_\_\_\_\_ tons of rotten manure properly thrown together in a heap for the use of his successor, without

receiving any allowance or compensation for the same, but shall be paid for any quantity of manure there may be left beyond tons, and shall pay the landlord or in-coming tenant or any quantity less than the amount stipulated for to be left on the premises as before mentioned (regard being had to the quality of the manure in each case), the sum to be paid in case of difference to be ascertained by arbitration; but it shall be lawful for the tenant from time to time to sell hay, roots, or straw, from the premises, on bringing back such quantity of good stable manure, or on expending on the grass land such quantity of bone manure in lieu thereof, as may cost not less than half the amount realised by the sale of such hay, straw, or roots, and a correct account of such sales and purchases, together with proper vouchers, shall be by the tenant presented half-yearly to the landlord or his agent, and the off-going tenant shall be at liberty (provided he and the on-coming tenant cannot agree as to price) to sell the off-going share of wheat with the straw, together with any hay, straw, and fodder which may be unconsumed at the expiration of the tenancy, and one-third of the amount to be received for such hay, straw, and fodder shall be paid to the landlord, to be applied in permanent improvement of the land, in lieu of the manure that would have been made from such hay, straw, and fodder being left on the premises.

8.—The tenant is to keep all the ditches well cleansed and of proper depth, and the under-drains clear and free from obstruction, and at the most seasonable time, once in every year at the least, effectually to cleanse all brooks and watercourses upon the farm, and keep the same at all times free and open.

9.—In case the tenant shall make any of the permanent improvements upon the premises, which are enumerated in the schedule hereunder written, fulfilling the conditions annexed thereto, and set on the second column of the schedule, he shall, on leaving, be compensated for the amount of permanent improvement then remaining to the estate, to the extent in each case stated and specified in the third column of the schedule. The compensations specified, in the third column of the said schedule, shall be made and paid only in case the tenant shall have substantially complied with the terms of this agreement, and on the express condition that the tenant delivers previous notice, in writing, to the landlord or his agent, of his wish to make such improvements respectively as are numbered in the schedule 2, 6, 7, 8, 9, 10, 11; and that the tenant receive the written authority of such landlord or his agent before such improvements respectively be made, and after any or every improvement mentioned in the said schedule is made, the tenant shall, within three calendar months at furthest from the completion of the work, present his account, in writing, of the cost of such improvements, with invoices of the amounts expended under numbers 1, 2, 3, 4, to be investigated by the landlord or his agent, and approved of by them.

10.—All timber, stone, and mineral, is reserved out of this letting to the landlord, with liberty to fall, get, and carry away the same, making reasonable compensation for any damage done thereby. Also all game, fish, or wild fowl, with full and free liberty to sport upon the premises at pleasure.

11.—That upon any change of tenancy, the in-coming tenant shall be at liberty to enter upon any part of the stubble land for the purpose of ploughing the same, at any time after the 1st day of November, and shall, after that time, be accommodated with stable-room for a pair of horses on the premises, free of charge, finding his own provender.

12.—Any alteration of rent or variation of terms that may be made, is not to affect these terms and conditions beyond the extent to which they may be altered and varied.

THE SCHEDULE ABOVE REFERRED TO.

DESCRIPTION OF IMPROVEMENT.	CONDITIONS ANNEXED.	RATE OF COMPENSATION TO BE ALLOWED ON QUITTING.
1.—Fine ground bone & half inch bones	On drained or naturally dry tillage land	Two thirds of the cost of what has been used in the last year of tenancy, and one-third of that used in the year preceding.
2.— Bone dust and half inch bones	On dry or well drained pasture or meadow land the same not being afterwards mown	Seven-eighths of the cost of that used in the last year of tenancy, and diminishing one-eighth every previous year subsequent to the application.
3.— Dissolved bones or guano	On dry or well drained land	One-fourth of the cost of that used in the last year of tenancy, for turnips and rape.
4.—Lime . . . . .	On dry or well drained land	One-half of the cost of that used in the last year of tenancy.
5.— Draining—landlord finding tiles	Provided the drains are not less than three feet deep at regular distances, and cut under the superintendence of the landlord or his agents, and are in perfect order at the expiration of tenancy	Six-sevenths of the expense of cutting, laying, and filling in the drains made during the last year of tenancy, and diminishing one-seventh for every crop grown on the land since it was drained.
6.— Draining—tenant finding tiles	Same proviso as above	Thirteen-fourteenths of the cost of those made in the last year of the tenancy, and decreasing one fourteenth for every crop grown since it was drained.
7.—New buildings or walls—landlord finding materials	Provided the same are done under the direction and approved of by the landlord or his agent, according to plan and specification previously agreed upon	Nine-tenths of the cost of those erected in the last year of the tenancy, and decreasing one-tenth for each year's occupation after erection.
8.— Ponds and roads	Same proviso as above	Nine-tenths of the cost of those roads made, or ponds filled up in the last year of the tenancy, and decreasing one-tenth for each year's occupation after completion.
9.—New walls or buildings—tenant finding all materials	Same proviso as above—tenant keeping and delivering up in good repair	Nineteen-twentieths of the cost of those made in the last year of tenancy, and decreasing one-twentieth for each year's occupation after erection.
10.— New fences of hawthorn. landlord finding posts and rails	Provided they have been properly protected and cleaned	Nine-tenths of the cost of those made in the last year of tenancy, and decreasing one tenth for each year's occupation after completion.
11.— Clover and grass seeds	Provided proper seeds have been sown, in a husbandlike and proper manner, and have not been depastured or trod by stock	The invoice cost of seeds sown in the last year of the tenancy, and 2s. per acre for labour of sowing.

I, \_\_\_\_\_, Landlord, do hereby agree to let, and I, \_\_\_\_\_, Tenant, do hereby agree to take and occupy the aforesaid farm and lands, at the rent and on the terms and conditions hereinbefore expressed. Witness the hands of the parties this \_\_\_\_\_ day of \_\_\_\_\_, 185 \_\_\_\_\_.

Now whatever may be thought of the minutiae of this agreement, taking the principle, it is, I think, as a whole a great step taken in the right direction, justifying the

anticipations of the chairman when, in opening the discussion, he said, "I am right glad to see that, at last, agricultural societies are going to do something practical." I do feel that, if all the agricultural societies in the kingdom would discuss the forms of agreement best suited to improve their own districts, they would do more than has yet been done to develop the resources of agriculture. I will add that I believe it will be found in other places, as it was at Chester, that the class of gentlemen who are most deeply impressed with the importance of liberal farm agreements, is that class whose professional duties place them in the position of mediators between landlord and tenant; and that one of the great difficulties which at present beset many of these gentlemen is, the delicacy of putting before their employers a form as liberal as their own views. I regard it as an immense advantage to get such men in conference with the other two classes, each having some good thing to recommend from his own experience. I am indebted to Mr. Twynham, of Winchester, for "eighteen rules drawn up by the Winchester Farmers' Club, 1850, entitled 'A Basis for an Agreement on equitable Tenant-right Principles.'" I cannot but regard this form of agreement as a beacon to warn us of danger; and I am not surprised that it has been so little heeded by the owners of land and their agents, who, I imagine, regard it as employers generally regard the instructions of the employed, illustrating as it does how the latter sometimes take care of their own pound of flesh, and offer the owner less than half a pound. Permit me now to direct your attention more especially to the distinctive features of a "tenant-right enactment," and a "tenant-right agreement." The former gives to the tenant, on quitting, a right to compensation for the improvements he may have made, irrespective of the landlord's approbation: otherwise, there would be nothing but a bargain between the parties; and if this were reduced to writing, it would be binding, without any new enactment. The latter—a "tenant-right agreement"—is also a landlord's-right agreement, or the bargain of both in writing; and in making this bargain, they will do well to keep in mind the following quotation from an able writer: "Though I write as a tenant farmer, I do so with a strong conviction that the true interests of the landlord and tenant are precisely the same. Nay, so far do I hold to this opinion, that if any part of an agreement can really be productive of the landlord's interests, I will accept that proof as a sufficient evidence that it is also for the interest of the tenant." But there is yet a medium course between an enactment compelling the landlord to pay for improvements of which he had *not* approved, and an agreement giving compensation to the tenant only for what improvements the landlord had sanctioned. I have here an agreement of this kind, for a farm of over 200 statute acres, dated 1817; and the compensation clause is in these words: "That, if the tenant shall be turned off the farm at any time, and shall not have reaped the benefit of such permanent improvements as he may have made thereon, he shall be allowed for the same such sum or sums of money as two impartial persons shall fix upon, one to be chosen by the landlord, and the other by the tenant; and in case they shall not agree, an umpire shall be chosen by them, whose determination shall be final." As this is the oldest farm agreement in which I have found a tenant-right clause, it is gratifying to perceive that it has stood the test of 39 years' experience. The tenant, feeling that the clause secured his improvements, so that the owner could take no advantage of him, soon changed the farm from

a bad to a good condition, and is continuing, up to the present time, to reap the harvest of his own sowing, having brought up his family in great respectability, and become independent in his circumstances. Many of the tenant-right agreements draw a proper distinction between acts of husbandry and permanent improvements, limiting the previous consent of landlords to the latter, as in clause 9 of the Cheshire agreement; and the approved invoices put the matter beyond dispute. I am indebted for a printed tenant-right memorandum to the kindness of the writer of the following note:

"Emmett's Grange, South Molton, Devon,  
"February 7th, 1856.

"DEAR SIR,—I now supply you a copy of our 'Tenant-right' memorandum, from which you may possibly draw some little comparative information.

"Our lease is also printed; but being adapted especially for unreclaimed lands, it would scarcely be of use to you.

"I will sketch out the heads of our plans of letting these 'open lands;' which plans are laid down with a view to mutual interest and future improvement.

"*Lease*.—For 20 years, the tenant having the option of quitting at the end of 8 or 16 years.

"*Rent*.—This is arranged upon a sliding scale, extending over 5 parts of 4 years each.

"Thus, suppose a case of rental—the average value of the farm being, say, 3s. per acre for the 20 years—it would run thus:—

	1s. for the 1st 4 years.
"Average"	2s. " 2nd "
	3s. " 3rd "
	4s. " 4th "
	5s. " 5th "

"Thus, should the tenant quit at the end of the first periods, he will only have paid the lower rents.

"With a view to *prevent* the tenants 'farming out,' we grant the accompanying (tenants') compensation clauses for all unexhausted improvements.

"The lease is arranged upon the principle of 'two men meeting to make a bargain; viz., if you will cultivate and farm so and so, I will build, drain, &c., and take such and such rents, &c.

"Each of the above stipulations is stated under their respective heads of landlord and tenant.

"As a rule, tenants cannot well be too free from formal covenants, provided certain covenants are made for leaving their farms in *proper order* at the END of their lease or holding.

"Compensation clauses go very far to ensure good cultivation. In my native county (Lincolnshire) we never hear of bad farming or disagreements about covenants, but the incoming tenant gladly pays over to the out-going one his bill for unexhausted improvements.

"I am, dear Sir, yours faithfully,  
"— Jackson, Esq." "ROBT. SMITH.

I extract from a note of E. W. Willmot, Esq., of Congleton, (one of the witnesses before the Tenant-right Committee, and a member our of Committee at Chester on Farm Agreements) the following sentence:—

"Whenever agreements are liberal, there we find improvements going on, and *vice versa*: without them, our poor soils would never have been brought into cultivation."

From the evidence of Mr. Kersey, land-agent to Mr. Tollemache's Suffolk estates, I extract the following. He is asked "Although in some instances you wish now that the tenants would be more liberal in their outlay, have you found, on the whole, the system of compensation answers, by improving the condition of Mr. Tollemache's property?" His reply is, "In every respect that has answered." I had before the first meeting of the Chester Committee got through the post a form of an agreement for Mr. Tollemache's Chester estates;

drawn up, as I believe, with a careful regard to the interests of both landlord and tenant. Finding afterwards that the Helmingham agent had eight years ago warmly commended the "system of compensations," I wrote to ask Mr. Beckett kindly to favour me with any practical information on the subject of agreements and leases that he might have derived from experience; and per return of post I got copies of the forms of agreements for the Suffolk and Northamptonshire estates, and was soon after favoured with the following note:—

"Helmingham, Stoneham, Feb. 15th, 1856.

"DEAR SIR,—I received your letter of the 8th inst., and forwarded by return of post a copy of Mr. Tollemache's old form of lease, as also a copy of his present agreement.

"In 1853 Mr. Tollemache decided upon having a form of agreement from year to year, upon a liberal tenant-right principle, as he conceived it would be better for a man to farm as yearly tenant under liberal covenants, securing to him, in the event of his leaving his farm, a fair and liberal proportion of any judicious outlay, by way of an unexhausted improvement.

"In granting leases for a term of years, a landlord must— to protect himself and his estate from wrong—necessarily insert much more stringent clauses than in an agreement from year to year.

"Before any improvement is carried out, the tenant knows by his agreement the number of years he will enjoy it, or, on the other hand, what proportion of his outlay he will receive at the expiration of the tenancy.

"The plan of giving certificates when the work is done, is likely to prevent any dispute arising between landlord and tenant at the end of the tenancy.

"The agreement is thought liberal, and much liked by his Suffolk tenantry.

"Where it can be done consistently, Mr. Tollemache makes it a rule to promote tenants to larger farms, when an opportunity offers.

"The yearly agreement having been used only two years, I cannot say that I have perceived any practical difference in the productiveness of the soil.

"The Suffolk farming, generally speaking, is very good; and I conceive you would not perceive that increased productiveness, from any alteration of covenants, as in other counties, where the farming has not reached the same standard as in the Eastern counties.

"I shall, with pleasure, give you any further information you may require.

"Remaining, dear Sir, yours most truly,

"Mr. Jackson.

"WM. BECKETT.

"P.S.—Extensive improvements are being carried out under the security given in the new agreement for the outlay."

The following is from Mr. Thairlwall, Secretary and Treasurer to the Wetherell Testimonial:—

"Richmond, February 11th, 1856.

"DEAR SIR,—I have sometime ago been made acquainted with the Cheshire agreement through the columns of the *Law Times* (October 20, 1855, No. 655), and consider it a most excellent model, which, by slight alterations, might be adopted throughout the country. Its great feature is its recognition of the tenant's right to compensation for extra management and artificial manures. Nothing could encourage the outlay of capital better than this, and the development of the resources of the land consequent upon it.

"Leases never were common in the North Riding. Nearly every estate is let under agreements, which vary with the whim of the various agents, many of whom have obtained their knowledge of agriculture from commencing life as gardeners, and progressing from house steward to land agent.

"I think an agreement which allows either party an easy dissolution of the contract, and secures the tenant's fair tenant-rights, is preferable to a lease, and I believe this to be the opinion of our principal agriculturists here; and at all events the rent reserved by a lease (if a lease is adopted) should be a corn rent, so as it may fluctuate with the alteration of prices.

"The feeling excited by the publication of Mr. Wetherell's agreement has extended far and wide, and I have communica-

tions from all parts of the United Kingdom universally condemning it. Many farmers' clubs, I am told, have already discussed it, and I trust these discussions will lead to a more enlightened view of this subject on the part both of landlords and tenants. With thanks for your communication,

"I am, dear Sir, yours faithfully,

"F. THAIRLWALL.

"P.S.—The *Law Times* highly approves of this agreement."

The blank agreements which are here, differ widely in detail, as such agreements ever must, if adapted to the varied soils and circumstances of agriculture; but they all recognize clearly the *tenant's right* to compensation for improvements; the benefit of which he might, in the absence of an agreement, be deprived of, by the caprice of the landlord or other circumstances cutting short the tenure. *Whether such agreements, reserving to the landlord annually the power, but depriving him of all pecuniary motive for cutting short the tenure, be "the description of farm agreement best calculated to give a stimulus to agricultural improvements?" is the question I have now much pleasure in submitting to the agricultural world.* However much we may differ on this question, I doubt not we shall all agree, that every farm agreement, however good, will fail in giving a stimulus to improvement, unless it obtain the entire suffrages of the tenant-farmers. In order to see how such good faith may be obtained, we will suppose the case of a West Indian proprietor and a large owner of estates in several English counties, whose senatorial and other important duties would seem to most such favoured mortals a sufficient reason for leaving his tenantry to the care of agents, in whom he and they will do well to place implicit confidence. But this M.P. has a conscience, and is not satisfied with declaring within the walls of Parliament, that property carries with it "duties as well as rights." Under a sacred impression of its moral and social obligations, he sets apart one day in the year for reciprocating words and acts of kindness with his numerous tenants. On a recent occasion of that kind, after those assembled had been indulged with a scientific lecture containing valuable information with regard to manures and other matters connected with practical farming, the gentleman to whom I allude expressed himself in the following terms:—

"Gentlemen,—I have here a new form of farm agreement, which has been drawn up with care for this estate. I do not imagine that it is all perfection; on the contrary, from what the lecturer has told us about the value of sulphuric acid and bones, I think superphosphate should have some compensation. I do not expect that all of you will approve of all the clauses; but I hope that whatever you find of which you do not approve, you will come and point out to me. I will not promise to alter it, for I may differ with you, but I will promise to reconsider the clause. You will not offend me by stating your objections; but, on the contrary, you will please me by so doing. I will as soon as possible make in your dairies the conveniences for abolishing the unnecessary practice of Sunday cheese-making; but in giving up this practice, I hope you will give up all other unnecessary work on that sacred day. You will probably think that in an establishment like this there must be much to be done on Sabbath days; but I am happy to assure you, that with a little arrangement and a little self-denial, this is avoided. All our food is prepared on Saturday. My guests, no matter what their distinction, must conform to my rule; and I could not consent for those in the 'servants' hall,' to sit down to a cold repast, while we in the dining-room were partaking of a hot one.

"I will refer to only one other clause, that restricting cultivation. I differ entirely from those who think that cultivation spoils land: it is only bad cultivation that spoils land. On some of my estates five-sixths of the land are in cultivation, and yet it is steadily improving, and I promise that your tillage shall only be restricted by your inability or unwillingness properly to cultivate and improve your farms. I have only further

to tell you that when I came in possession of some of my other estates much of the land was in lease, and I have there introduced agreements of this nature; and I am happy to tell you, that so well have they been received, that some of those who held leases have even given them up and taken the agreement."

If you can imagine such a scene: an intelligent landlord— anxious alike for his tenants' interests and his own—dispensing hospitalities with a generous hand; inviting friendly remarks, with a view to common good; gracing the meeting by the introduction of his lady—you will imagine no more than actually took place within the county of Cheshire on the 7th day of February, 1856. May I not remark, that this is an example worthy of imitation? Who would not be satisfied with land, on such a holding? Who would not esteem it a pleasure to improve his farm, where such encouragements are offered? Good or improvable farms held on fair and equitable terms; farm agreements guaranteeing to the *tenant* a fitting share of his own toil, skill, and capital, and to the *landlord* his fair share of the benefit derived from a wise administration of his estates; these are what Cheshire requires— what the counties of England want! Then, while tenant-farmers rejoice in the growing disposition of the landowners to meet them fairly, let the farmers exhibit concern for the mental, moral, and religious improvement of their dependants. Let them show that they care for the farm-labourers by setting an example of that which is virtuous, good, and truthful, by lessening their servants' labour on the day of rest; by aiding schools for the instruction of the young; by co-operating with the clergy and nonconforming ministers in all practical schemes for the good of the poor; and then, with the blessing of a gracious God, landlords, tenants, and labourers shall form a prosperous, strong, united, and happy rural population.

Mr. SIDNEY (of Peckham), though he occupied the position neither of a landlord nor of a tenant-farmer, had had an opportunity of studying this question in connection with some of the best estates in the country; and he thought it very important that the club should pronounce an opinion upon it. England stood almost alone among the countries of Europe in retaining considerable traces of the feudal system; and it was not very long since tenants occupied land on the condition of performing various services. Many landlords still acted in some degree under the influence of the feeling that they were conferring a favour on their tenants by allowing them to occupy their land; and in all such cases that notion was a great hindrance to good cultivation. The first trace of any general improvement in this respect was to be found about twenty-five years ago. He had been told by Mr. Hudson that if he let his farm "go out of heart" during the last four years of his term, it would still be in as good condition as when he first entered upon it; for at that time it only produced 92 coombs of wheat, whereas it was now producing, and had produced for 14 years in succession, upwards of 1,300 coombs.

A MEMBER: What was the quantity of land?

Mr. SIDNEY believed about 1,400 or 1,500 acres. This high state of cultivation had been brought about by Mr. Hudson every year putting into the land more than he took out of it; consequently he had always a vast amount of capital thus employed, with which the landlord could have nothing to do. The question on the card was, "The form of farm agreement best calculated to give a stimulus to agricultural improvement;" and was not that form of agreement the best which induced the tenant to put as much of his floating

capital into the soil as he could employ at a profit? They were all agreed as to these points:—That they must have a rotation of crops, use the best descriptions of farm implements, lay out very large sums in concentrated manures, and maintain a numerous stock upon the land. Was there one among them, then, whether Mr. Hudson, of Castleacre, Mr. Thomas, of Lidlington, or any other man, who would go and put his £8 or £10 an acre into the soil upon an annual agreement which placed it in the power of the landlord, or the landlord's trustee, agent, or even gamekeeper, if there happened to have been a quarrel with that individual, to give him notice to quit, turn him out at the end of 18 months of his tenancy, and leave him to a law-suit or an arbitration for compensation? In considering this question they must not keep their eye upon certain model landlords, but bear in mind that they were asked to sanction a form of agreement which might be adopted under all or any circumstances between two different men. He did not deny that there were objections to leases: but no form of agreement could make a good tenant more than the laws could make all people honest; and in dealing with this question they must go upon the assumption that landlord and tenant were both honest men. The great difficulties, however, in the way of granting that security, a tenure which was essential to good cultivation, were the poverty, ignorance of the farming business, and love of power, on the part of the landlords, and the *penchant* for legislation on the part of the lawyer and land agent ("Hear, hear.") With regard to the broad and general principles on which all farm agreements should be founded, in order to develop to the utmost the agricultural resources of the soil, the following circumstances were essential:—

1. That the landlord should provide the buildings, farm steadings, roads, drains, fences, suitable and required for the cultivation of the farm.
2. That the tenant should, in addition to experience, possess capital sufficient to provide the implements, machinery, stock, seeds, artificial manures, and labour required by the acreage and quality of the farm.
3. That the tenancy should be on terms that would enable the tenant to put the farm through at least one complete rotation of crops, with security for return of unexhausted capital sunk in the soil.
4. That as minute restrictions hampered a good tenant, and did not restrain a bad tenant, the restrictive clauses should be as few and simple as possible.

Mr. R. BAKER (of Writtle, Essex) had always held the opinion that in making an agreement for letting lands, it was more advisable to secure the tenant in the money he invested by way of improvement as he went on, than to pay him an amount of compensation upon leaving (Hear, hear). How a tenant could be secured by a mere annual agreement he was utterly at a loss to conceive. It was no remuneration merely to pay him or the improvements which were unexhausted. That was only the last act of justice which could be done him in taking the farm out of his hands, or letting it to another tenant at an increased rent (Hear, hear). It must be obvious to every one who regarded the matter in the light of a commercial transaction, that, in taking a farm and looking to it to repay him his investment of skill and capital, to bring it into a cultivable state, it was more necessary to have security for repaying himself the outlay in improvements, than defer it until the expiration of the tenancy, when it would have to be said by another. With regard to leases, they were so influ-

enced by custom that they would not suit all districts alike; but no well-intentioned tenant, who was desirous of investing his capital for the improvement of his property and the benefit of his family, would ever consent to take a farm upon a yearly tenancy if he could obtain a lease upon any terms (Hear, hear). Unfortunately, however, the landlord generally had the dictation of the terms, and there was nothing for the tenant but to comply with, and manage under those terms, to the best of his ability. No reasoning of the tenant could scarcely ever induce the landlord or his agent to alter the terms upon which the farms on an estate were wont to be let, and of this evidence was furnished in the recent case of the Duke of Northumberland, who chose to part with the best tenant on his estate, and whom he had commended and rewarded in a most extraordinary manner, rather than abrogate one of those covenants, however unjust or impolitic they might be, which were propounded by his agents (Hear, hear). But, whatever they might think of the Duke for "doing what he liked with his own," there was no doubt that every other landlord did the same (Hear, hear). The object of the present discussion should be, he thought, rather to convince the landlords as to what their real interests were, than to dictate the terms upon which they should let their farms; and in all their arrangements they should be governed by this principle, that, whatever the improvements on an estate, they should be suffered to remain there, and not be withdrawn by the tenant at the end of his term. It had been very much the custom in his (Mr. Baker's) neighbourhood, where the farms were let for 14 years, for the tenant to go on farming exceedingly well for the first seven or eight years, but after that time he made it his business to exhaust the improvements, until, at the expiration of the term, the farm was left in as bad condition as, or worse than, when he first took it. Now he (Mr. Baker) wished to see that system obviated by restrictions being introduced into the clauses governing the latter portion of the lease, so that the tenant should not be allowed to exhaust his improvements, out should be paid compensation upon the principle laid down in the Cheshire agreement, or some principle analogous to it, in proportion as they remained unexhausted. What the amount of that compensation ought to be, was a matter which should be determined by others, who were more competent to judge as between landlord and tenant; and it had struck him (Mr. Baker) that in every county there might be a tribunal constituted to which disputes relative to the occupation of land might be referred, in preference to a court of law. He himself had been engaged as arbitrator in two or three expensive cases of litigation between landlord and tenant. In one of these cases the whole of the damages awarded amounted to only £75, but the costs and damages together, which had to be paid by the tenant, were not less than £650. He thought there was much ground for complaint on the part of the tenant, because it so happened that in this case no general injury had been done to the farm, but some particular injury to a part of the estate from one or two fields having been cross-cropped in an injudicious manner. In the other case in which he (Mr. Baker) was concerned, the sum awarded was very large; but that arose from the wilful conduct of the tenant, who had endeavoured to injure the farm; and, though the costs were in the same proportion, he richly deserved the consequences, because he had inflicted an injury upon his landlord with his eyes open. Now, when these cases were brought into a court of law, the judge generally refused to adjudicate upon them, and referred them to an

arbitrator; and this being so, why, he asked, should there not be a court of reference established in each county, for the settlement of these matters? Why not have an arbitrator appointed by the Government, or a certain number of men selected in the county to do that part of the business without going into a court of law at all? because, if it must come before an arbitrator in the end, it would be as well or better that it should do so in the first instance. Mr. Sidney had stated that which the practical farmer would see was not exactly correct, namely, that until lately there had been no permanent investment of the tenant's capital in the land. Now he (Mr. Baker) maintained that fifty years ago the amount so invested was very little different from what it was at present.

Mr. SIDNEY had meant 50 years ago.

Mr. BAKER.—The difference in management now applied in this way. There was, first, tile draining. In most cases the tiles were found by the landlord, and the draining done by the tenant in some cases, but generally by the landlord. Where, however, it was done by the tenant, it was of course a permanent improvement. Then there were artificial manures, guano, oilcake, and bone manure; the application of expensive implements to cultivate the soil, with a view to its manipulation in the most perfect manner, and the introduction of a great variety of roots. All these things would so far improve the land as to give the tenant a greater interest in his holding, and should in his (Mr. B.'s) opinion be compensated for, in the proportion that they had been used during the last two or three years of the tenancy. Beyond that, he did not see that the investment now was much larger than it was fifty years ago. At that time marling, chalking, and draining were understood and applied to the land. He granted that the drilling of turnips was a recent practice, but he did not know that it had much increased the production.

Mr. SIDNEY.—Not in Norfolk?

Mr. BAKER.—Not anywhere (Hear, and a laugh). The old system of growing turnips was just as good as the present, and every practical farmer would say that as good beef and mutton were made with turnips alone then, as with oilcake and turnips now. If they had increased the growth they had not improved the quality of turnips, for every year they deteriorated. (Hear.) But the point they had to discuss to night was "The form of farm agreement best calculated to give a stimulus to agricultural improvement;" and he held that the best form of agreement would be that which would give the tenant sufficient interest in the soil to induce him to invest his capital therein; that would give him sufficient time to make a return upon it, so that at the expiration of his term he should not feel compelled to withdraw his capital with the knowledge that if he did not withdraw it he would not be paid for it, but that compensation should be secured to him, in proportion to the amount of capital he had invested over and above what was invested under the ordinary modes of farming, and over and above what he might have extracted and returned to his own pocket. He (Mr. Baker) should say that that would be best effected by a running lease extending from 10 to 15, 20, or 25 years, and terminable by either party giving to the other five years' notice in writing to that effect. But no tenure of land should be commenced without a written agreement. Everything should be reduced to writing, which would prevent a vast deal of trouble in the end; and as the stamps on leases were reduced, there would be no difficulty in effecting it on that account.

Mr. MECHI (of Tiptree, Essex) said there were two or three

considerations which were suggested by common sense in the discussion of this question. And first, he felt that if he had happened to be a tenant farmer, he would have found himself in a very awkward position had he introduced his improvements in cultivation without a lease, or even with a lease up to a certain period (Hear, hear). For it was quite possible that in Essex a man might spend £6 an acre in tile-draining its heavy lands, £5 an acre in chalking, and incur a serious outlay in the improvement of roads, the removal of extra fences, and other things which were requisite; and yet, if he were snatched away by death, or circumstances obliged him to resign the occupation, not a shilling of compensation would be obtainable from either landlord or incoming tenant. Such a state of things as that was in no respect consistent with the encouragement of improvement, and he thought that if custom recognised a certain amount of compensation to the outgoing tenant for improvements of a permanent character, it must tend to a larger investment of capital on the part of the tenant. He was well aware that there were good landlords and good tenants, and bad landlords and bad tenants; but what they wanted was a "custom of the county" that would so adjust the matter between well-meaning parties, that each might have a fair and proper interest in the progress of agricultural improvement. The evidence they had, particularly as to Lincolnshire, showed that that might be accomplished. But the combination of a fair and moderate valuation of improvements with a lease was, perhaps, the most desirable arrangement that could be made; and, of course, if custom recognised that practice in a particular district, it had in effect the power of a law. At the same time it would not interfere with the general right of individuals to make their own agreements. Practically, at present there was nothing like harmony of action throughout the kingdom; for while in many parts of the country—in Lincolnshire, Norfolk, and Bedfordshire—liberal and enlightened arrangements were carried out, in others the whole system was so backward that they were really not in a condition to avail themselves of the improvements of the age; and if an attempt were made suddenly to force upon some miserable districts the high notions and progressive sentiments prevailing in others, the results would be anything but satisfactory (Hear, hear). He had often heard landlords complain of the difficulty of getting tenants with capital; but his answer to that was simply that it was their own fault, and that to obtain men of capital for tenants they should offer them advantages which would compensate them for whatever investments they might make in improving the cultivation of the soil (Hear, hear).

[The Chairman here announced that he had received a letter from Mr. Acton, of the Temple, referring to a communication of his on the subject, that appeared a few months since in the *Morning Chronicle* newspaper; and also alluding to the evidence taken before the Customs Committee, as already quoted by Mr. Jackson; and suggesting that a Committee of the club from, say Essex or Norfolk, Sussex and Northumberland or Yorkshire, should determine upon a model farm agreement or lease, for both heavy and light lands; which should contain all the appliances of high farming, with a view to the economy of machinery, labour, and manure, together with proper and liberal covenants, so as to enhance the capabilities of land; as nothing of the kind is to be found in "Woodfall's Landlord or Tenant," or in the more recent practical works.]

Mr. THOMAS (Lidlington, Beds.) recognised much truth in the remarks which had just fallen from Mr. Mechi; but he did not think the Club could take upon itself that evening to lay down a code of rules applicable to every variety of circumstances in the letting of estates. The question had hitherto been argued simply as one of pounds, shillings, and pence—

as a question of remuneration for this or that outlay, upon the tenant quitting his farm—and not one word had been said respecting association with the place where he had invested his capital, where he had formed social and domestic connexions, long lived, and had hoped to die (Hear). But this he (Mr. Thomas) maintained—that if they wished to have an honest, independent, persevering, wealthy, and intelligent tenantry, they would never obtain them, in the long run, under the system recommended by Mr. Jackson: that was, a yearly tenure determinable at the will of the landlord or a crusty or bilious agent, even though, on leaving, the tenant had an undoubted right to claim a money compensation for the outlay he had made in the soil. There were higher and more generous feelings than those which originated in pounds, shillings, and pence, which ought to dictate the arrangements between landlord and tenant. It was not right that the latter should be in continual dread lest he should be turned out, with a present in money, or what he had invested during the last two or three years of his tenancy; but, before agricultural improvement could be pushed forward at an accelerated pace, mutual good feeling should be established between proprietor and occupier; and that could only be effected by the former giving such a tenure as would attract the best men to the land, and encourage them to lay out their capital, with the prospect of its being returned to them ten-fold (Hear, hear). In the remark attributed to the Earl of Leicester, who had observed to one of his tenants that, two or three years before his lease expired, he must begin to think of giving a fresh one, he (Mr. Thomas) recognized a correct principle, and the right of the landlord to improve his rent-roll at the termination of a long lease during which the land had progressively improved, and farm produce generally had been greatly enhanced in value (Hear, hear). He had seen such improvements introduced in the cultivation of the soil, and such an extraordinary increase of stock bred upon it, on the Duke of Bedford's and the Earl of Leicester's estates, as would be sufficient, if universally practised, to banish want from our door, even though we were altogether debarred from foreign supplies (cheers). Moreover, in the Lothians, in Berwickshire, and other parts, leases had been literally the initiative of good farming; and if they turned to the "Scottish Husbandry" of Sir John Sinclair, and the *Journal of the Agricultural Society of Scotland*, reported by Stephenson, they would find cases upon cases where, under a lease of 21 years, the tenants drained with their own tiles, and, upon the expiration of that lease, took the land for a fresh term of the same duration. Such he knew to be the case also on the estate of Lord Leicester, and on the estate of a portion of which he (Mr. Thomas) had the honour to be tenant (cheers). He could not, therefore, discard from his mind that, in order to ensure the improved cultivation of the land, they must look to a fixed tenure, and the establishment of a generous confidence between landlord and tenant. Still, he should be sorry if the Club arrived at a decision to-night that long leases were best, because he knew it to be a vexed question, and one that should, therefore, be left open for the present (Hear, hear).

Mr. TATTERSALL (of Hyde Park Corner) said there could be little doubt that a lease was, generally speaking, the best form under which to hold land, but then it should not be forgotten that there was a vast quantity of land on which leases could not be given. What was the best sort of agreement as to that he would not undertake to say. (Hear, hear.)

Mr. J. PAIN (of Felmersham, Beds.) said that in travelling through the kingdom he never had occasion to ask the question whether the land in particular districts was held under fixity of tenure or not. He thought he could always

tell, without making any inquiries of the sort; and the conclusion to which he came was that the farms of tenants-at-will were seldom in the high state of cultivation that with a lease they would have been in. In his county (Bedford) he believed there was but one opinion upon the subject, and that not a single voice would be raised in favour of yearly tenancies. He happened to be connected with a few estates at a distance from that county, and he was happy to say that he had been able to introduce long leases—that was, of twenty-one years—there also. The landlord found the tiles for draining, the tenant the workmanship. He had never seen greater improvements effected than under the encouragement thus afforded; and upon the whole he was satisfied it would be found that fixity of tenure was the very basis of good farming, and a mode by which a larger amount of produce would be raised than by any other. (Hear, hear.) For himself, his experience, now tolerably extensive, had taught him such a lesson that he should be very shy indeed in taking a farm of any extent that was out of cultivation, unless he had fixity of tenure (cheers.) He also thought that it would be well if, some two or three years before the expiration of a lease, the landlord and tenant came to some understanding as to the future, instead of deferring it until the term had come to an end. (Hear, hear.)

Mr. JACKSON then briefly replied, observing, with regard to the Earl of Leicester's leases, that they ran to the extent of not less than 14 folios; and that he would never sign such a deed, unless he received some enormous advantages in the shape of rent. He held in his hand a letter from Mr. Robert Smith, an extract from which he thought the club would like to hear; and with the reading of that extract he would close what he had to say upon the subject. Mr. Smith wrote thus:—"Compensation clauses go far to ensure good cultivation. In my native county (Lincolnshire) we never hear of bad farming—(Hear, hear)—or disagreement about covenants (Hear, hear); but the incoming tenant gladly pays to the outgoing one his bill for unexhausted improvements" (cheers).

On the motion of Mr. R. Baker, the following resolution was passed unanimously:—

"That the form of farm agreement, or lease, best calculated to give a stimulus to agricultural improvement, is that which gives security to the tenant during his occupation, with compensation for unexhausted improvements at the expiration of the term."

Thanks having been voted to Mr. Jackson and the Chairman, the proceedings terminated.

## LEASE, AND NO LEASE.

Men are rarely apt to get so wrong as when they attempt to lay down some rule which can have no exception nor misapplication. It is amongst the tritest and truest of sayings, that different cases require difference of treatment. However good, then, a certain recipe may prove under certain circumstances, it by no means follows this must always be equally effective. It is only the mountebank who cures every ill that flesh is heir to, with one and the same pill.

And yet how firmly each of us still adheres to his own favourite nostrum! In the conduct of no other pursuit is there such a continual variety of condition to be considered as in the business of the farm. What at one time and place is altogether indispensable may be of little import at another. What in one district shall be a leading principle of practice is found to be almost unrecognized in the next. With this landlord and these powers, we require so much; with as good a one a little further on, but so little. Imagine, then, the boldness of any man who would bind down all the infinite custom and circumstance of British agriculture to the same line and rule. Class landlords with all liberty of action, indiscriminately with those fettered and circumscribed up to the highest possible pitch consistent in any way with actual possession. Rank equally without distinction tenants of the fullest means with those of the weakest resources. Force every habit, association, and disposition up to the same one standard of

excellence; and compel all alike, suited or unsuited as they may be, to own at once to its influence.

The London Farmers' Club has frequently the good fortune to introduce its different discussion subjects at times particularly appropriate to their consideration. Last month, for instance, it reopened the question of Agricultural Statistics just previous to the Government doing the same. The one might be taken as a prologue to the other. At the next meeting the members turn their attention to the best form of Farm Agreement; their deliberations over this being rather a ready epilogue to not only what the whole body of agriculturists, but the people as generally, have been so lately canvassing. What this best form of agreement is comes more readily to a solution than might perhaps at first be thought possible. Everybody simply answers for himself; and the best form of farm agreement is accordingly—short holdings with compensation covenants—long leases under almost any terms—leases with renewable clauses—the especial customs of certain districts—mutual confidence between good landlords and good tenants—and so on.

It is very apparent that a more specific answer was here volunteered than was by any means demanded. No one upon reflection would for a moment attempt to model one form of agreement or lease that should suit alike all cases and circumstances. No one, however wedded he might be to the results of his own experience and observation, would seriously desire to

change and derange what, contrary to his own theory, is yet working so well. Would any of us honestly propose to substitute the compensation custom of Lincolnshire for the long leases of the Lothians? or that the Wolds-man should renounce his tenant-right and take refuge in a lease? Would any one say the form of agreement the Cheshire Agricultural Society has sanctioned is so equally applicable for all other counties? To our thinking the discussion on farm agreements should be something very like what the agreement itself might be—based on general and liberal principles, but not tied down to minute details, circumscribed action, or assumed infallibility.

Take the whole tenor of the Farmers' Club debate, as reported in this magazine, and it directly comes to the maintenance of these two very opposite propositions—that a man *cannot* farm well without a lease; and, on the other hand, that he *can*. If, say the one side, you wish for proper tenants, you must give them long leases; for there is no good cultivation to be had without security of tenure. If, argues the other, you want able men, you must give them agreements, with compensation covenants; for there is no getting on without security of capital. These are the two several text-words, and in support of them we hear of Scotland and the North of England, where the good farmers have long leases; and, again, of Lincolnshire and Nottinghamshire, where the good farmers have no leases at all. And thus we draw on once more to a conclusion of our own, that we have often repeated in these columns—that security of capital and security of tenure mean very much the same thing—Identically the same in their results where the best examples of either are to be met with.

The key-stone, in fact, to the whole fabric is this one word, SECURITY. It gives a tangible and practical tone to the arrangement. None would foster more earnestly than ourselves the good understanding which should exist between landlord and tenant—the mutual respect and sympathy that those so closely associated should have for each other. Still, harsh as it may sound, this is no true, recognisable principle, in what should be a matter of business. None of us can *secure* a good landlord; a far greater law than we could frame forbids it; and thus, without its admirable custom of country, the holdings in Lincolnshire, despite its fine “breed” of landlord and tenant, would in reality be but little better than those of the worst-farmed districts in England. A lease to some extent implies security of capital; a short tenure, on the other hand, to be worth anything must have this distinctly contracted for; and *with* this, it is still a question, both in theory and prac-

tice, whether the shorter term does not work quite as well as the longer.

The conventional lease, indeed, is anything but a perfect document. The tenant, as is well known, commonly farms up only to farm down again. A tenant-right agreement can stand alone; but no lease without compensation covenants to finish off with, can be honestly approved. And yet, how many such have we now in force! This, however, is fortunately beginning to be observed. The landlord sees how the weak point may be turned against himself, as in the instance referred to by Mr. Thomas, where the owner, two or three years before the occupier's lease expired, began to think of giving a new one. Mr. Baker goes into the evil and its manifest amendment at greater length:—“The object of the present discussion should be, he thought, rather to convince the landlords as to what their real interests were, than to dictate the terms upon which they should let their farms; and in all their arrangements they should be governed by this principle, that, whatever the improvements on an estate, they should be suffered to remain there, and not be withdrawn by the tenant at the end of his term. It had been very much the custom in his (Mr. Baker's) neighbourhood, where the farms were let for 14 years, for the tenant to go on farming exceedingly well for the first seven or eight years, but after that time he made it his business to exhaust the improvements, until, at the expiration of his term, the farm was left in as bad condition as, or worse than, when he first took it. Now he (Mr. Baker) wished to see that system obviated by restrictions being introduced into the clauses governing the latter portion of the lease, so that the tenant should not be allowed to exhaust his improvements, but should be paid compensation upon the principle laid down in the Cheshire agreement, or some principle analogous to it, in proportion as they remained unexhausted.”

Of course, on such an occasion, the Duke of Northumberland's model form of agreement did not pass without comment. It appears still to be a doubtful point as to whom the credit of this affair is chiefly due—to the Duke himself or to his agent. The resolution with which the proceedings as usual terminated scarcely bore as much on this as we could have wished. Our notion of what a model agreement should be, is one that not only gives security of capital or tenure, but with it *liberty of action*. It was for this Mr. Wetherell so properly held out; and it is this which every man with a proper respect for himself will “ask and have.”

## ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A WEEKLY COUNCIL was held on Wednesday, the 20th of February. Present, Mr. Miles, M.P., Vice-President, in the chair; Mr. Alcock, Mr. Raymond Barker, Mr. Burness, Mr. Caird, Dr. Calvert, Mr. Dent, M.P., Mr. Foley, M.P., Mr. Gadesden, Mr. Jonathan Gray, Rev. L. Vernon Harcourt, Mr. Fisher Hobbs, Mr. Holland, M.P., Mr. Horsfall, Mr. Lawrence, Mr. Majendie, Mr. Mainwaring Paine, Prof. Simonds, Dr. Timm, Prof. Way, and Mr. Wilson, of Stowlangloft.

**OIL-CAKE.**—The Rev. Thomas Burroughes, a member of the Society, residing in Cambridgeshire, transmitted to the Council a specimen of oil-cake, which had been supplied to him as genuine "Rape" cake; but which, from its suspicious indications, Mr. Burroughes had not ventured to give as food to his cattle until a chemical analysis of its component parts had been made for him. This cake on examination appeared to contain various kinds of seed, had a very pungent taste, and on dissolving in hot water was found to emit the strong odour of mustard. Mr. Burroughes, therefore, desired to ascertain whether it would be safe as food for stock; and, if safe, whether it would prove nutritious.

**PEAT-FUEL.**—His Excellency the Danish Minister addressed an inquiry to the Council on a subject of much interest in Denmark, namely, the compression of peat for fuel. A note on this subject was read from Messrs. Easton and Amos, the consulting engineers of the Society; and the Secretary was authorised to make further investigation on the points to which the Danish Minister had referred.

**ECONOMY OF HEAT.**—M. Etienne Salmon, of Brussels, communicated a plan by which the heat given off from coal, during its slow combustion and conversion into coke, might be applied to conservatories, manufactories, hospitals, and other large buildings, which require a great expenditure of fuel to warm them. M. Salmon's plan was illustrated by a drawing, and consisted in connecting pipes with the coke-oven, by means of which hot air could be thrown into the atmosphere, and steam conducted through the earth in conservatories, or below the floors and along the walls of the buildings in question.

**STEAM DIGGING MACHINE.**—Miss Charlotte Bauer, of Schwabitz, near Nimes, in Bohemia, reported to the Council the progress made by her brother, the late Captain Bauer, in the invention of a steam digging machine, in competition for the Society's prize; and her desire to carry into execution the plans he had, as he believed, so successfully perfected at the time of his decease. The Council referred this communication to Mr. Allen Ransome, with a request that he would give to Miss Bauer such advice in reference to the best mode by which she could carry out her wishes as his experience might suggest to him.

**AGRICULTURAL WEEDS.**—Mr. Rawson, of Glanhenwyr, Radnorshire, applied for leave to print off, at his own expense, for private distribution, two hundred copies of Professor Buckman's Prize Essay on Agricultural Weeds, published in the last Journal of the Society. Mr. Rawson thought that such a gratuitous distribution of the essay among the Welsh farmers in his district, would strongly call their attention to the importance of the destruction of weeds in their waste lands and hedgerows, and to the injurious consequences of the neglect of such eradication; and the example once set by a few of the most enlightened of those farmers, and the good effects of it shown, he had no doubt that in due time it would be followed by those who at present were least aware of its importance.—The Council referred this request to the ensuing Monthly Council, with an order to the printers in the meantime to keep the type of the essay standing.

**PARLIAMENTARY LEGISLATION.**—Several communications were addressed to the Council on the subject of agricultural statistics, but were referred, without discussion, to the ensuing monthly meeting, when Mr. Miles, M.P., gave notice that he would call the attention of the Council to the following clause in the Society's Charter, with a view to ascertain what interpretation was to be given to the terms of that clause for the guidance of the Council in their proceedings:—

"And know ye further, that in granting this our Royal Charter to the said Royal Agricultural Society of England, we do hereby declare it to be our full and entire will and pleasure that we extend our Royal Protection to its national objects, under the condition that a principle of its constitution shall be the total exclusion of all questions at its meetings, or in its proceedings, of a political tendency, or having reference to measures pending, or to be brought forward, in either of our Houses of Parliament, which no resolution, bye-law, or other enactment of the said body politic and corporate, shall on any account or pretence whatever be at any time allowed to infringe."

**STEAM CULTIVATOR.**—Mr. Burness, of Prospect Terrace, Brixton, submitted to the Council a schedule of suggestions on the subject of the Society's prize of £500 for a steam cultivator, and in reference to the best mode generally of obtaining the great object of steam cultivation. These suggestions were received with thanks, and referred to the Implement Committee, with a request that they would report upon them to the Council.

**AGRICULTURAL MEETINGS AT PARIS.**—Mr. Miles, M.P., reported to the Council the arrangements in progress by the French Government for the agricultural meeting to be held at Paris in the years 1856 and 1857. He also submitted to the Council the official prize-sheets having reference to those meetings. The following abstract includes those principal points of information which refer to the current year, and to English exhibitors:—

**SHORT-HORNS.**

Bred between May 1, 1854, and May 1, 1855.

FOR MALE ANIMALS.		FOR FEMALE ANIMALS.	
First prize.....	£40	First prize.....	£28
Second prize.....	32	Second prize.....	20
Third prize.....	24	Third prize.....	16
Fourth prize.....	20	Fourth prize.....	12

Bred before May 1, 1854.

FOR MALE ANIMALS.		FOR FEMALE ANIMALS.	
First prize.....	£40	First prize.....	£28
Second prize.....	32	Second prize.....	20
Third prize.....	24	Third prize.....	16
Fourth prize.....	20	Fourth prize.....	12

**HEREFORDS.**

FOR MALE ANIMALS.		FOR FEMALE ANIMALS.	
Bred before May 1, 1855.		Bred before November 1, 1854.	
First prize.....	£32	First prize.....	£20
Second prize.....	24	Second prize.....	16

**DEVONS, SUSSEX, &c.**

FOR MALE ANIMALS.		FOR FEMALE ANIMALS.	
Bred before May 1, 1855.		Bred before November 1, 1854.	
First prize.....	£32	First prize.....	£20
Second prize.....	24	Second prize.....	16

**AYRSHIRES, ALDERNEYS, &c.**

FOR MALE ANIMALS.		FOR FEMALE ANIMALS.	
Bred before May 1, 1855.		Bred before November 1, 1854.	
First prize.....	£28	First prize.....	£20
Second prize.....	24	Second prize.....	16
Third prize.....	20	Third prize.....	14
Fourth prize.....	16	Fourth prize.....	12
Fifth prize.....	12	Fifth prize.....	8

**ENGLISH, SCOTCH, AND IRISH BREEDS.**

(Not included in the foregoing.)

FOR MALE ANIMALS.		FOR FEMALE ANIMALS.	
Bred before May 1, 1855.		Bred before November 1, 1854.	
First prize.....	£28	First prize.....	£20
Second prize.....	24	Second prize.....	16
Third prize.....	20	Third prize.....	14

The animals, to be qualified for competition in the foregoing classes for cattle, must have been bred and reared in foreign countries, introduced or imported into France, and the property either of foreigners or Frenchmen. The same remark will apply to the following classes for Sheep and Pigs (as well as to the prizes for Poultry).

**PURE AND MIXED MERINOS.**

FOR MALE ANIMALS.		FOR PENS OF THREE EWES.	
Bred before May 1, 1855.		Bred before Nov. 1, 1854.	
First prize.....	£24	First prize.....	£16
Second prize.....	20	Second prize.....	14
Third prize.....	18	Third prize.....	12
Fourth prize.....	16		

**DISHLEYS, NEW-LEICESTERS, NEW-KENTS, &c.**

FOR MALE ANIMALS.		MALE ANIMALS (continued).	
Bred between Nov. 1, 1854, and May 1, 1855.		Bred before Nov. 1, 1854.	
First prize.....	£24	Third prize.....	£16
Second prize.....	20	Fourth prize.....	12
Third prize.....	16	FOR PENS OF THREE EWES.	
Fourth prize.....	12	Bred before Nov. 1, 1854.	
Bred before Nov. 1, 1854.		First prize.....	£12 0
First prize.....	£24	Second prize.....	11 4
Second prize.....	20	Third prize.....	10 0
		Fourth prize.....	8 0
		Fifth prize.....	7 0

**COTSWOLDS, &c.**

FOR MALE ANIMALS.		MALE ANIMALS (continued)	
Bred between Nov. 1, 1854, and May 1, 1855.		Bred before Nov. 1, 1854.	
First prize.....	£24	Third prize.....	£16
Second prize.....	20	Fourth prize.....	12
Third prize.....	16	FOR PENS OF THREE EWES.	
Fourth prize.....	12	Bred before Nov. 1, 1854.	
Bred before Nov. 1, 1854.		First prize.....	£12
First prize.....	£24	Second prize.....	£11 4s.
Second prize.....	20	Third prize.....	£10
		Fourth prize.....	8
		Fifth prize.....	7

**SOUTH-DOWNS, &c.**

FOR MALE ANIMALS.		MALE ANIMALS (continued).	
Bred between Nov. 1, 1854, and May 1, 1855.		Bred before Nov. 1, 1854.	
First prize.....	£24	Third prize.....	£16
Second prize.....	20	Fourth prize.....	12
Third prize.....	16	FOR PENS OF THREE EWES.	
Fourth prize.....	12	Bred before Nov. 1, 1854.	
Bred before Nov. 1, 1854.		First prize.....	£12
First prize.....	£24	Second prize.....	£11 4s.
Second prize.....	20	Third prize.....	£10
		Fourth prize.....	8
		Fifth prize.....	7

**OTHER BREEDS OF SHEEP**

(Not Specified in the Foregoing.)

FOR MALE ANIMALS.		FOR PENS OF THREE EWES.	
Bred before May 1, 1855.		Bred before Nov. 1, 1854.	
First prize.....	£20	First prize.....	£12
Second prize.....	16	Second prize.....	10
Third prize.....	12	Third prize.....	8

**PIGS, OF LARGE BREED.**

Bred before Oct. 1, 1855.

FOR MALE ANIMALS.		FOR FEMALE ANIMALS.	
First prize.....	£12	First prize.....	£8
Second prize.....	10	Second prize.....	£7 4s.
Third prize.....	8		

**PIGS, OF SMALL BREED.**

Bred before Oct. 1, 1855.

FOR MALE ANIMALS.		FOR FEMALE ANIMALS.	
First prize.....	£12	First prize.....	£8
Second prize.....	10	Second prize.....	£7 4s.
Third prize.....	8	Third prize.....	£6

**FOREIGN OR FRENCH POULTRY.**

Prizes amounting to £125.

**AGRICULTURAL IMPLEMENTS AND MACHINERY.**

Prizes amounting to £328.

**IMPLEMENT FOREMEN AND WORKMEN.**

Premiums amounting to £40.

**FARM-SERVANTS IN ATTENDANCE ON PRIZE ANIMALS.**

Premiums amounting to £120.

The Exhibition of 1856 will last from May 23rd to June 7th.

Foreign animals, implements, and produce sent to the Exhibition will be conveyed at the expense of the French Government, but only from the frontiers.

Entries must be made before the evening of April 9th.

Implements received at the Showyard on May 23rd, Produce on May 26th, and Animals on May 28th.

The Exhibition will be open to the public on June 1st, 2nd, 3rd, and 4th, at the fixed rates of entrance-charge; on June 5th, free admission.

Mr. Caird took that opportunity of suggesting that arrangements should be made in future for obtaining such reports of the Paris Shows as were furnished by the Senior-Stewards and Judges of the Society's Country Meetings, in the departments of Live Stock and Implements, and published annually in its Journal. He thought that there were many foreign breeds of dairy cattle which were well worthy of the attention of the breeders in this country.—Mr. Fisher Hobbs corroborated Mr. Caird's opinion of the value of those breeds of cattle. The French appeared to have thoroughly studied the combination of milk, labour, and flesh in their dairy-stock.

**MANAGEMENT OF DAIRY-STOCK.**—Mr. Horsfall stated that he had just returned from Dublin, where he had been placed in communication with Prof. Sullivan, who was extensively engaged in an examination of the different kinds of Irish Butter, and to whom Mr. Horsfall had detailed the peculiarities of his own manage-

ment, and submitted specimens of his own butter, which Prof. Sullivan had undertaken to analyze, in comparison with the Irish samples. Prof. Sullivan thought it likely that the superior excellence of Mr. Horsfall's butter was derived from superior breed in the dairy-stock from which it was obtained; but Mr. Horsfall was confirmed in his own opinion that all his success had arisen from the peculiarity of his winter feeding, which he found gave a richer cream, and furnished to the butter a greater proportion of the solid and olein fats than the richest summer pastures.—Mr. Miles, M.P., suggested that, as Mr. Brandreth Gibbs had kindly undertaken to examine the character of dairy-herbage from Ireland, it would at the same time be interesting to ascertain the quality of Mr. Horsfall's pastures.—Mr. Horsfall expressed his willingness to supply a plot of growing turf from his land for the purpose of that comparison.—At the suggestion of Mr. Caird, Mr. Horsfall again favoured the Council with a recapitulation of the peculiar management of his dairy-stock. He had for four years given his dairy-cows rape-cake, which imparted to the butter a finer flavour than any other kind of cake; and in order to induce them to eat it, he blended it with one quarter the quantity of malt-dust, one quarter bran, and twice the quantity of a mixture in equal proportions of bean-straw, oat-straw, and oat-shells; all well mixed up together, moistened, and steamed for one hour. This steamed food had a very fragrant odour, and was much relished by the cattle: it was given warm three times a day, at the rate of about 7lbs. to each cow (or of 21lbs. daily). Bean-meal was also scattered dry over the steamed food, cows in full milk getting 2lbs. per day, the others but little. Mr. Horsfall had found this substance to be an unfailing means of keeping up the condition of cows while giving milk. When the animals had eaten up this steamed food and bean-meal, they were each supplied daily with 28lbs. of cabbages from October to December, of kohlrabi till February, or of mangolds till grass-time; each cow having given to her, after each of the three feedings, 4lbs. of meadow-hay (or 12lbs. daily). The roots were not cut, but given whole. Mr. Horsfall had reverted to this old practice, for four reasons: 1. Less expense. 2. Less trouble. 3. Better mastication; and 4. No instance of choking. The animals were twice a day allowed to drink as much water as they desired.—Mr. Gadsden believed that Mr. Horsfall's rape-cake was not the ordinary market article sold under that name, but the kind termed "green" rape-cake, which bore a higher price.—Mr. Horsfall remarked that he could only get this particular cake by giving an early order to the maker. It was made only from the German or English seeds, which were free from the mustard-seed; while the ordinary cake was manufactured from the East Indian seeds, which were intermixed with the mustard, and both kinds were worked up together. He had last October met with a large stock of green cake, for which the dealer could not find a sale. Mr. Horsfall having had a trial analysis of it made for him by Prof. Way, which showed it to contain 30 per cent. of albuminous matter and 13 per cent. of oil, he purchased the supply he then required at £7 10s. per ton, and found it fully to

answer his expectations. The dealer soon after sold off all the stock he had on hand, and had also sold 120 tons since. His cows were always kept housed in the winter, and were milked twice a day. They were only put to the bull when their yield of milk fell below twelve quarts a day. Dr. Timm had tried the green rape-cake, but could not get his stock to eat it, unless steamed, and then only in quantities not more than 2lbs. a day: when mixed with linseed cake they would eat that, and leave the rape-cake.—Prof. Way stated that a new cake was likely soon to be brought into the market, namely, the cotton-cake, obtained from cotton-seeds, after the oil, for the candle-manufacturer's purposes, had been pressed out of them by machinery. The husks, however, and the short fibres of cotton remained attached to them, might prove indigestible and obstructive when given as food to animals; but the manufacturer was about to employ a process for decorticating the seeds, which would remove such objection to this use. The cake would be of superior quality, and moderate price, namely, £8 10s. per ton. The manufacturer also thought it might be advisable to make an intermediate cake, of cotton seed, with linseed, which would oblige the cattle to eat the cotton cake.—Mr. Gadsden remarked that he had at that time some experiments in progress on the subject of cotton-cake, which, when completed, he would report fully to the Council. As far as he had gone, the linseed had made more meat at the end of the first month on the six sheep feeding upon it, than had been made by the other six sheep which had been feeding for the same period upon cotton-cake; but the difference of price between the two kinds of cakes equalised, in an economical point of view, the advantage so gained by the feeding properties of the linseed over the cotton-cake.—Mr. Holland, M.P., stated that a friend having sent him a supply of cotton-seeds from Egypt, sufficient to fatten two beasts, the husks were found to be no objection, but the oil in the seeds had imparted a most disagreeable odour to the flesh of the animals.—Mr. Fisher Hobbs thought, from Professor Way's analyses, that rape and linseed-cake ought to be very nearly equal.—Mr. Horsfall explained that the steaming process he employed rendered the essential oils in the substances of his mixture more volatile and diffusive, rendering the food more agreeable to the taste of the animals, while they counteracted, at the same time, the bitterness of the rape-cake. The temperature of his dairy-houses was 60° F. in winter. His cows had no exercise at that season, as the change of temperature would be too great for them. Their yield of milk was more regular in winter. They were tied up, 3 feet 9 inches apart, with 2 f. 6 in. at the hind feet of each; and straw was bought for them. They stood when eating on open boards, and rested on a couch of straw covered by a cocoa-nut matting. This matting he had found to be both cheap and substantial. No water was laid on in his dairy-houses. His fattening animals required none, while his milking cows were supplied twice a-day from a tap, with as much as they liked to take. They were brushed down once a-week, but currying was practised. His butter fetched a penny a pound more in

the market than his neighbours'; and the only complaint he heard from his customers was, that he could not supply them with a larger quantity. In the purchase of his dairy stock he did not confine himself to any niceties of breed, but selected, from time to time, such a fresh supply of animals as appeared best suited for his purposes. These were generally large cows of the native Yorkshire breeds, improved by intermixture with the short-horned and long-horned breeds. He valued his herd, on the average, as worth £25 each. He sold his new milk at 2d., and his old at 1d. per quart. The cows were in the morning first milked, and afterwards fed; then fed again at noon; and in the evening, after milking, when they were put up for the night. He had found it to be the most profitable to milk the cows down till they gave from five to six quarts a-day, and then dry and fatten them. They had the same food as the others, with the exception of the bean-meal, which was then discontinued.—Mr. Alcock, M.P., referred to the letting-system in Wiltshire and Dorsetshire.—Mr. Caird remarked that in Dorsetshire the dairyman got good prices for his butter and cheese; but did not feed in the winter.—Mr. Horsfall added that he was persuaded that his system was an economical one, otherwise he should have discontinued it, as he himself only farmed for profit. The malt-dust (or coombs) he used was obtained from pale-dried malt, and cost him 10s. per quarter. He had only used it since October, having previously employed bran, which was agreeable in its flavour, and contained phosphoric acid, a substance important for dairy cattle. Malt-coombs were also rich in milking properties.—Mr. Fisher Hobbs remarked that in Cambridgeshire malt-coombs were used for breeding-ewes.—Prof. Way was glad to find that Mr. Horsfall was not in his present practice deviating from the original principle on which he had set out, and that his view of the action of albuminous (nitrogenous) food on dairy stock was borne out by facts. Rape-cake, oat-straw, bran, and malt, were all of the nitrogenous, or flesh-forming class; while butter itself, although appearing to result from their employment, was not so. This paradox might, Prof. Way thought, be explained, by considering that the functions of the milch-cow were intended to produce cheese and butter in the secretion of milk; and that if more oily and less albuminous matter were given as food, less butter would be the result.—Mr. Horsfall remarked that his principle involved two objects: 1. The due supply of albuminous matter in the food; and 2. The quality of the oily matter, given along with the albuminous matter. Tenant-farmers in his neighbourhood had, like himself, obtained an increased richness in their butter from an additional supply of bean-meal to the food of their cows. Linseed oil alone, without albuminous matter, had been found to have no effect of that kind. Mr. Horsfall obtained 1½ oz. of butter from each quart of new milk.

Mr. Caird moved a vote of thanks to Mr. Horsfall. While on his tour of inspection throughout England, in 1850, as the *Times'* Commissioner, he had visited Mr.

Horsfall's establishment, and was much interested in what he then witnessed. The important details Mr. Horsfall had communicated at the Council Meeting held that day, fully confirmed the selection Mr. Caird had made when deciding on the particular dairy-farms he should visit and report upon, on the occasion to which he had referred.—Mr. Gadesden seconded the motion, and bore testimony to the great readiness Mr. Horsfall had so kindly evinced on all occasions to communicate the results of his experience on the important investigations to which he had so successfully devoted his attention.—This motion being carried unanimously, Mr. Fisher Hobbs hoped that the Weekly Meetings of the session would be attended by many of the practical members of the Society, and lead to friendly discussions as interesting and important as the present had been.

The Council then adjourned to the 27th of February.

A WEEKLY COUNCIL was held on Wednesday, the 27th of February: present, Mr. RAYMOND BARKER, V.P., in the chair, Sir Edward Clarence Kerrison, Bart., M.P., Mr. Appold, Mr. George Raymond Barker, Mr. Hodgson Barrow, M.P., Mr. John Berners, Mr. Brandreth, Mr. Burness, Dr. Calvert, Col. Challoner, Mr. Evelyn Denison, M.P., Mr. Dent, M.P., Mr. Devas, Mr. Gadesden, Mr. Fisher Hobbs, Mr. Holland, M.P., Rev. E. C. R. Keene, Rev. James Linton, Mr. Majendie, Mr. Hall Maxwell, Mr. Mainwaring Paine, Mr. Allen Ransome, Mr. T. Scott, Professor Simonds, Mr. Slaney, Professor Way, Mr. Burch Western, and Mr. Wrench. The Baron George de Cotta from Würtemberg, and the Count Sparre from Sweden, favoured the Council with their attendance.

SEA SAND.—Communications on this subject were received from the Rev. S. Kingdon, Mr. Bence Jones, and Mr. Marychurch, and referred to Prof. Way.

PEAT-PRESSES.—Mr. Burness laid before the Council a statement of the peculiarities of several machines adapted for that purpose. This communication was ordered to be transmitted to the Danish Minister, as having immediate reference to the inquiry submitted by his Excellency to the Council at a previous meeting.

COTTON-SEED CAKE.—Mr. Gadesden, of Ewell Castle, Surrey, favoured the Council with the following statement of his experiments connected with the fattening properties of Cotton-seed cake in comparison with Linseed cake:—

“Ewell Castle, Feb. 27, 1856.

“With a view to testing the comparative quality of this cake for feeding purposes, I selected, two months since, a dozen Southdown sheep, dividing them into two pens of six each, in an open shed on boards, supplying them daily with equal quantities of swedes and chaff, giving to one six a pound each per day of Linseed cake, and to the other six a like quantity of Cotton-seed cake. The sheep were weighed when put up, and again at the end of four weeks, with the following result:—

6 fed with Linseed cake, weighed Dec. 26, fasting	Cwt. qr. lb.	5	3	18	6 fed with Cotton-seed cake, wghd. same time . . . .	Cwt. qr. lb.	6	0	9
Ditto, wghd. 24th January . . . . .		6	1	25	Do., weighed 24th January . . . . .		6	1	15
Increase . . . . .		0	2	7	Increase . . . . .		0	1	6
4 weeks' consumption of cake, 1 cwt. 2 qrs. 6lb. at £14 10s. per ton, cost . . . .	£ s. d.	1	2	6	4 weeks' consumption of cake, 1 cwt. 2 qrs. 6lb., at £8 10s. per ton, cost . . . .	£ s. d.	0	13	3

"It will here be observed that, although the cost of the Cotton-seed cake gave a saving of 9s. 3d. as compared with that of the Linseed cake, the sheep fed on it increased less than the others by 29 lbs. live weight, equal 16 lbs. dead weight, which, at 6½d. per lb., would be 8s. 8d., being very nearly equivalent to the 9s. 3d. saved in price of cake. The weighing at the end of the second month gives results so nearly corresponding with the foregoing, that I need not trouble you with the details. From these it would seem that, at £8 10s. per ton, Cotton-seed cake is, in fact, no cheaper than the best Linseed cake at £14 10s. At the same time we may rejoice, as agriculturists, at the introduction of another variety of cake likely to be supplied in almost unlimited quantity, useful in itself, and the competition of which with Linseed cake is calculated to render the cost of the latter more moderate to feeders of stock.

(Signed) "JAS. GADESSEN."

**CENTRIFUGAL CHURN.**—Count Sparre favoured the Council with the following communication:—

"London, 26th Feb., 1856.

"As being much interested in every improvement in agriculture, and especially in the treatment of milk, I have paid much attention to a new system of churn invented by my countryman Major Stiersvärd. This churn was exhibited at Paris last year, and received a first-class medal. As it is well known that no country pays so much attention to all improvements in agriculture as England, I have thought it but right to request the opinion of the Royal Agricultural Society, and therefore beg to inform you that I have now with me in London one of these churns, which I shall be happy to place at the disposal of the Society for any experiments they may submit it to. The advantages of this churn are:—1st. The milk is put in at once from the cow, without standing for cream (although cream may be churned in it as well). 2nd. After the butter is formed, which is with certainty in a few minutes, the milk is not soured, not being in any sense buttermilk, and can be boiled without coagulation. 3rd. The churn is not subject to get out of order; is easily kept perfectly sweet, and is inexpensive in its construction. I have the honour to present to the Society a small treatise by Major Stiersvärd on the treatment of milk, in which will be found the mode of using his new invention.

(Signed) "Count AMBJÖRN SPARRE."

The Council accepted Count Sparre's kind offer, and arranged that it should be submitted in action before the Council on that day fortnight.

**VITALITY OF SEEDS.**—M. Salaville explained the various conditions of organisation in grain in reference to its vitality, and to the action of corrosive vapours applied to it by means of his machinery.—Prof. Simonds exhibited to the members, under the action of his powerful microscope, various portions of Wheat in its original state, as well as in the condition in which it had been left by the process to which M. Salaville had submitted it during the previous fortnight. He remarked, as the result of his own scrutiny on this occasion, that on submitting the dressed Wheat to the microscope several spores of the *Uredo foetida* were seen attached to the hairs of the grain, which did not appear to have

undergone any physical alteration; but this Mr. Simonds stated to be no proof that their vitality had not been destroyed through the use of the fumigating agents, such being alone to be proved by vegetating the grain and comparing the results with undressed samples.

Mr. Riddell exhibited his model of a reaper, and Mr. Collett a model of his proposed plan for raising water.—Mr. Trimmer's letter on Geology connected with Drainage, and Mr. Fulbrooke's further statement of his views on Meteorological Cycles, and the influence of the Moon on Weather, were referred to the Journal Committee.

**VALUE OF DAIRY COWS.**—Mr. Horsfall has communicated the following explanation of his estimation of the value of his milch cows, at £25 each, at the Council Meeting on the 20th of February: "My milch cows give on the average about 9 quarts each per day; which, at the price stated, 2d. per quart, gives £25 per year."

The Council adjourned to their Monthly Meeting on the 5th of March.

A MONTHLY COUNCIL was held on Wednesday, the 5th of March. The following Members of Council and Governors of the Society were present:—Colonel CHALLONER, Trustee, in the chair; Lord Feversham, Hon. A. Leslie Melville, Sir John Villiers Shelley, Bart., M.P., Sir John V. B. Johnstone, Bart., M.P., Sir Archibald Keppel Macdonald, Bart., Sir Edward Kerrison, Bart., M.P., Mr. Dyke Acland, Mr. Bosanquet, Mr. Bramston, M.P., Mr. Bullock, Mr. Evelyn Denison, M.P., Mr. Druce, Mr. Foley, M.P., Mr. Gadesden, Mr. Garrett, Mr. Brandreth Gibbs, Mr. Hamond, Mr. Hudson (of Castle Acre), Mr. Fisher Hobbs, Mr. Wren Hoskyns, Mr. Jonas, Mr. Kinder, Mr. Lawes, Mr. Miles, M.P., Mr. Milward, Mr. Mainwaring Paine, Mr. Allen Ransome, Professor Simonds, Mr. Simpson, Mr. Thompson, Professor Way, Mr. Jonas Webb, and Mr. Burch Western.

Sir Edward Clarence Kerrison, Bart., M.P., of Oakley Park, Suffolk, and James George Appold, Esq., C.E., of Wilson-street, Finsbury, were elected Governors of the Society.

The following new members were elected:—

Atkinson, William, Great Rapers, Bures, St. Mary, Suffolk.  
 Baily, John, sen., Mount-street, Berkeley-square, London.  
 Catchfool, Edward, Feering Bury, Kelvedon, Essex.  
 Cordy, Charles, Frimley St. Mary, Ipswich.  
 Coulson, John, Icklingham, Mildenhall, Suffolk.  
 Daniell, James, Coton Park, Burton-on-Trent.  
 Dod, Whitehall, Brynduiarth, Conway.  
 Enfield, Viscount, Wrotham Park, Hertfordshire.  
 Hagger, Franklin, Hartford.  
 Hodson, Rev. Greuville Frodsham, North Petherton, Bridgewater, Somersetshire.  
 Ingram, James, Shroton, Blandford, Dorset.  
 Kendrick, Edward, Weeford, Lichfield.  
 Macdougall, A., Isk Vale, Chadderton, Manchester.  
 Marriott, James, Floore, Weedon, Northamptonshire.  
 Muggeridge, Edward, Earl-street, Blackfriars.  
 Pertiver, James Frederick, Rettenden, Wichford, Essex.  
 Probyn, Edmund, Huntley, Gloucestershire.  
 Wagstaff, Thomas, West Ham, Essex.

**FINANCES.**—Colonel Challoner reported from the Finance Committee, that the current cash-balance in

the hands of the bankers (including the Chelmsford subscription) was £2,748.

**GUANO-SUBSTITUTE.**—Sir John Shelley reported the preparatory steps he had taken for the trial of Colonel Warrington's manure offered in competition for the Society's prize. He also stated that other competitors had put in claims for that prize. The Council confirmed this report, and referred to the Guano-substitute Committee the subsequent arrangements to be made for the trials proposed.

**FOREIGN CATTLE AND SHEEP PRIZES.**—Mr. Miles, M.P., reported from the Foreign Prize Committee the following schedule, which was unanimously adopted :—

BULLS, of any pure foreign race.	
Six Prizes, amounting to . . . . .	£105
COWS, of any pure foreign race.	
Four Prizes, amounting to . . . . .	50
RAMS, of any pure foreign race.	
Two Prizes, amounting to . . . . .	40
RAMS crossed : foreign and any other race.	
Two Prizes, amounting to . . . . .	30
EWES (pens of three), of any pure foreign race.	
Two Prizes, amounting to . . . . .	30
EWES (pens of three), crossed : foreign and any other race.	
Two Prizes, amounting to . . . . .	15

The final arrangements of the Foreign prize sheet were specially referred to Mr. Miles and Lord Feversham. The entry of Foreign stock, as in the case of English stock, must be made before the 1st of June.

**CHELMSFORD MEETING.**—Mr. Fisher Hobbs having reported the favourable progress of the arrangements at Chelmsford for the Society's ensuing country meeting in July next, he was requested by the Council to meet Mr. Brandreth Gibbs and Mr. Wren Hoskyns at that place, at an early date, for the purpose of deciding on the amount of land required for the trial of implements on that occasion.

**SPRING LECTURES.**—The Council decided on the following arrangements for the spring lectures to be delivered before the members of the Society at the weekly meetings of the Council :

WEDNESDAY, April 9, noon.—Prof. Simonds, on the diseases and injuries arising to domesticated animals from the presence of parasitical insects infesting their skin.

WEDNESDAY, April 23, noon.—Prof. Way, on the progress of chemical science at home and abroad, in reference to agriculture.

WEDNESDAY, May 14.—Prof. Way's second lecture.

WEDNESDAY, June 18.—Prof. Way's third lecture.

The Council then adjourned to their Weekly Meeting on the 12th of March.

A WEEKLY COUNCIL was held on Wednesday, the 12th of March; present—Mr. Miles, M.P., Vice-President, in the chair; Sir John V. B. Johnstone, Bart., M.P., Mr. Amos, Mr. Raymond Barker, Mr. John Berners, Mr. Burgess, Mr. Burness, Colonel Challoner, Mr. Corbet, Mr. Gadesden, Mr. Brandreth Gibbs, Mr. Jonathan Gray, Rev. L. Vernon Harcourt, Mr. Fisher Hobbs, Mr. Hoskyns, Rev. James Linton, Mr. Kingsmill Key, Mr. Majendie, Mr. Mainwaring Paine, Mr. Parkius, Mr. Ramsay, Mr. Allen Ransome,

Mr. Scott, Mr. Slaney, Professor Way, and Mr. Burch Western. M. Eugène Tisserand, Agricultural Commissioner from the French Government, and Mr. Donovan, the South African traveller, favoured the Council with their attendance. The Baron George de Cotta and Count Sparre were again present.

**CHURNS.**—At a weekly meeting of the Council, on the 24th of April, 1850, Messrs. Burgess and Key submitted their box churn to the inspection of the members, and exhibited its simple and peculiar action in the production of butter from cream. At this meeting, on the 12th of March, Count Sparre favoured the Council with an opportunity of witnessing the performance of Major Stiernsvärd's Swedish centrifugal churn, to which a medal of the first class had been awarded last year at the Paris Exhibition. These two churns were on the present occasion tried before the Council in juxtaposition and under the same circumstances, the same milk and cream being in each case used :—

I.—CHURNING WITH NEW MILK.

Churn.	Milk.	Temperature of milk.	Revolutions per minute.	Persons successively employed at wheel.	Butter produced in	Quantity.
Stiernsvärd . . . . .	5 quarts.	64° F.	120	3	5 m.	7½ oz.
Burgess & Key.	6 quarts.	63° F.	60	2	6 m.	7½ oz.

II.—CHURNING WITH CREAM.

Churn.	Cream.	Temperature of Cream.	Revolutions per minute.	Persons successively employed at wheel.	Butter produced in	Quantity.
Stiernsvärd . . . . .	5 quarts.	60° F.	120	3	12 m.	{ Not in a state to be weighed. } { 3¼ lbs. good butter. }
Burgess & Key.	5 quarts.	60° F.	60	2	14 m. 52 sec.	

The Swedish churn was then tried, with the remaining cream, at less than its usual speed; but in consequence of its not being charged with the exact quantity of cream required in its case, no result was obtained. In the former trial with cream, at the full speed of revolution, the butter on being taken out of the churn was too soft to be weighed; and on being put into cold water it was found too incoherent, without undergoing the regular process of "making," to be weighed.—The churn of Messrs Burgess and Key required little labour to be kept in action, and the butter was almost at once turned out in a fine marketable state. Count Sparre thanked the Council for their kind attention in witnessing the performance of his countryman's churn, and regretted that its performance on that occasion, from circumstances for which he could not account, was not so satisfactory as it had been on former trials.

**HANOVERIAN AGRICULTURE.**—His Royal Highness Prince Albert communicated through the Hon. Colonel

Phipps a present of two agricultural works to the Society, from Dr. C. H. Meyer-Altenburg, of Ebstorf, in the principality of Lüneburg, entitled respectively: "Die Vorzüge der Minorats-Erbfolge in sittlicher, materieller, and national-ökonomischer Hinsicht," and "Die Einführbarkeit der Spaten-Cultur, in der grössern landwirthschaftlicher Betrieb;" the latter work being

the prize essay on spade cultivation of the Royal Hanoverian Agricultural Society at Celle. The Council ordered their best thanks to his Royal Highness Prince Albert, and to the author, for the favour of these presents.

The Council stands adjourned over Passion week, to Wednesday the 26th of March.

### TOP-DRESSINGS—THE EXPERIMENTS OF THE LATE MR. PUSEY.

When on a late occasion we were engaged in some inquiries as to the best top-dressings for our wheat, we were reminded of one considerable friend to agriculture, who was busily engaged in the same important research when death arrested his valuable career. We mean the late Philip Pusey, to whom his cotemporaries are now much more inclined to do justice than when he was labouring in their service. We opine that to his memory something practical should be done. Surely his portrait should grace the Council Chamber in Hanover-square; and still better, some "Pusey Fellowship"—bestowed as a reward to those who, like him, laboured hard for husbandry—might show the gratitude of the members of the Royal Agricultural Society, and evince at the same time that modern farmers are made of different and more enlightened materials than those who denounced poor Jethro Tull because they did not understand his reasoning, and the inventor of the winnowing machine for his wickedness in imitating Heaven's breezes. The services of Pusey, indeed, are hardly yet sufficiently remembered, although the sixteen volumes of the Society's Journals have to some extent chronicled them. The mere list of his valuable papers there to be found—too long to be inserted here, commencing at p. 1 of vol. i.—well evinces the extent of his services and his untiring zeal. In the whole of those 48 communications will be seen his love of practical farming—his inclination to science, and yet his jealousy lest it should be estimated more highly than he deemed its merits deserved—his dislike to controversy, and his care to avoid political discussions. The constancy and perseverance, too, with which he conducted his experiments, we may note in the instance of the very subject which reminded us of him—the top-dressing of cereal crops. We find him in August, 1851, recording his experiments "On Nitrate of Soda as a Top-dressing for Wheat." In the December of the following year, he again recurs to this very practical question; and when treating in a very interesting essay upon the source and supply of cubic petre, and its use in small quantities as a restorative to corn crops, gives

the result of his further trials upon barley, and of the advantage of adding to the cubic petre double its weight of common salt, not exactly as a manure, on the soils he farmed, but as necessary to correct the luxuriant vegetation caused by the nitrate. Three years had elapsed, Philip Pusey had for the second time become President of the Society, when—chiefly through his nerves being shattered by the loss of his wife—death, in July, 1855, terminated his labours. Amongst his papers found after his decease, appeared an unfinished detail of his last experiments upon the question of top-dressing with cubic petre—a detail full of mournful interest to the readers of the last number of the Journal. These, his last trials, were made on wheat in a field of eight acres, which had been previously exhausted by the growth of five white crops in succession. His objects in this case were to try the effect as manures of, 1, nitrogenous substances (as in cubic petre); 2, of phosphorus (as in superphosphate of lime); 3, of potash (which, as it evidently produced, at the rate of 1 cwt. of pearl ash per acre, no effect whatever, its crop was not separately thrashed); and 4, that which constitutes the bulk of dung, its strawy matter, or carbon, this being applied in peat charcoal. The superphosphate and the charcoal were drilled in the autumn with the wheat—the cubic petre, at the rate of 170lbs. per acre, being used as a spring top-dressing. The results per acre are given in the following table in bushels of wheat—the first column showing the produce *without*, and the second giving the produce with, cubic petre:—

	Bush.	Bush.
Soil, simple . . . . .	7 1-3rd	19 3-10ths
4 cwt. of superphosphate . . . . .	7	19 1-3rd
6 cwt. of peat charcoal . . . . .	8 3-4ths	18

In thus reminding our readers—close as we are to the top-dressing season—of what has been long a growing and a profitable practice, we would also bid them "gang warily," both in the *purchase* of, and in carefully watching and *ascertaining* the results, and in drawing the legitimate conclusions

from their trials with those manures. Mr. Pusey's nearly last words may here usefully serve to indicate the tone and moderate spirit with which he was actuated, when he observed—"In conclusion, I am well aware that the only novelty in this experiment consists in negative results, that is, in the inefficacy

of certain chemical elements on the growth of the wheat plants. Still, negative results are not altogether useless in mapping out for future investigators the unexplored fields of science, and may, therefore, when carefully made, be placed on record for their service."

### THE PROGRESS OF ENGLISH AGRICULTURE DURING THE LAST FIFTEEN YEARS.

Declaim as some authorities have done, and may yet, on the apathy, ignorance, and altogether out-of-date character of the English farmer, it is very certain that no other class in the state has, within the last few years, continued to make a more steady or satisfactory advance than this much denounced branch of the community. Through difficulties with which few others were anything like equally tried; with a systematic want of encouragement and attention that none others could complain of; the last whose interest was to be consulted, and the first whose claims were to be passed over, the agriculturist has still done more than hold his own. Within the comparatively short period over which we may here trace back, we have submitted his energies to the greatest uncertainty of return it was possible to conceive. We have forced somewhat rudely upon him an experiment that might be to him the most serious of all alterations. We have told him, in doing so, that it would be no great matter whether he kept his land in cultivation or not. An agitation which, conducted in the tone it was, could scarcely fail to depress him: grave doubts as to the future, which could hardly warrant him in extending his business: the constant snubbing of gentlemen who lived not so much by agriculture as by talking about it, and abusing those who really made it a pursuit:—Let us but sum up all these, and we shall find the practical farmer has had quite his share of trial and trouble within the last fifteen years.

There are many of us a little apt to forget all this. Human nature, happily, is not prone to dwell much on the ills it has overcome. Nevertheless, in making any fair estimate of what the farmer has done within the same period of time, we must not fail to take into account the circumstances under which he has done it. We repeat, these have been anything but favourable. And yet, embarrassed as he has been, the advance of British agriculture has been most signal, and, we had almost said, general. There is not a really sound valuable theory but he has adopted; not a useful invention but he has encouraged; not a discovery but he has put to its

best use. Can Science complain that Practice has neglected her advice? Has Art had any impediment offered to the improvement it has effected? Have not rather the dicta of either been promptly acted on, and the advance of agriculture during the past fifteen years been something to look back upon with honest satisfaction?

Without perhaps altogether intending it, the paper which Mr. Wren Hoskyns lately read to the members of the Society of Arts, is one of the highest compliments that has yet been paid to the English farmer. Its chief omission is some tangible deduction which one might be supposed to draw from the experience of these fifteen years. We should supply it in a very few words. If Science has done much, Agriculture has done much too. They have gone on hand-in-hand—"the twin sisters of the chase," either alike energetic in the pursuit. Let us test this by a little evidence from Mr. Hoskyns' own paper. He names, then, amongst the chief elements of new resource opening on us since 1840—The introduction of artificial manures by the discovery of guano, and the publication of Liebig's works; the establishment of the Royal Agricultural Society, with which he more especially associates the use of machinery; an improved system of drainage; and an increased attention and respect for agricultural literature.

Where amongst all these grand accessories to advancement has the tenant farmer been found wanting or heedless? On the other hand, has he not ably done his duty in developing the uses of each? Admit that he did at first exercise a little necessary caution—and in no occupation is caution more necessary—guano and artificial manures are now and long have been the first of his accredited agents. In a word, he requires more guano than you can supply him with; while, as Mr. Hoskyns says, the advertisements in our own and the other agricultural journals speak plainly enough to his patronage of the manure manufacturers. If further proof were needed, we have it from Mr. Hudson, of Castleacre:—"The three great items in the

farmer's expenditure are—rent, labour, and the purchase of artificial manures." The progress of the Royal Agricultural Society may be left to speak very much for itself. Let us but remember the improved stock the farmers have continued to send into its show-yards; the excellent papers the farmers have contributed to its Journal; and, above all, the extended employment the farmers have given to our agricultural implement makers at the suggestion of this Society. Strange as it may sound, we were told at this very meeting, the least improvement in any business associated with agriculture, within the time defined, has been in the manufacture of implements and machinery! In twenty years there has been little more done than to increase the sale of those already brought out! Mr. Allen Ransome assured his audience of this on Wednesday. The material difference, after all, between the Oxford and the Carlisle shows is, there were more buyers at the latter, and consequently more makers! Must we bow to even so high an authority? Surely not. Still, there is at any rate something to be grateful for. The Royal Agricultural Society has proved a pretty good customer. In other words, the farmers have had the sense to appreciate a good implement as soon as they saw it. But for the Society, in many instances, how long might such an opportunity have been delayed.

Drainage we are inclined to look upon more as the duty of a landlord than a tenant. That it is "coming," there is no question. The comparatively small progress made, so far, is simply a matter of pounds, shillings, and pence. Who is to find the money? The facilities for doing this depend upon and must originate with the Legislature and the landowners. Any blame here is consequently theirs, and not the farmers. The Legislature has, indeed, much to answer for. The chief obstacles Mr. Hoskyns still sees in the way, he generally finds before their door. But, as we said at starting, to none does the Government of this country habitually pay so little attention as to the calls of agriculture—"No history, no statistics, no representative in the law or the state, no board, no minister, no department, 'no nothing'." Really, Mr. Hoskyns, after all this, we may surely come to a resolution on the strength of what you have told us; and this is—that the farmer has done a good deal for himself, "sans board, sans representatives, sans everything."

Need we stay to say how much the farmer now reads, or how often he writes? To name the publications he supports, the new works he orders, or the further editions he awaits? To point to his articles in the Journal, his letters to the papers, his combats with commissioners, or his discussions at

the clubs? We think not. Let us admit, rather, all Mr. Hoskyns tells us so pleasantly, and let us deduce from this—satisfaction for so much, and hope for so much more. With a fair chance, we are bold to say, the farmers of this country will do all they should; and we turn to what they *have* done as some guarantee for what they *will* do.

It would be ungracious to omit mention of the presence of Prince Albert and the palpable interest his Royal Highness took in the proceedings. The vote of thanks to Mr. Hoskyns was put with great taste; while the conclusions the Prince himself arrived at agree very much with those of the gentleman he was complimenting:—"I hope I am not trespassing in asking you, gentlemen, and every one of you in his particular circle, to contribute his mite in obtaining those statistics, which are so much wanted." This request must have sounded oddly enough to those who came direct from another Society, in all the flush of recent triumph—*bodily* resolved to do nothing of the kind.

On Wednesday, March 5, Mr. Chandos Wren Hoskyns read a paper on this subject to members of the Society of Arts, at their rooms in the Adelphi. Prince Albert, the President of the Society, took the chair. His Royal Highness, attended by Lord Torrington and Captain Dudley de Roos, arrived a few minutes before eight o'clock, the room being already filled, there being scarcely a seat vacant for some time previously. Many of those present were no doubt attracted more by the promised visit of their august President than by any especial knowledge or interest in the subject to be considered. There were, however, with these some more directly associated with the pursuits of agriculture: amongst others, Earl Fortescue and Lord Ebrington, M.P.; the Earl of Caithness; Sir Thomas Philips, Bart.; Mr. Evelyn Denison, M.P.; Mr. J. H. Langston, M.P.; Mr. Alcock, M.P.; Mr. T. D. Acland; Colonel Challoner, Mr. A. Hamond; Mr. Fisher Hobbs; Mr. Hudson, of Castleacre; Mr. J. M. Paine; Mr. R. A. Slaney; Mr. B. P. Shearer; Mr. J. J. Mechi; Professor Playfair; Professor Way; Mr. Lawes; Mr. R. Garrett; Mr. J. A. Ransome; Mr. J. Howard, of Bedford; Mr. Moore, of Coleshill; Mr. T. Scott; Mr. J. Bethell; Mr. J. Clutton; Mr. J. Caird; Mr. J. C. Morton; Mr. H. Corbet; Mr. L. Levi; Mr. P. L. Simmonds; Mr. J. Girdwood; Mr. J. H. Gilbert, &c., &c.

His Royal Highness, on taking his seat, at once called upon Mr. Hoskyns, who proceeded to read the following paper:—

A very acute observer of the minor experiences of life has left behind him the remark\* that no subjects are so

\* "Difficile est propriè communia dicere."—HOR.

difficult to handle as those which are of every-day interest, and come under the definition of common property.

A very strong sensation of this truth came over my mind on being honoured by the request of the Council of this Society to undertake a paper on the recent progress of agriculture as one of its evening topics for discussion. There is no branch of our industry to which the remark I have quoted applies so forcibly; and if it were not that the most difficult tasks and the most discouraging results I have ever met with have been from my own soil, I should never have had the courage to undertake the task, nor that deep interest in the topic which makes pleasure vault over difficulty, and enables hope to look discouragement in the face without flinching. In fact, if I am not so much afraid of it as I know I ought to be, it is because, with the everlasting exception of my own farm, my agricultural experiences have not verified that stubbornness and tenacity which we used to hear of; but, on the contrary, every idea or suggestion forced out by the reflections that accompany a difficult practice have generally met with a freedom and openness to conviction which of itself has seemed to me to mark a sort of agricultural era, and has led me to watch with a wider interest its cotemporary development throughout the country.

Yet in doing this, and looking back upon its past history, I cannot deny that the comparative universality I have alluded to, of the topic, has appeared in some degree to lay it open to the adage that "what is everybody's business is nobody's business," diverting the eye of public interest from the landmarks of its progress by the very breadth over which its current extends; whilst other industries and arts, lying in more defined channels, are more readily marked and measured, and every invention and improvement mapped down with a precision, not so easily accorded to the progress of a national industry, which, though representing an invested capital calculated, twenty years ago, at £217,000,000,\* has, for the reason suggested, reached our time with no history, no statistics, no representative in the law or the state, no board, no minister, no department—in fact, as Mrs. Gamp would say, "no nothing." So entirely unnoted and unchronicled is its progress, by the state for the public, or by the public on its own account, that if it were possible for me to recapitulate step by step all the forgotten facts of its history during the present century alone, and lay them succinctly under the eye, I do not believe there is a single branch of art or industry of which the particulars would seem to form a more novel or eventful history, or more suggestive of surprise that they should have been allowed to drop astern, as it were, in the wake of time, and fade from view; and this, too, while presenting facts surely as instructive for reflection, or foresight, as could occupy the attention of the economist or the statesman.

Before enlarging on its more recent progress, it seems desirable to premise some statement of the condition at which it had arrived at the opening of the period under

review. To form a judgment of the growth, one must know the original stature. For this purpose I must hasten over some ground familiar, probably, to many of my hearers.

I need hardly point to the fact that this country, whose average imports are now nearly ten million quarters annually, was, less than a century ago, doing a large trade as an *exporter* of corn to other countries; that later in the last century than the year corresponding with this, a celebrated French economist (M. D'Anguille), quoted afterwards by Arthur Young, said that England could grow corn enough in one year to support herself for four. The twenty years elapsing between 1773 and 1793 were the turning point of our history in this respect; a sort of pivot period, when exports and imports nearly balanced each other, under almost nominal duties inward and outward. A slow but steady inclosure of land, during that interval, began to mark the consumption of a gradually increasing trade and population, of which, however, we have no accurate means of computation or comparison till the opening of the present century. I may just mention that throughout that unique period of twenty years the price of wheat averaged with great steadiness about 45s. per qr. in the money of that day, when rents were from 7s. to 10s. per acre, which afterwards rose to from 30s. to 40s. Thus, in the memory of men now living, the price of a bushel of wheat was two-thirds of the rent of an acre of land, not at a time of any severe pressure of war or scarcity, but under circumstances of comparative equability. It would be difficult to adduce a more striking evidence of the fall in the price of food as compared with the producing area, than the change that has since taken place.

With the year 1793 this period terminated, and, with the war, began also a succession of deficient harvests. No account had been kept of the progress of inclosure during the century; but a Committee of the House of Commons, which sat in 1797, computed the total quantity at about four million acres.

From the commencement of the present century, down to this time, we have a definite record of the progress of inclosure, of population, of corn imported, of prices, and in some measure of the rent of land; and from these we shall be able to form some idea of the point to which our agriculture (using the term in its national or territorial sense) had arrived at the period which forms the starting point of our present inquiry.

Taking it in decenary periods, the account stands as follows:—From 1800 to 1810, the quantity of land enclosed was 1,657,980 acres, the increase of the population of Great Britain 1,506,687, and the quantity of wheat imported 6,009,468 quarters.

In the second decade, from 1810 to 1820, the inclosure was 1,410,930 acres, the further addition to the population 1,978,523, and the wheat imported 4,585,780 quarters.

Thus, during these first twenty years, while upwards of three million acres were brought under the plough, the population was increased about three-and-a-half millions. The rent of land advanced during the war to

\* McCulloch.

at least three times its former amount, measured at least in a depreciated paper currency; but with the close of the war, in the middle of the second decade (1815), the average price of wheat given by those fifteen years, 84s. 9d. a quarter, fell to an average of 78s. 4d. for the last five years of the same period.

These twenty years, therefore, present to our view the phenomenon of immense inclosure of land, under the stimulant of the highest prices of food ever known, except in very early recorded cases of famine, in this country. It would seem to have required no prophet to foretel the collapse that must occur when the stimulating causes were withdrawn, with the increased acreage brought under crop; yet it does not appear that this was the point that drew chief attention in the remedial measures proposed, the tendency of which was rather adverse than favourable to the laying down of land to its original pasture.

From that time (*viz.*, 1820) the whole scene changes, and the most trying period commenced that the business of husbandry has perhaps ever known in this country; the causes of which are now more clearly apparent. Three million of fresh acres, not of the best quality, as the land last brought into cultivation in an old-inhabited country rarely is, and a circulation suddenly contracted to a metallic currency, produced a condition which no prohibition of importations was of any avail to remedy, because the competition lay, in fact, at home, in that increased acreage, held at greatly advanced rents. Nothing but the *steady increase of population*, and the still more rapid increase of trade and capital, could have sustained cultivation at the point it had extended to; nor was this done without considerable reduction of rents, though to nothing like what they had been before the war.

The best expression of this is seen in the strikingly reduced inclosure of the next ten years (from 1820 to 1830), which reached only 340,380 acres, little more than a fifth of the previous rates. During this third decennary period, the advance of the population by 2,161,495 was gradually bringing round the natural remedy to the farmer for those overdoses of inclosure which the war had prescribed; but the reduction of the average price of wheat from 78s. 4d. to 58s. 3d., accompanied by no increase of importation, shows an advanced acreable produce under a strong home competition; the rent of land gradually rising to nearly its previous mark.

The next decennary period (from 1830 to 1840) shows, in spite of the facilities afforded by the General Inclosure Act of 1835, a still reduced and almost trifling addition to the cultivated soil, amounting to only 236,070 acres, less than a sixth of those first named. Still, though there were 2,249,648 more mouths to feed, and the importation, though increased, was not large, the average price again fell to 57s. the quarter, disclosing a still further increased acreable produce against the advancing numbers.

The summary of the whole four decades, then, from the beginning of the century to the year 1840, exhibits, on the one hand, an addition of rather more than three-

and-a-half million acres to the cultivated land, against an increase of nearly six million to the population of Great Britain; whilst the effect of the foreign supplies of wheat did not amount to so much on the average as *three weeks' consumption* in the year, calculated over the whole period.

It may be remembered that at the time when the question of the free admission of foreign corn was in agitation, it was a common prediction that it would have the effect of throwing land out of cultivation. It will be seen from the preceding account of the immense inclosures during the first twenty years of this century, that had the measure taken place at the close of that period, there might have been some ground for the apprehension on the part of the inferior undrained clays, from the fact that the increased produce, shown by the figures I have given, was chiefly drawn from a remarkable cotemporaneous improvement going on, I might almost say discovered, in the cultivation of the *lighter class of soils*. But it is equally evident, from the same figures, that, from 1820 to 1840, not only was this prediction becoming every year less applicable, but, on the contrary, we were beginning to present the opposite condition of a population overtaking the resource of fresh inclosure, and compelled to have recourse to some other means for increasing the produce of the soil.

It is at this period in the history of a country that agriculture begins to assume the most interesting aspect for the purpose of our present inquiry. It is quite obvious that until this pressure arrives, until the tide of population has so risen as to cover that outlying margin which fresh inclosure brings under the plough, the mere routine of practice is not likely to offer much change, or to undergo much intrinsic improvement. As long as the deficiencies of acre No. 1 can be supplied by a mere collateral resort to acre No. 2, the same system will do, the same old implements, the same waste of manure, the same uneconomised apparatus in the field and in the fold, in the barn and in the cowshed, in the dairy and in the piggery, for the simple reason that the second inclosed acre is open to precisely the same process as the first.

But it has been and is the characteristic of our day to have witnessed in this country the comparative exhaustion of this resource. The plough can no longer strike a supplementary furrow in fresh ground; and we have seen, during the fifteen years that have elapsed since 1840, the first fruits of that opening problem, how the old furrow was to be made the arena of an increased produce, when agriculture is thrown back upon its own resources, and compelled, somewhat tardily at first, to examine those resources by the light of its principles.

No doubt this condition may have befallen other countries; perhaps in the Netherlands and in Tuscany, not to name any other, something of the same kind in the exhaustion of territorial resource may have been presented; but certainly never before in any country possessing such characteristics as this in point of capital, inventive power, industry, and skill; and there never perhaps has been a more remarkable exemplification of the proverb—that “all things are double, one against

another"—than in the timely elements that seemed to spring up just when our husbandry had come to need them, more than it was, so to speak, itself aware of.

I allude to four distinct elements of new resource opening to view for the first time, almost simultaneously, about the year 1840, and which, for reasons, that will presently appear, I will state in this order:—First, the introduction of the use of Guano; secondly, the publication in this country of the works of Liebig; thirdly, the establishment of the Royal Agricultural Society of England; and fourthly, the introduction of an improved system of Drainage.

My hearers will perhaps draw rapid mental conclusions on the comparative practical value of these four farmers' friends. No doubt guano is a ready friend, and a quick teacher. But who is there that does not remember the almost universal error that guano brought to light, existing in men's minds as firmly rooted as a first principle, respecting the food of plants and the nature of manures? Who cannot recal the shakes of the head with which 'practical men' pronounced con-dign judgment upon guano, with the hundred 'artificial' that sprang up after it, as being a mere 'stimulant,' forcing a single crop by some sort of magic, and then leaving the ground no richer than before? The very objection was a challenge, which cried out for an answer as plainly as matter could appeal to mind for explanation. The manure was come, "and the man" was needed to answer that challenge; and the man was found in the distinguished Professor, then of Giessen, whose publications, if they did not initiate, at least drew attention to, the important and new-sounding fact that the bulk of a plant being not derived from the soil, the bulkiness of a manure had little to do with its value. Let us give the honour due to our first great teacher, Liebig; though it still remained for us to learn a deeper lesson from a quarter nearer home. But this expression regarding 'artificial' manures, that they were 'mere stimulants,' was an error not in husbandry only, but in physiology. The analogy which the phrase assumed, from animal to vegetable life, was false. You cannot 'stimulate' the growth of a vegetable except by supplying it with its natural food; and whether that be conveyed to it condensed into half a bushel, or disseminated through the mass of a cart-load, the elements it feeds on are identical in either case, and the growth and substance produced are the same. It has pleased Creative Wisdom to adapt certain herbs and minerals to the faculty of producing upon the brain and nervous apparatus of *animal* life sudden and temporary exaltations of power and feeling, to meet the sudden emergencies to which animal life is subject from without; and these exaltations are followed by an equivalent depression. But no such necessity, and consequently no such capacity, exists in vegetable life. LIGHT is, in fact, in their case, the only thing to which the term 'stimulant' can, for want of a truer expression, be applied. Whatever promotes their growth is their *specific food*; and the more readily and completely a manure yields itself wholly up to the crop it is applied to, the more effectually it obeys the farmer's purpose, by the quick return

of his capital, and the production of an ample supply of manure for the coming year, from the consumption of the crop that has been obtained. Mr. Lawes put this truth into few and striking words, when addressing the party assembled last year at the presentation of his testimonial Laboratory. "It is sometimes said," observed he, "that farm-yard manure possesses an advantage over artificial manures in its lasting qualities. This is a fallacy. The lasting qualities of farm-yard manure are (in a commercial sense) not an advantage; for it is getting back your money by instalments instead of getting it all at once. A great deal of your capital is placed in the land, where it lies dormant for a long time; but science can correct that evil by enabling you to put *the right manure in the right place.*"

I have ventured into this point so far, with the view of showing what a happy collateral commentary upon the introduction of guano were the translated works of such a writer as Liebig, who, whatever his after-suffered breach at certain points, when exposed to the formidable battery of such experimentalists as Lawes and Gilbert, had yet probed into nature's secrets, and disclosed the theory of the action of manures, and led to that economy in the *special* application of them to different crops, the effect of which has been to institute a new business and establish a new manufactory in this kingdom. What would our ancestors have said to the manufacture of an *artificial manure*? Thirty years ago, the phrase would have sounded about as rational as the idea of manufacturing a wheat-rick. Yet this is now a large trade ancillary to agriculture, employing thousands of hands, and proceeding upon chemical data that, before the investigations of Professor Liebig, were like an unknown tongue to the agriculturist. The very advertisements of such traders, puffing and exaggerated as they may often be, have had the effect of engrafting into the language of this new agricultural commerce words and phrases which incidentally assert scientific facts, and involve a sort of rough introduction to the meaning and use of chemical terms for those who would, probably, obtain it in no other way.

There is nothing more remarkable than the rapidity with which the smallest morsel of practical truth, however scientific in its nature, becomes snapped up and digested into the language of commerce. The late Charles Buller used laughingly to say that the *Times* advertisements were the best light reading he knew for amusement and instruction, at short notice. I often think of his words when I see the practical doses of chemistry administered to modern husbandry in the weekly advertisement pages of our agricultural periodicals. The revolution, perceptible *to the ear*, that farming has undergone from such causes, strikes me, in truth, as a "great fact," so gradually grown up, that it is only by certain landmarks laid down by accident, or by some of those irresistibly ludicrous mistakes which the use of new terms bring to pass, and stamps upon the memory, that one can measure the change wrought in this particular. What a long-winded sentence it used to take, for instance, to paraphrase and explain the now well-known word ammonia, in order

to rescue that all-essential "chemical" from a certain personality of attribute which its feminine termination inconveniently suggested! and what would now be thought if my friend Mr. Paine, of Farnham, in contrasting the geological wealth under the soil with the fertilizer just named existing in the atmosphere above it—describing, in fact, the fossil dung which he "digs out of the bowels of the harmless earth," and of its antediluvian live stock, should narrowly escape, as Mr. Huxtable did some ten years ago, being reported as introducing *coppery lights* into the dark places of agriculture! I can hardly forgive myself for having dropped an extinguisher on those metallic luminaries, which caught my eye in a version of a speech that chanced unluckily to come across me before publication, with that now well-known mineral superphosphate, the coprolite, thus brilliantly introduced to the farming world. But to return.

The third element of progress I named was the establishment of that powerful engine of agricultural improvement, combining both the stationary and portable character, the Royal Agricultural Society. If I were asked to name, in a breath, what I regarded as the greatest achievement of that important body, I should say that, like Aladdin's lamp, it has summoned up a new race of potent genii, and set them all at work for the farmer. If any one doubts that fact, let him contrast the exhibition of agricultural implements collected by its first meeting, in 1839, at Oxford, where the entries were twenty-two, with that which took place in 1852, at Gloucester, where they amounted to no less than *two thousand and thirty-two*. What would have been thought, only ten or twelve years ago, of the facts disclosed in letters received last year from several of the great firms of English agricultural machine makers, whose engines we were unable, for lack of space, to select for the Paris Exhibition—viz., that, being in the habit of exporting from *one to two hundred agricultural steam engines* a-year to different parts of the continent, the non-appearance of one of their manufacture amongst the prize engines in the French Exhibition would operate unfavourably to them with their foreign connexion? And these, be it noticed, were the "*unsuccessful candidates*," the less brilliantly distinguished amongst the decorated throng of prize and medal-winners. Such a fact speaks volumes. As it was impossible, of course, to accommodate all in the space allowed us, of 4,000 square yards, in the Exhibition, the only thing left was to "bear it in mind," which I have done ever since, and now beg to offer it as a specimen "highly commended."

The fourth element I named was drainage. To this I shall have to return.

I refer to these four prominent agencies, presenting themselves to our review, as contemporaries, not in the tone of an exclusive citation of particular causes, for the causes co-operating with them have been many, much less with the object of stringing upon them a dry chronological narrative of facts. The use of the past does not lie in its catalogues of annual occurrences, little better for our purpose than an almanack or obituary. The

review that gives back life and value to bygone events consists in their analysis for present information and future guidance; and following that vein of thought, the causes I have named as dating their origin about the same period (1840), suggest to my mind the two great heads into which agricultural improvement naturally divides itself, viz., the Chemical and Mechanical. And I confess that when I see the extent to which the use of "chemical manures," so to call them, has been carried, upon the light turnip-husbandry soils—upon those vast Norfolk plains, for instance, which the names of Holkham, and West-acre, and Castle-acre bring to mind; where the manure merchant is the largest landlord, amongst the large, and the heaviest rent his "little bill,"—I cannot help identifying those two divisions I have named, with the two classes of soils which form almost separate codes of agricultural practice in this country, and whose history and experiences are so widely different, viz., the Light Soils and the Clays.

It must be obvious to any one who considers the nature of our climate that the treatment of the heavier and more tenacious soils presents by far the greater difficulty, and one that would be the latest surmounted in the natural progress of labour or invention. But the mechanical disadvantage presented by the clays is not the only one, nor the worst. Few men prefer a difficult task to an easy one. Few men under a weeping sky prefer a soil which is for ever turning rain into a foe, to one where it is not only a friend, but an ever-welcome one. Few men prefer a soil upon which, whatever its boasted mineral superiority, that "beast with golden feet," as the sheep is called in the Persian proverb, gets its four golden extremities screwed into the ground like the table of a ship's cabin. The consequence is, that we realize upon the clays a sort of travesty of the saying of the old poet, who says that "Love alights with ease on wealthy places."\* We find, conversely as it were, that "Wealth alights with love on easy places"—in other words, that every farmer who has capital enough to manage a clay farm in a capital way goes travelling about in search of "a sheep and turnip farm." In the track of capital follows, I fear, the main average of intelligence and skill; settling, like the monks of old, upon the choicest spots, where the struggle with Nature is not only lighter, but spreads its easier task over a *longer* and more leisurely year of *twelve* uninterrupted months. The statistics of the rain-fall of this country, of which happily we *are* in possession, show that the quantity of rain which falls in the west of England is nearly twice as much as in the east; and that the farmers of the midland and west-country clays have thus had another disadvantage to contend with, in their plough-lands; and that the causes which, in the early part of this century, occasioned so much land which formerly was pasture to be broken up for corn in those districts of the kingdom, bequeathed for many years a forced application of the soil not easy to correct without too long-continued a loss for tenant-farming to encounter. Stiffer land, more rain, a shorter working year, less capital, with

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\* Soph. Antig: 582.

its too frequent concomitant, less skill and intelligence, present a formidable array of disadvantages against the heavy soils in taking a comparative review of our means of advancement. To this the one reply has been—Drainage. But if the drainage statistics are only half true which we heard read in this room not many weeks ago, the advanced knowledge of this art has sadly outstripped the practice, and what has been done is little compared with what remains to do. What are two or three millions, or five millions of public money spent in drainage? Would *one hundred* millions drain, at £4 or £5 an acre, all the clay soil, pasture as well as arable, in Great Britain now undrained or badly drained, and the draining of which would pay 10 per cent. and 20 per cent. upon the outlay? What *can* be the cause that, in a country which has sunk nearly its three hundred millions sterling upon railroads that scarcely pay back their 3 per cent. upon the outlay, stints and diverts the free flow of capital from a channel as safe—as certain of return as the arterial blood to the heart and inner sustenance of the nation?

That this is a matter involving serious points of consideration will, I think, appear from the following facts:—

During the seven years from 1840 to 1846, inclusive, our imports of wheat had advanced from less than one million quarters per annum in the previous ten years to very nearly an average of two millions; while from 1846 to the present time, under the development of an unrestricted trade, they have advanced to nearly *five million* quarters per annum, or more than half of the whole imports of foreign grain. Now, inasmuch as the wheat crop occurs only once in the four-course system of the light soils, whilst upon the clays, whether managed upon the six-course system or upon the older three-course shift, it is grown upon a larger oddmark, approaching to the ratio of a *third* instead of a *fourth* of the arable land, and is therefore looked to by the farmer as furnishing the profit which on the light soil is drawn from the wheat and barley crop together (besides a wider range of profits derived from the sheep flock), it seems obvious that the improvement of the clay soils to their utmost extent is the special, I should almost say the only, means left to us for operating in any important degree to maintain the produce of wheat in proportion with our increasing numbers.

The population of Great Britain at the last census in 1851 was twenty-one millions; during the five years ending with that year, the imports of wheat had averaged four-and-a-half million quarters, thus giving about eleven weeks' consumption instead of three weeks, the quantity I named as supplied by importation during the first forty years of the century. But, it must also be borne in mind, that not one quarter of imported corn do we obtain except by its equivalent in additional labour at home, the wages of which will still be mainly spent in the purchase of fresh supplies of food; whilst, therefore, the extra demand is so far cumulative, the home grower can only avail himself of it by meeting it with an extra produce obtained from the soil at the same cost. We have here indeed a challenge to the improvement of

the wheat soils. Drainage first, and some new mechanical aid not yet divulged, are the only resources we can look to with reasonable prospect of success.

It would be beyond all expression interesting, if, on looking back over the last ten years of increasing population, and enormously increased imports, we had any possible means of ascertaining the statistics of our increased home produce; but for this invaluable retrospect we are without the shadow of progressive data. The weekly returns of corn sold, which regulate the averages, are too imperfect and manifestly untrustworthy to be even worth alluding to; and beyond these we have literally nothing approaching to a guide to go by. All we can do is to look at our improved implements of husbandry, and their immensely increased sale, indicated by an annual exhibition augmented a hundredfold—from *twenty to two thousand*—as a subject of indefinite congratulation, which it is out of our power to estimate, as we should like to do, by an annual table of recorded results. This would be a practical and complete test. But instead of this, we are in the position of a manufacturer who shows you the quantity of fresh machinery he has put up, the new inventions he has made or purchased, the extra hands he employs, the increased number of his customers, and the superior economy with which his work is accomplished, but can furnish you with no account whatever of the produce! Whoever wishes for an almost provoking argument for agricultural statistics, let him look at this now irreparable fact. In vain do we point to the almost perfected specimen of the plough from the manufactories of a Ransome, a Howard, a Ball, or a Busby; to Garrett's horse-hoe; to Hornsby's drills; to Bentall's broadshare; to Coleman's cultivator and scarifier; to Chandler's ingenious water-drill; to Crosskill's clod-crusher; to the nearly, but not quite, perfected reaping machine; to our splendid late improvements in steam-driven barn-works, completing at once, and in the compass of a stage-waggon, the whole operation, from the thrashing of the corn to the dropping it into the sack, winnowed and cleaned, and ready for market; recalling, to the above distinguished list, the names of Clayton and Shuttleworth, Exall and Andrewes, Humphries, and others. These names are but a few even of the most prominent among an army of Titans eternally waging peaceful war, whose machines, like a "list of the running horses," at our annual agricultural Olympics, approach each other within the narrowest shades of differing merit. We witness all these fresh accessions of mechanical economy to the various details of husbandry practice, but what their joint comparative effect *has been* upon the national produce we cannot tell, and, what is worse, shall never know. But this we are able to see, that, with the exception of the inimitable clod-crusher, almost every mechanical improvement I have named is, more than at first meets the ear, addressed to light land culture. First, because a great proportion of them are adapted to the larger holdings, more rarely met with on the clays. But let me take, for instance, that useful class of instruments represented by Bentall's and Coleman's scarifiers for *Autumn cultivation of stubbles*, one of the greatest

improvements of modern practice. The farmer of the clays may listen with admiring envy to the virtues of an instrument whose wholesale power of extirpating the annual weed crop bids fair to reduce the bare fallow to its narrowest necessary limits; but in the majority of seasons he dare not use it. The utmost exertion of his team is required to get his ploughing done, and his wheat sown, in the few weeks after harvest when his land is in proper condition for tillage. Had he but an implement that would work *night and day* during those critical six weeks of September and October after his grain is harvested, and before the November fogs and rains set in, he would indeed be a debtor to mechanical skill; but the want of this leaves him often overtaken by the approach of winter, with many a task unfinished that comes with redoubled pressure upon the hurried days of spring-time. I say that this is the specific want upon that large portion of the arable land of this kingdom which the character of our climate renders unfit for winter cultivation. The effect of drainage, even when most perfectly performed, is only comparative. It modifies the evil, but does not cure it. "We have scotch'd the snake, not killed it." Besides, the glazing passage of the plough through a clay in winter time is often detrimental to the operation of the drains; and the elongation of the modern mould-board—one of the features of its improved form—is an elongation of that glazing action, showing that even its very points of excellence and finish for light land culture are, to some extent, negative upon the clays.

Unless the mighty power of steam will befriend us here, I see no loop-hole of escape from the unequal struggle which has long been going on, and is every day widening the distance, in the race between the light soils and the heavy. The resources of the light soils are more readily available, and *followed out through the year*. The turnip crop, fed off by an ample sheep flock, with the collateral advantage of the barley crop, renders their quadrennial wheat-crop a thing of almost attained excellence, whilst, in their case, of far different comparative importance to the place it holds upon the clays.

I do not deny that, when I look at the new and extraordinary powers which the use of guano holds out to the heavy-land farmer, and not guano alone, but every artificial fertiliser which, like it, can be *applied by hand to the growing crop*, leaving no track of horse or wheel, during the wet months of winter, and rendering these naturally rich staples almost independent of "courses" and "shifts," as they are called, I see a power of almost indefinite increase in the wheat crop (for whose enlargement we must look to that quarter), could we only overcome the mechanical difficulty, the two-fold problem of hard work and shorter time, in their preparation. That it can be overcome I do believe; that it is worth the effort, not only of a Company, but of a NATION to overcome it, I foresee. To no other country is the problem presented, under the necessity which enforces and *compels* its consideration and solution upon our large acreage of clays, with such a weeping winter-sky above them, yet such inexhaustible capabilities

within them. The celebrated seven-acre field at Rothamsted, and that perplexing Eden of mystery at Lois Weedon, differing in other aims, agree in this, in showing the unfailing annual produce which a wheat soil, *unmanured*, will give, *according to its tillage*, if kept free from weeds.

What, then, might not be accomplished on the clays, if, to a more specially adapted mechanism of tillage, we should add the revision and partial abrogation of an ancient system of cropping, and covenants for cropping, which the introduction of guano has, to a great extent, rendered obsolete? When we consider the primary rank of the wheat crop as the direct human food, and the peculiar capacity of the Scotch and Irish climates for the production of oats and other inferior grain, evinced in the statistical returns that have appeared of those parts of the United Kingdom, is it not forcibly indicated that no blind adherence to custom, or rotation, should prevent our stronger class of soils being put to their full capacity, being *worked on high-pressure*? Nor can I see why the farmer of the clays should be forbid to do as the manufacturer does—adapt his produce to the market, and turn guano into wheat as fast as the machine he hires will enable him. The idea of "exhaustion of the soil" is a chimera. Let it be only kept free from weeds, the true exhausters of land, and the simple equation remains, that so much applied nitrogen\* will produce so much wheat; and, when that is reaped, and the land is ploughed and cleaned, the same dose of nitrogen will occasion the same result again. If the question be still asked, what has chemistry done for agriculture? let the most original and practical authority in this or any other country on that subject, Mr. Lawes, point to that simple fact which he has discovered and proved. The controversy which has made this important discovery memorable, has had the singular fate of outlasting its field-proof and practical adoption in this country. 'Nitrogen for wheat, and phosphates and sulphates for turnips,' has received the stamp of successful practice, before the battle of theory has been brought to a close. But Chemistry has a fair right to its *Retorts*; and it would be ungrateful to suppose that our debt to Professor Liebig is cancelled or affected by the practical disproof of his opposite theory, whose original announcement, regarded as part of a grand research into the principles of manure, awakened attention and investigation to the point, and has thus conferred such lasting benefit on agriculture, "bringing, with its surcease, success." The experiments, too, of Mr. Thompson and Professor Way, resulting in the discovery of a specific chemical relation between ammonia and the silicates of alumina, have strengthened our practical reliance on an affinity, the importance of which, in the culture of clays, can hardly be overrated. Regarding the atmosphere as the proved storehouse of that element, shown to be the special food of cereal crops, and repeated fresh exposure of the soil

\* The term will, of course, be understood only in its popular, *agricultural*, sense. In strict chemical language a manure can only be regarded as an exciting agent; a cause enabling by its presence the result of certain combinations.

as the surest invitation to its absorption, this subject has become the meeting point in our day of the chemistry and the mechanics of agriculture, reflecting new immortality upon the labours and guiding instincts of Jethro Tull, carried out as they have been to more accurate demonstration by the unvarying personal success of his modern illustrator and improver, whose "word" is every year "in season," with four quarters and a half per acre, on the garden-farm of Lois Weedon, which still produces its annual crop, of wheat without manure, and followers with partial success.

But to return to the mechanical question. I shrink from speaking of myself; but let me not be thought to have slackened upon the great subject of steam culture. I have watched the spread and progress of the question from the time when its very name produced a smile, and have lived to realize a certain prophecy, that the time would quickly come when the reclaim of the thought would be the harder task, amidst the throng of speculators on the subject, each enveloped in the believed originality and perfectibility of his own idea. But it is a task which far exceeds, for its accomplishment, the power of a single hand. If all who nurse ideas upon the subject would but agree to sacrifice a little of that self-reliant individuality with which Nature has gifted inventive minds, and those who pronounce upon the merit of whole catalogues of others' patents would but sink a little of that generality of which she has been equally liberal to minds that are not inventive, this invaluable object would be on the right road to its accomplishment, and England might add that *one-fourth* to its wheat crop which it now purchases abroad. The October temper of a clay soil will not wait while horses are eating and sleeping fourteen hours out of twenty-four; and the substitution of a power that needs no rest at that period when the soil says "Now or never," is not so much a question of economy in money as in *time*. I cannot desert the principle that that particular *mode* of turning the soil peculiar to the plough is the mere relative necessity of a particular tool; that it may be done and is done in other ways; and that it will be done with less expenditure and waste of power, in detail, beginning from the top, as the planing-machine would eat through a board, than by up-heaving the furrow-slice from the bottom, upon the hardened fulcrum of a subsoil already too compact and impervious; and lastly, that by so performing it in detail, the object of *cultivation*, supplementary to that of inversion with the plough, is incidentally comprehended in one operation: a confirmation, to my mind, on the principle of the occult relations of mechanical truth, that the suggestion is a right one. But a union of thought and action, and of all the sinews of enterprise, is the course that indicates itself for the accomplishment of this now widely-cherished object. Could the inauguration of such an union be ever more appropriate than in a place and in a presence which recal to mind the greatest union for the sacred international brotherhood of industry and art that time has yet witnessed?

I turn with natural interest to such a machine as Fowler's Draining Plough, with its happy incidental

adoption of the lately-invented wire-rope, and that most suggestive and satisfactory feature which it embodies in its stationary engine. It is impossible to see this, or, indeed, to read its inventor's practical remarks on steam culture, lately delivered here, without recognising in it the outline of something which may relieve our clay soils as much from the pressure of heavy hoofs and wheels on the surface in the act of cultivation, as his iron-strung necklace of pipes relieves their moisture from below, cutting through the subsoil like a cheese. It is upon the steam-engine in every form—as it gradually wins its way from the fold into the field, and from the one engine that smoked in our trial-yard at Bristol, in 1842, to the *fifty-seven* that stood in a row at Lincoln, waiting to prove their speed and power by Mr. Amos's perfected dynamometer—it is upon this power that we must rest our hopes for that mechanical progress of agriculture which our climate and our clay demands, and our mines of coal and iron, with equal speciality, present the means of.

There is one striking feature which has marked the period we are looking back upon, and has perhaps attracted the notice and interest of the non-agricultural world more than any other, and will hereafter become, perhaps, a distinguishing landmark of the time: I mean those numerous example-farms, which, spreading gradually from one or two isolated instances, and weathering a somewhat rude storm during the range of low prices reaching from 1847 to 1852, are now sufficiently numerous to be said to afford a specimen, almost in every county, of what can be accomplished by a resolute enthusiasm in the adoption and carrying out of all the improved resources which capital and general intelligence can bring to bear. I use the term general intelligence as distinguished from practical farming knowledge, not as at all denying the latter qualification, often in a very high degree accompanying the effort, and always gradually attainable, but because I shall not, I think, misdescribe the object and idea of these really patriotic establishments in speaking of them as the pioneers who, generally speaking, have explored untrodden paths, and whose more prominent labours and results have been perhaps too much mistaken by the public eye for a general movement of the main line and body of our agriculture, to which they form a sort of advanced company. If, however, foreigners express themselves in terms of admiring astonishment at these examples of applied capital and skill, which they are taken, from one to the other, to visit, and from which, as in the case of that careful investigator and flattering eulogist of British agriculture, M. Lavergne, they naturally gather so high an estimate of our general progress, I think they would be not less astonished could they be made aware how large the bulk of farming is, in this country, which is literally unreached by the very echo of what is being done even within a few miles of its boundary fence. The terrible *per contra* that might be shown, if a balance were struck of the *acreable proportion of best farming* against the worst, is a subject that would be surprising to those who judge of the whole contents of the basket by the plump rosy

apples that lie prominently at the top. The fact is that the revolution which has been taking place in the agriculture of this country presents, like the planetary motion from which the term is borrowed, a *centrifugal* as well as *centripetal* action; as the heavier capitalised portion, which has come to regard the soil as a mere arena for investment, has approached nearer to the utmost limit of profitable produce, a large outer circle of those who vainly persist in looking upon a farm as its own capital are clinging on to holdings far beyond their means, and to a system which every invention and every improvement and every addition of capital to agriculture renders more untenable. The condition of the hand-loom weavers after the introduction of the power-loom, more obvious and sudden in its operation and the struggle it presented, was not more hopeless in principle. I fear no honest portrait of the condition of English agriculture could be given which did not include this shadow upon the back-ground. It is the result of an inflexible law, which no philanthropic regret can avail to alter. It is true that capital cannot be applied profitably to agriculture beyond a certain limit, as Mr. Lawes has shown by a simple table that submits it to the eye as plainly as an equation, so far as the growth of cereals is concerned; but the proof lies at a point so high, so far above the ordinary scale of farming, that for the present question it is as though that limit did not exist. Every description of improvement that we hear of with so much welcome can only be of use so far as it tends to lower the cost of production. With every step in that direction the profits of the unimproved farm, of the uncapitalised occupier, are threatened to be left high-and-dry by the sinking level around. No advance of population will come to the aid of this. Occasional high prices, like the present, mask for a while the operation of this law; but in the long run it will be found that the market will not wait for, will not rise to meet the exigencies of a high cost of production. The "mountain will not come to Mahomet." The remains of *the profit* still left to us, lie poised between two elements, and *the miracle* consists in escaping a collapse; viz., between the over-cost of cultivation and the under-level of the market price.

Nor does this apply to the occupier alone. Our system of lauded settlements, like the cropping covenants in farming leases, are the creation of a period when the mere tenantry of a farm was a boon, a sort of grant, by which an old servant or dependant might be pensioned off, when, to use the shortest phrase, the land was its own capital. It now approaches much more to the character of a mill, in which, if the best machinery be not put in, the balance of profit is lost in useless labour and wasteful expense. Reaching the occupier first, it is yet upon the owners of settled property that the impact of this movement ultimately falls. Improvement is not a choice—it is an imperative necessity. We have tried to reach the case by Government grants for drainage; but drainage is a mere first step, implying a succession and round of investment in the soil, in stock, in buildings, in barn-works, in additional hands, even to *furnish* the farm with its

complement of requisite machinery. The annual loss which this country, with all its prominent and boasted agricultural improvement, undergoes by the tied-up hand of ownership, which settled estates, without proper powers for improvement both to owners and trustees, and land held under ecclesiastical leases, with the injurious system of septennial fines on renewal,\* too extensively exhibit, is a subject

\* "AGRICULTURAL IMPROVEMENTS.

"TO THE EDITOR OF THE TIMES.

"SIR,—The comparative state of waste in which many large estates are kept by the want of improvement, is a loss to the country of considerable magnitude, and much good may be done by your exposing such an instance as I am about to relate, and which the experience of many of your readers, who have to deal with church or college estates, will say is not singular.

"The Dean and Chapter of ——— are owners of extensive farms, let to tenants on leases for 21 years, which it has been the custom to renew every seven years at a low rent, on payment of a proportionate fine. The general bad condition of properties so held is notorious. These gentlemen not only set their faces against parish improvements to which they may be asked to contribute—and upon this much may be said—but it will appear they are such enemies to innovation, that they not only refuse to assist their tenants in improving their farms, but will not even give them the opportunity of doing so at their own cost. I am the lessee of a large farm of theirs in Oxfordshire, which might be made very productive, but which is now almost a waste, and I am debarred from improving it by its want of draining; I, therefore, lately applied to the steward to aid me in obtaining a Government loan to drain it, expressing my willingness to pay the whole of the rent-charge during my occupancy of 21 years. It may be necessary to explain that the Government advances money for draining, to be repaid by an annual rent-charge of 6½ per cent. for 22 years; but to obtain this a leaseholder for 21 years must get the lessor to join in their application. One would think that, as I am the lessee at a nominal rent for 21 years, and the money is to be expended in the permanent improvement of the land to at least the extent of the rent-charge, the lessors would be most happy to join in an application by which they would get their land permanently benefited, at the expense of the tenant, to at least the extent of the outlay, namely, about £5 per acre; I say to at least the extent of the outlay, because it is only on condition that the draining shall benefit the land to this extent that the Government advance is to be obtained; and, in addition to the benefit from the draining, the land would further have the advantage of the other improvements which the draining would lead to, but which its present wet state is a bar to. But no! the steward sees the possibility of the dean and chapter having to pay the rent-charge for one year at the end of 21 years, and does not see that by that time the estate will have been benefited by my having made 21 payments out of 22, and that I am desirous of incurring the rent-charge for 21 years, from seeing that the farm must each year be benefited more than the additional rent I undertake to pay, and at the end of my lease the lessors would come into the improved rent my outlay would have created at the cost of one year's payment; and so, by this refusal, I must continue to hold the land in its present unimproved condition for 21 years, and the dean and canon will, at the end of my lease, find their farm remaining in its present comparatively valueless condition, and thus their future representatives are being deprived of the improved rent which their joining in the application would secure them. But perhaps it may be said, seeing the advantage is so great, why do I not lay out the money myself? To this there is this unfortunate objection: Were I to do so, when the time comes, seven years hence, to renew my lease, the same steward would be the first to assess the farm at the improved rent my outlay would have created, and thus I should increase the fine I should have to pay, by my own act; and this, I think, every one in my position would decline doing.

"You are, doubtless, aware that the consumption of corn by this country has now attained to such an amount, that we require the assistance of about 11,000,000 quarters per annum

that sooner or later must find a tongue, and a more efficient and constitutional remedy than Government grants, which struggle with the effect, but leave untouched the causes which they incidentally recognise.

An almost exhausted hour—I fear a quite exhausted patience—warn me to a brief conclusion, while the hydra-headed subject I have merely approached stares me in the face with its numerous and various topics, rising thicker and thicker to my view, still untouched upon. Looking back over the space of my own, however limited, experience, and purposing a sketch, I have encountered a *history*, which no effort at compression could reduce into the narrower space I would gladly prefer. One subject alone I cannot end without a parting word upon, and that shall be as short as those words can be which carry long thoughts. When the cares and difficulties of an intractable soil first drew me from other studies to that of agriculture, what was my dismay to find that *books* were looked upon as the very rocks and shoals ahead to be *avoided*, not consulted, by the home mariner, the plougher of the land, who would escape shipwreck. Strange paradox! Yet of all the prejudices to be surmounted this seemed surely the most difficult, which would cut off every chart of information beyond that which the solitary steerer already possessed, or saw around him, in however wide a latitude. It is still, indeed, true, as so discriminately pointed out by one whose toiling and valued pen has ceased among us—PHILIP PUSEY—that books will not teach practical farming; but neither, as he justly rejoined, are they a substitute for the apprenticeship of daily practice in any other pursuit. Yet, luckily—as no man better than the farmer knows—‘knowledge is no burthen,’ and the boy who whistles at the plough, or the man who holds it, much more the master who directs it, walks none the heavier, observes none the less acutely, draws truth from nature none the less easily, is none the less “in league with the very stones of the field,” though all “Morton’s Cyclopædia,” and Stephens’ “Book of the Farm,” were sublimated into his brain. It would be toiling over a stale furrow to argue the point again; but it is impossible for me to look back over the period I have spoken of, without a keen sense of gratitude to the bold and brilliant pens that have broken through a barrier threatening to immure husbandry within the solitude which is, in truth, its own greatest deprivation, and in some degree inseparable from its steady and industrious pursuit, apart from the civilising thought and intercourse which the ‘city mouse’ enjoys. But who is there whose labour is not cheered and lightened by the words of those who, too far away for personal intercourse, are yet struggling with the same task as himself? Whether the scene lie

of foreign growth; and, this being the case, is the production of the large estates vested in trustees for the public advantage to be kept down in this way by their worse than ignorance of their duty to their tenants, to their successors, and to the nation? I think you will see in this a subject of general importance, and I trust I need not further apologise for troubling you, and asking you to insert this in the *Times*.

“I remain, sir, your obedient servant,

“T. R. B. C.

“Northamptonshire, Jan. 11, 1856.”

among the now too classical fields of Pusey, in Berkshire, or amidst the liqui-fertilised and startled acres that once bore the dry and barren name of Tiptree-heath, in Essex; whether we imbibe long draughts of chemistry from the fountain-head at Rothamsted, in Hertfordshire, or seek a *too short* oblivion, or enjoyment, of ‘Present Prices’ upon the chalky downs of Dorset; or whether, deserting these hospitable homesteads, invited by the active spirit of the times, we start forth upon a general commission, with the “chief among ye taking notes,” “from the Solent up to John o’ Groats;”—do we find that such fireside companions as these diminish our practicality, or invade our winter evenings less usefully and pleasantly than the *Gazette*, or *Express*, or *Messenger*, or other weekly page which brings us tidings of the markets of the world, to which not more the trade than the mind of British Agriculture has been opened? I, at least, for one, must acknowledge that in the steady and progressive change which “Practice with Science” has wrought upon the aspects of English farming during the fifteen years past, the most striking, the most complete of all has been, where I saw most to despair of in the outset,—in its LITERATURE, both practical and scientific (for even in its literature these two classes must co-exist). Did I need a token—a convincing attestation—that in the threefold character of farming, as an ‘Art,’ a ‘Manufacture,’ and a ‘Commerce,’ and, let me add, an *Education*, its interests and progress are *felt* as among the highest objects of the highest minds,—in the spirit, if not the words, of a well-known epigraph, “*Lector, si indicium requiris, circumspice*,”—I might gratefully recognise it here, before my brother-members and the Council of this Society, and the Presiding presence of one who, amidst the absorbing avocations of a life devoted to the promotion of the useful, the beautiful, and the good, has practically earned, and freshly dignified, a name associated of old with the Throne and Royalty of England—the name of a British Farmer.

Mr. J. M. PAINE (of Farnham) said: Having been honoured by the invitation of the Council to speak a few words on the geological resources of agriculture, I will not occupy the time of your Royal Highness and of the meeting by any further prefatory remark. I fear that it must be admitted that geology has not hitherto done much for agriculture, and, although its resources are manifold, that it has not done what it ought and might do. Still some good things have been effected by its means, and more particularly within the fifteen years of the interesting review so ably presented to us by Mr. Hoskyns. But geology, without the aid of chemistry as an interpreter, will not profit the farmer. Chemistry must tell us what to find, or when we have found it what it is, while geology teaches us where to search for it. It has been said, however, in disparagement of such combined investigations, that the knowledge of the constituents of the true geological subsoils is of little value, inasmuch as the greater part of our cultivated fields is composed of superficial drifts, oftentimes differing widely in character from the soils they overlies. That this is usually the case is most true; and still more, these

drifts are generally of so mixed a character, that it is not likely we should obtain much advantage from a chemical knowledge of their ingredients, as such information would not admit of general application. Geology, however, would here serve agriculture in another manner, by teaching the extent, depth, and direction of these diluvial drifts; and this knowledge is often very useful in the drainage of land. I need scarcely remind my present hearers how this has been signally and successfully exemplified in the case of Lord Berners, at Keythorpe. On a much humbler scale I have derived similar benefit in draining some of my own land at Farnham. But I consider that agriculture would ultimately reap many advantages, did it possess an analytical knowledge of the true geological subsoils as they outcrop in various parts. From my own experience, I can confidently state that the soil of one field is frequently the most appropriate manure for another. And it sometimes happens that examinations of this nature lead to the discovery of beds of peculiar substances, which act as specific manures, and will bear the expense of distant carriage. Such discoveries have been made; and I think there are sufficient grounds for indulging in the sanguine hope that a more diligent research would be rewarded both by pecuniary and scientific success. In confirmation of this opinion, I need only remind you of the several sources of phosphates which geology has already developed, and many of which agriculture has wisely appropriated to its use. It is sufficient merely to name the mineral phosphate of lime which Dr. Daubeny introduced to our notice from Estremadura—a name about as happily chosen as the “coppery lights” applied to my friend Mr. Huxtable; the so-called coprolites from Suffolk; the phosphatic nodules from Cambridgeshire; the fossils and nodules of the upper and lower green sand, from Farnham, and the base of the chalk hills generally; the mineral phosphate from New Jersey; and lastly, and perhaps the most important, a very pure *apatite* recently imported from Norway by Mr. Lawes, from which superphosphate of a most superior quality is now manufactured, containing from 30 to 40 per cent. of the soluble phosphate of lime. These discoveries are due to geology, and I think they ought to stimulate us to undertake more complete investigations; and I confess that I should heartily rejoice to see set on foot a carefully-conducted chemico-geological examination of all the subsoils of this kingdom. I have endeavoured to commence this task, so far as it relates to one well-known geological division—I mean the chalk; and having obtained the eminent chemical assistance of Professor Way, I have hitherto been well rewarded for my pains. The Royal Agricultural Society, I am persuaded, would willingly assist gentlemen in kindred investigations; and if this recommendation were systematically carried out, I believe very valuable results would ensue. Might we not hope to discover in our granite districts rich veins of phosphate of lime like those I have just mentioned? For phosphoric acid is of frequent occurrence in these rocks; it is, I imagine, one of the primeval existencies of our globe, as it in fact constitutes a large proportion of that, “dust of the earth” out of

which man and all other animals were created. Geology, too, with the help of chemistry, has shown us on what lands to grow specific crops. It is well known that the peculiar botany of any district is chiefly determined by its geology. So also does it indicate the description of agricultural crop to be cultivated with profit and advantage. I may perhaps be permitted to illustrate this remark by reference to the growth of the hop, a perennial plant requiring the richest soil. Until I brought geology and chemistry to bear on some of my own fields, they did not pay me 5s. per acre rent. I compared their soils, both geologically and chemically, with hop grounds worth £20 per acre, and I found them alike in geological position and chemical analysis. There now remained only one obstacle to their being placed in a very different category of value; that impediment was water. The land was deeply drained, and the fields became worth £10 per acre. My attention, as I stated just now, has been more specifically directed to the chalk formation, as my land affords peculiar facilities for its examination. In a section of about two miles, running from S.E. to N.W., I obtain every out-crop, from the low green sand to the plastic clay. These have been examined, as it were, step by step, and we found beds of phosphate of lime, clay with a large per-centage of potash, thick beds of the soluble or gelatinous silica, and carbonate of lime in every variety. Some of these carbonates of lime strata furnish an excellent marl, as they are intimately commingled with alumina, potash, silica, and phosphoric acid. This marl is applied to other parts of the farm whenever opportunities offer for its transit. It is a marl of this description in the lower chalk which has been so abundantly used from time immemorial throughout the south of England, and probably to a greater extent formerly than at the present time, if we may judge from the immense old marl pits of this district. Here, as in many similar instances, practice derived from experience first indicated a rich and peculiar soil, the real value of which was not known until science told us what were its ingredients, and their fitting application. The soluble silica beds of the chalk form a very remarkable soil. On my farm at Farnham they are about 100 feet thick, and from the lower to the upper member of the series the per-centage of the soluble silica ranges from 20 to 76. This substance has not received much attention hitherto either from agriculturists or chemists; indeed prior to this discovery soluble silica was far too costly an article to be employed for agricultural purposes. If it be useful, it can now be procured at a very trifling expense. I use large quantities of it on my farm, and immense quantities are used in the neighbourhood. The soft parts are spread like mud over the fields, or employed as a covering to, and as a bottom to dung-heaps, and also to spread over the bottom of the fold-yards and farm-yards. The hard parts are dried and ground up into a fine powder. This is used to absorb the urine in the tanks, and to litter up the fattening pigs, as a substitute for straw. It thus forms an excellent drill-manure for root crops. As an absorbent and deodoriser it is equal to charcoal dust; and I need scarcely add, that it is much cheaper. Possibly the best way of using

this substance is to convert it into silicate of lime, which is very easily effected. The methods are fully described by Mr. Way in Vol. XIV. of the *Journal of the Royal Agricultural Society*. At Binsted and Selborne, in Hampshire, lime is largely employed on the out-croppings of these silica soils. The farmers there speak highly in praise of its application, while on the gault soils below they say that lime does very little good. I formerly laughed at them for what I considered their misapplication of lime; but the farmers were right, for the gault there contains much carbonate and sulphate of lime, while the silica rock, which resembles a piece of impure chalk, contains scarcely a trace of lime. Here, again, practice was in advance of agricultural science. I will not detain your Royal Highness and the meeting by any further remarks, observing only in conclusion, that the earth furnishes supplies of organic as well as inorganic manures, and that our coal-fields might furnish us with an abundance of ammonia, now wasted in the ordinary consumption of coals, and that many of our soils contain latent stores of this valuable article; and if chemists would set their brains to work, and teach us how to avail ourselves of these riches, it would indeed prove a great boon not only to farmers, but to the community at large.

Mr. J. B. LAWES (of Rothampstead) said: The period which Mr. Hoskyns has selected as the starting point in his most interesting and instructive paper just read to us, although comprising so small a portion of time in the history of British agriculture, refers back to a period sufficiently remote to include the whole history of the chemistry of agriculture, so far as it relates to this country. Whatever might have been known or practised in other countries before that period, certainly neither attracted the attention nor influenced the practice of the agriculturists of Great Britain. It is to an illustrious countryman of His Royal Highness, to Baron Liebig alone, that is due the merit of having effectively roused the attention of British farmers to the importance of applying chemical science to advance the practice of their art. Although fifteen years have elapsed since the first work of Baron Liebig was published, the foundation of this new science can hardly yet be said to be laid, or the first truths admitted without dispute. When we consider the wide distinction which exists between the man of science and the practical farmer, and the very different points of view from which they would regard the use of this new science, it could hardly be expected but that serious disagreements should arise between them. The question of profit and loss naturally enters largely into all the views and considerations of the practical farmer, while the scientific man entirely disregards it. To obtain the same increase in vegetation, by the employment of a few pounds of white crystallised salts, as would be produced by a cart-load of dung, is to the man of science a phenomenon of great interest, irrespective of any question of cost; but to recommend this salt to be used for agricultural purposes, would depend upon economical questions, having no connection with science. For want of practical knowledge, the man of science, although correct in his

principles, has often erred in the application of these principles to practice. For want of scientific knowledge the agriculturist has expected from the teachers of science rules to guide and improve his practice, which the science of the day was quite incapable of supplying; hence the farmer is inclined to regard the man of science as visionary, theoretical, and unpractical; while the man of science accuses the farmer of indifference to science, or applying to it only to furnish him with recipes to enable him to fill his pockets more rapidly. It has of late years been too much the custom to explain everything connected with the practice of agriculture by means of chemistry alone. I would, however, venture to claim for agriculture the rank of an independent science, in close alliance, it is true, with chemistry, botany, physiology, and some other sciences; but still distinct from them all. Its truths can alone be investigated and explained by experiments conducted in the field, with all the aids and refinements which modern science affords. It is a science abounding in difficulties, and yielding its fruits but sparingly to those who cultivate it with the greatest assiduity. Although it would not be easy, or even possible, to point out distinctly in what way science has advanced the practice of agriculture from year to year, there is evidence of a very marked progress, if we compare two periods sufficiently remote. When we consider that, ten years ago, it was thought that every description of soil would require special manures to suit them, it is no small addition to our stock of knowledge to have ascertained with certainty that when once we know the most suitable manure for any particular crop, it will be applicable for all soils. The farmer who leaves the light soil of Norfolk to cultivate the heavy clay of Warwickshire, requires no analysis of his soil to tell him that the same artificial manure which he used successfully to grow his wheat on one soil will be equally applicable to the other. I would go further, and say that the same rule would hold good in any part of the world where wheat is cultivated. Ten years ago, nothing certain was known of the value of manures in connection with their chemical composition; at the present time, there are many in this room who would be willing to accept the chemical composition of any manure as the measure of its value. If time permitted, I could point out to you that more correct views are also entertained on the subject of feeding animals; that we begin to know that a rotation of crops is not a necessity, but merely an economical process for obtaining certain ingredients essential to our corn crops. With increased knowledge, the necessity for any fixed routine will be no longer apparent, and the farmer will be free to pursue that system which freedom of competition and fluctuation in price render necessary to enable him to realize the full reward for his skill and capital.

Mr. J. A. RANSOME (of Ipswich) said: I have listened with great pleasure to the interesting paper read by Mr. Hoskyns; and in venturing to make a few remarks on that portion of it which is more immediately connected with my vocation as an implement maker, I am desirous to lay before the meeting such facts as will enable it to

form a just estimate of the comparative state of agricultural mechanics during the period referred to by Mr. Hoskyns. I do not entirely agree with Mr. Hoskyns as to the amount of improvement which has taken place, within the limited time he has assumed, as coincident with the establishment of the Royal Agricultural Society, nor am I prepared to go the full length of attributing the present state of agricultural mechanics so exclusively to the influence of that body. It is very far from my desire to depreciate the workings of that Society, or in the slightest degree to detract from the vast amount of good it has conferred on the cause of agriculture generally, and to that portion which involves its mechanics in particular; but I should hardly do justice to those who for many years before the establishment of that Society were contributors to the advancement of agriculture through the medium of its mechanics, if I did not avail myself of this opportunity to vindicate the position which they had attained long antecedent to the establishment of the Royal Agricultural Society. The first meeting of that Society at Oxford could hardly be supposed to afford very fair evidence of the state of agricultural mechanics at that period; the Society was little known—its rules less so, its motives doubted; and many held back from contributing to its exhibitions, in order that they might see what others would do, and how they were likely to fare. The meeting was limited certainly; but, limited as it was, at this meeting and the one succeeding, one or more good specimens of all the best implements then in general use were exhibited; and if I might be allowed to lay before you the names and character of the instruments then in use and there exhibited, you will be enabled to judge to what state agricultural mechanics had at that date arrived. There were drills by Garrett, Hornsby, and Smith; ploughs by Ransome, Howard, and Barrett; zig-zag harrows by Howard; portable thrashing machines by Ransome, Garrett, Barrett and Exall, and Hart; winnowing machines by Cooch and Hornsby; clod crushers by Crosskill; turnip cutters by Gardner; haymaking machines by Wedlake; chaff engines of great variety by Cornes, Ransome, Garrett, Richmond and Co., and many others; and rollers of every description. It is no less a fact, that all these implements remain at the present day standard implements, little if at all altered in their principles, though perhaps generally improved in their details. In the subsequent period many new inventions have from time to time made their appearance at the Society's exhibitions, many crudities, and many novelties. Most of these have had their short hour of fame and trial, and eventually have disappeared for ever. Amongst those introduced during the last fifteen years, which have since proved their title to be added to the original list of standard implements, the following stand as the most prominent:—Garrett's lever horse-hoes; Grant's, Smith's, and Howard's lever horse-rakes; Bentall's broad share plough; Bushe's, Baxter's, and Phillips's root pulpers; Biddell's bean cutter; and many improvements and varieties of chaff-cutters and of mills. These, with those mentioned as existing previously to the Oxford meeting, may be considered as mainly com-

prising the class of standard implements of the present day. I have not included in this list the reaping machine, upon which much ingenuity and cost has been expended to adapt it to the requirements of this country, by several makers, because it has not, as yet, assumed the character of a standard implement; but, I think, another season will not pass without at least one specimen which may secure for it that position. Having now, I trust with all becoming modesty, shown the position to which agricultural mechanics had attained both prior to 1839 and since, I will endeavour to explain the causes to which the present general use of the standard implements is mainly attributable. 1st. The improvements in all machinery and tools for working in wood and iron, producing a superior style of workmanship at ordinary cost. 2nd. To the facility of transit afforded by railways. 3rd. To the necessity of economising all farming costs by means of every labour-saving machine; and last, not least, to the opportunities afforded by the itinerant annual exhibitions of the Royal Agricultural Society, for general observation, test, and comparison of all the best implements throughout the length and breadth of the land. This has enabled the makers of implements in every district to profit by the examples of the best implements of all other districts, and the standard being selected as one of the highest class, the best implements have become more generally diffused; the advantage obtained to the agricultural community arising less from the introduction of new inventions, than from the general adoption throughout the country of the best implements of every district, with a general improvement in the style and quality of workmanship. Hitherto, I have only spoken of the instruments as ordinarily used by horse or hand-power; but the introduction of steam-power in its portable form has opened up a wide field for the ingenuity and enterprise of the manufacturer; inasmuch as, by its aid, machines of a much more comprehensive character, which are beyond the limits of ordinary horse-power, can be constructed; and in this direction the energy and the ability of the agricultural machine-manufacturer have been largely called into action, and with most satisfactory results, especially in relation to the steam-engine itself, and to the thrashing-machine, which combines, with the merely thrashing operation of beating out the corn, the further stages of separation from offal and the production of a perfect sample fit for market. Important, however, as has been the application of steam power, whether to fixed or portable machinery, greatly more important would it be if it could be brought to bear upon the tillage of the soil. All honour to the inventor of the steam tile-draining machine, who by his persevering exertions has at last effected the first stage of this desirable object. But a very much wider field remains yet to be accomplished in the tillage of land by steam; and honour to all those who have attempted the further stages. The mode in which it is to be accomplished is at present only seen in the distance. There are many and various views as to the best means of effecting it, but certain it is that the experiment is too great for any one individual—too large for individual enterprise. The

cost of inventions, of experiments, of trials, and of errors, is enough to drain the deepest purse, and break the strongest heart. I have no hesitation in saying, that if the object is to be accomplished within a reasonable time, as it is a matter that would result in great national good, it should be made a matter of national cost. The funds, I believe, are all that is wanting to bring about some arrangement which will have a practical effect. Until some such general fund is obtained, we shall go on hoping, each hope to end in disappointment. This is not the time nor the place to enter upon the plan, but I should be most happy to confer with any one on the subject, and throw my information into the general fund for the accomplishment of such a desirable end.

Mr. JOHN HUDSON (of Castle Acre) spoke as follows:—I have been requested to speak a few words upon the subject of the progress of Practical Farming during the last fifteen years. The scientific gentlemen who have preceded me this evening have entered so fully into the subject, that they have left me an almost barren field to work upon. I must, therefore, crave your Royal Highness's indulgence to be allowed to allude to the early part of the present century, when Thomas William Coke, the late Earl of Leicester, adopted and recommended the improved system of practical agriculture. At that time the county of Norfolk consisted of large tracts of wild heaths and rabbit warrens. Rye was extensively grown, but very little wheat was produced there. Mr. Coke recommended the farmers to cultivate the turnip crop upon an extended scale, and it was at that time the drill superseded the broadcast method of sowing both corn and turnips. Mr. Coke spent large sums of money in building convenient farm premises for his tenants, and encouraged them to improve their farms by granting them 21 years' leases, with liberal covenants. And it was his pleasure, at the latter part of his life, to give his improving tenants the best tenant-right they could have—a renewal of their leases four years before the expiration of the term, and that without taking undue advantage of the outlay of the tenants' capital. Up to 1821, he held annual meetings at Holkham, in the month of July, where he gathered around him all the scientific and practical experience he could obtain at that time. I have there seen Sir H. Davy, Sir Jos. Banks, Dr. Rigby, and the only agricultural chemist of the day, Mr. Grissenthwaite. They thought there was something "looming in the future," but it remained to the period named on the paper for discussion this evening, for the further development which chemical science has brought to bear upon agriculture. It is to Liebig, Lawes, Paine, Way, and others, that we are indebted for the discovery of the method of converting the hard bone into food for the infant plant of our root crop. In my early days, the turnip crop was a most uncertain one to obtain; but now that our chemists have made these important discoveries, it is almost reduced to a certainty. It was about fifteen years ago that the Royal Agricultural Society of England was formed, under the auspices of his Grace the Duke of Richmond, and the late Earl Spencer, Mr. Pusey, and Mr. Handley. That Society has offered prizes for improved implements, as well as

improved breeds of cattle, sheep, horses, &c., and held out inducements for chemical science to aid practical farming. When I first put my hand to the plough, it was a very primitive implement, and performed its work imperfectly. Ransome and Howard have improved our ploughs; Garrett has improved Cook's drill and the inverted horse-hoe, which was invented by Francis Blaikie in 1816, and which I first used on my farm at Castle-Acre in 1823. These improved implements have very much tended to the progress of practical farming during the last fifteen years. Ransome, Clayton and Shuttleworth, Hornsby, Tuxford, and others, have brought out the steam thrashing machines. These have greatly lessened the cost of production. The legislature of this country has also done much towards the progress of agriculture. Some twenty years since, the alteration of the tithe-law took place, and labour was set free by the repeal of the old poor-law, without which improved practical farming could not have progressed as it has done. The people require cheap food. This can only be obtained by lessening the cost of its production. The three great items in the farmer's expenditure are rent, labour, and the purchase of artificial manures. As the area of these islands cannot be extended, we must not expect the first to be much decreased, and the labourer is not too well paid. It appears to me that the best way to reduce the cost of agricultural production is to endeavour to obtain the manures at less cost. We are told that many of the uninhabited islands in the Pacific abound in fertilizing matter; and could it be supplied at about half the present price, it might enable the farmers of England to raise an abundant supply of food, both bread corn and meat, for the increasing population. I trust the farmers of England will not be considered drones in the busy hive of industry, as, in my opinion, they have endeavoured to keep pace with the advancement of the manufacturing and commercial community of these realms.

H.R.H. THE PRESIDENT said: I feel that I am only carrying out your wishes in proposing to you that we should return our best thanks to Mr. Hoskyns for the very valuable paper which he has read to us. He has given us a very accurate and succinct history of the progress of agriculture, in that peculiarly agreeable and epigrammatic style which is familiar to every one who has read his amusing and valuable little work the "Chronicles of a Clay Farm." He has not only interested and amused us for the hour, but he has given us much to think on; and if he has taught any one lesson of greater importance than another, it is that the future progress of agriculture will mainly depend upon the close and intimate union and the hearty co-operation of science, art, manufactures, and commerce; and that the primary condition of a successful progress for the future will be the obtaining of accurate and complete agricultural statistics. And here I hope I am not trespassing in asking you, gentlemen, and every one of you, in his particular circle, to contribute his mite in obtaining those statistics which are so much wanted, and which Government is now trying to collect. I merely repeat our thanks to Mr. Hoskyns for his interesting paper.

Mr. Hoskyns briefly replied.

## THE ADVANTAGE TO THE FARMER OF A DECIMAL SYSTEM OF ACCOUNTS.

It may be asked, perhaps, what difference it can make to the farmer whether we have a decimal system of accounts of money and of weights and measures or not. The reply is obvious. Such a system would economise time, and by saving time economise money. It has been calculated by those most competent to form the calculation, that such a system would save 50 per cent. of the time expended at school in learning "tables" and being initiated in the mysteries of compound arithmetic, to say nothing of the floggings to which these studies give birth. Now the demands of modern agriculture on the farmer for scientific knowledge are so great that it scarcely seems possible for him to acquire even a moderate knowledge of the whole of them: the time thus saved from learning compound arithmetic might be devoted to the acquirement of that knowledge.

The decimal system, again, would facilitate calculations in actual business—so all the men of business examined before the Committee on the decimal system testify. And modern farming requires such numerous and exact calculations, that in the simplification of this work no class is more deeply interested than the cultivators of the soil. To the working classes, too, who have little time for acquiring knowledge, whatever tends to simplify the intricacies of such calculations as they have occasion to make respecting their wages and expenditure must be an advantage. In this respect it would place them on a level with the more highly educated. To none is this of more importance than to the agricultural labourer, who works so extensively by the linear rod or the acre. For these reasons we wish to make our agricultural readers familiar with what is in reality an easy subject. We shall on the present occasion endeavour to direct attention to the superiority of the mode of dividing our coinage decimally, which we advocate, over those methods which have been proposed by some as substitutes for it. Be it remembered that the majority of the witnesses who were examined before the Committee, whether mercantile, political, or scientific, were in favour of that method. Two others, however, have been proposed in opposition to it.

The advocates of one of these rival systems consider the penny of so much importance to the labouring classes that they would retain it unaltered, and make our higher denominations, whether of accounts or of coin, tenfold multiples of it. They would have,

for instance, a cent, containing ten farthings (or  $2\frac{1}{2}$ d. of our present money); a florin, or coin of some other denomination, containing ten cents (2s. 1d.); and a pound containing ten florins (or £1 0s. 10d. of our present money). To the poorest classes, however, the retaining of the penny at its present value is not an object of importance. Its value to them consists in the quantity which it will purchase of the most important articles of daily consumption of which they have need; and in those—bread, for instance—the quantity which they obtain for a penny fluctuates more from week to week and from year to year, from fluctuations in supply, than would be occasioned by the amount of change in the value of the two lowest denominations of our coin which we advocate, in order to preserve unchanged that important unit of account the pound sterling, which enters into all our permanent contracts. If we ascend a little higher in the scale, to the weekly wages of the labourer, we shall find that he estimates them not by pence, but by shillings; and he will very soon see, that five or six florins, as the case may be, is the equivalent of ten or twelve shillings a week, if he has not found that out already from the introduction of the florin into our coinage. The issue of that denomination of coin has therefore been attended with great advantage, notwithstanding the inconvenience arising from the joint circulation of two coins at so nearly the same value as the florin and the half-crown. It is much to be desired, for these reasons, that the coinage of pieces of the value of one-tenth and one-hundredth of the florin had taught a similar lesson; and the sooner they are issued the better.

It has been well observed that the circulation of decimal divisions of the pound would be the best means of teaching the masses decimal arithmetic. That done, a change to a complete decimal system of accounts and of money would be a work of little difficulty.

The workman and small shopkeeper can easily connect the florin in their ideas with a shilling; but they would be seriously inconvenienced if they had to think of a coin different in value from a shilling. In commerce, again, and in the corn-market, it is usual to quote prices in shillings for quantities which amount to pounds; and these would be as easily stated in half the number of florins or tenths of a pound, and tenths of florins, as in shillings and pence. On the other hand, these quotations would be entirely deranged

by the introduction of a new coin of the value of 2s. 1d.; and it must be obvious that the decimal division of the pound would afford greater facilities and a wider range of quotations. By the plan which we advocate, in common with the majority of those anxious for the establishment of a decimal system, the shilling, while ceasing to be a money of account, would continue to circulate, and might be used both in thought and speech as at present.

The most plausible objection against the alteration of the penny is the alteration which it would introduce into such payments as tolls on turnpike-roads, railways, canals, rates of postage, which are now fixed by Act of Parliament in pence and farthings. Satisfactory modes, however, of adjusting these difficulties were proposed in the Committee of the House of Commons; and no one person who would be affected by this change offered any proof that it is of insuperable difficulty.

Another scheme brought forward in opposition to the pound as the unit, starts with a new farthing ten to the penny; the moneys of account to be the penny, a franc of ten pence, and a ten-franc piece of the value of 8s. 4d. Such a change, while it would require an immense amount of new coinage, and that of the most expensive kind, would possess serious disadvantages, both as regards money of account and money of circulation. Its highest denomination, the franc, would require too long an array of figures to express the large sums which our vast financial and commercial transactions require. As a money of circulation, the ten-franc piece, worth 8s. 4d. of our present coinage, would be too small for a gold coin, and too large for one of silver. Even our half-sovereigns are found inconvenient, liable to loss from their smallness, more liable to abrasion than the sovereign, and more expensive to coin. As a silver coin the five-shilling pieces are disliked because of their large size, and scarcely circulate. We have said that a gold coin of the value of 8s. 4d. would be expensive to coin. It would cost as much as a sovereign, and the loss from abrasion would be four times greater. This arises partly from the extent of surface, proportioned to their weight, and partly from the greater number of them required to pay a given amount.

We have already described the different systems which have been proposed for decimalizing our coins and accounts, in opposition to that which we advocate, in common with the great majority of those who desire a decimal system—of retaining the pound as the unit, and dividing it decimally. Let us now examine the rate of progress which has been made in the question. The decimal system was first brought under the consideration of Parliament by Sir John Wrottesley,

father of the present Lord Wrottesley, in 1824: more than thirty years ago. He proposed that the pound should be the unit, and should be divided into 1,000 farthings. So little encouragement did the proposal receive, that he did not press his motion to a division. There the question rested for fourteen years. In 1838 Lord Monteagle, as Chancellor of the Exchequer, appointed a Royal Commission to inquire into the subject. Their instructions were only to inquire into the advantages of a decimal system of weights and measures; but in their report, in 1841, they remarked that a decimal arrangement of the coinage was so connected with that of weights and measures that they could not refrain from stating that one would be incomplete without the other; and that their report would be unsatisfactory, if they did not recommend that the coin should be at once decimalized, dividing the pound sterling into 1,000 parts. In 1843, a Commission for the same object as that of 1841 was appointed. Their report confirmed all that had been advanced in the previous Commission of 1841, and was equally strong as to the necessity of decimalizing the coin. In 1847, Sir John Bowring, on the strength of that report, induced the Government to make a commencement, by coining the florin, or tenth of a pound, at present in circulation.

After the publication of the report, the Chairman, Mr. Brown, had repeated interviews with the Chancellor of the Exchequer and the President of the Board of Trade; and finding the Government hesitating, and pleading the necessity of first instructing the people on the subject, a meeting was convened at the London Tavern, in June, 1854, consisting of merchants, bankers, traders, and scientific men anxious to obtain an immediate issue of the required decimal coins, and the early consideration of a uniform system of decimal weights and measures. Here the matter rests for the present. We think most persons will agree that the question has been sufficiently discussed, and that the time for action has come, by the issue of coins of the value of tenths and hundredths of a florin.

The amount of new coin requisite to commence the system would be but small. Our present farthing might circulate as the mil, and all that would be required is a new silver coin, equal to one-tenth of the florin. If the new coins were put into circulation, no working man would complain if the old pence were declared of equal value with the new—that is, were to exchange for five, instead of four farthings, although the farthing itself were to be worth the twenty-fifth part of a farthing less than at present. The difficulty as to prices of pennyworths [is merely imaginary. None of the

changes in the prices of articles of daily consumption purchased by the poor, arising from the ordinary fluctuations of supply and demand, could be settled for, in quantities of from a quarter of a pound to a quarter of an ounce, by any existing coin. Competition among dealers, compensation by an advance on one article for a reduction on another, and the turn of the scale, enable the dealers in such articles to adjust a balance such as no division of coins could meet. A week would not elapse before every child in the family of every working man would know how much more of coffee, sugar, milk, &c., they ought to have for a coin worth five farthings than for one worth four farthings.

How readily such changes may be made was exemplified when the currency of Ireland was assimilated to that of England, and that among an excitable people, prone to have recourse to violent measures for the redress of real or imaginary wrongs. The Government thought the change desirable; they adopted it without consulting the masses on the subject, and the masses readily acquiesced. The change to a decimal system has been made in other countries; and in none more readily adopted than in America and Switzerland, where universal suffrage prevails. We boast, and truly, of being the first commercial country in the world. Why, then, should we be behind the rest of the world as regards the adoption of a decimal system? France, Spain, Portugal, Madeira, Bermuda, the United States, the South American Republics, Sardinia, and Poland, have all decimal monies. Even Rome and Russia, which we consider to be the least progressive among the nations, are in advance of us in this respect! Russia adheres to the "old style" in the computation of time, simply because the reform of the calendar originated at Rome. For the same sage reason we adhered to it longer than any other nation. Semi-barbarous Russia has adopted a decimal system;

but civilised, enlightened, and commercial England has not!

On a former occasion we gave an example of the manner in which an account-book for the decimal system might be ruled with only two columns; one for the pounds, and another for its three decimal subdivisions. Our old forms of account-book might, however, be used by those who deem them more convenient. The column now used for shillings being retained for florins and cents, and the mils being written in the pence column.

The difficulties of the decimal point have also been conjured up as an argument against the decimal system. It presents, however, no real difficulty. The rules for placing it, in the results of processes of addition, multiplication, subtraction, and division are simple, easily remembered, and their application is only difficult from want of practice. They are insignificant compared with the complications of compound arithmetic.

It has been said that a working man would be puzzled if told that .01 was the proper way of representing a one-hundredth part. It has been replied that a person ignorant of decimal arithmetic, if told that 22 is the proper way of writing twenty-two, would wonder what had become of "two-and-two make four." The mode of writing decimal parts, however, complained of as so abstruse, appears to have been the mode of writing pounds, shillings, and pence a little more than a century ago; for what reason is not very apparent. There is before us a little work, printed in 1726, called "The Gentleman Farmer; written by a person of honour in the county of Norfolk," in which are sundry calculations "shewing how a younger brother shall be able to spend more than his elder brother, who has more than a thousand a-year." This wonderful power is to be conferred by cultivating flax *scarots* and breeding fresh-water fish in ponds; and all the calculations in this work are written as in the following example:—£02.06.03.

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### THE LAND-AGENT.

Modern agriculture cannot flourish satisfactorily, or be carried out with the greatest energy and efficiency, unless through a mutual good understanding between the agent and the tenant. In these enterprising days many landlords farm portions of their own estates—it has become fashionable. We highly approve of it, as also the laudable aim set up by many of them in taking the initiative in modern improvements. These, however, form quite the exception; the rule is, landlord and tenant.

The country is, in reality, farmed by the

tenantry; and if they are to be prevailed upon to expend their capital freely—unreservedly and without limit—in the cultivation of their tenancies and the improvement of their stock, so as in every way to make the very utmost return from their holdings, for the good of themselves and also of the community, it is, I repeat, imperatively necessary that a good and proper understanding and arrangement should subsist between the agent and the tenant.

The practice of modern agriculture—the extended adoption—the efficient working and costly

management connected with modern husbandry—is totally at variance with the antiquated notions and restrictions imposed by the old order of land-agents in their agreements and leases. If more capital is to be expended—if more and larger crops, and more varied, are to be raised—if more meat is to be produced—if the tenant is to be enabled and encouraged to use his most strenuous endeavours to make his farm produce the greatest possible amount of food for the benefit of the country—then every unreasonable restriction as to management must be abolished, and every reasonable aid given in furtherance of an object so fraught with the most important results.

The tenant under the best practice of modern farming has, unquestionably, to *buy* many of his crops—*every extra crop*—by his expenditure either in the form of artificial manures for the land, or in adventitious aids for his stock, whereby his fold-yard dung is greatly enriched, or, as our new lights have it, *manufactured*. His implements, too, are much better adapted to the purposes of culture than formerly; his knowledge and skill have increased; he knows what is requisite for the full development of the powers of the soil, and what crops to put upon it with advantage; he knows what artificial aid to apply, and what modes of culture to pursue; he studies closely the whole theory of his business; and what he finds applicable to the requirements of his farm he at once adopts, regardless of the cost, knowing that ultimately he will derive benefit.

Modern husbandry cannot be judiciously practised without improving the soil farmed. It requires a liberal expenditure throughout all its details—in labour, in manures, in artificial food, in implements, in machinery, in drainage, in farm-buildings, in general management, and also in his live stock; the latter are his manure manufacturers, as well as large sources of profit in themselves. Modern farming is based upon producing a much larger amount of good crops, and a far greater increase of good stock, than under the old order of things. The judicious application of skill, industry, and capital will effect this, and also keep the land farmed in a progressive state of improvement; good crops they *must* be, or loss must ensue from the cost of raising them. The cost of artificial aids to the land, or in food for the stock, can only be repaid by a heavy course of cropping; and a liberal expenditure in this way by the tenant ought to be met by an unrestricted tenancy on the part of the landlord; otherwise it is prescribing a limit to the energy and skill of the tenant, and is ultimately revisited on the community in a restricted produce, involving a three-fold loss—to the landlord, the tenant, and the public. This ought not to be. What is

the great advantage and value of the diffusion of so much knowledge, and the improvement of agriculture, but to enhance the productive powers of the soil, and to provide better for the wants of the people? and what real advantage is to accrue, if land is to be held under the old order of tenancy?

The improvement, then, is in rapid progress; the great requirement of the age, in agriculture, is to give it permanency, stability, confidence, and reciprocity of interest. A well-digested and equitable law or system of tenant-right would aid much in numerous cases; but if a landlord gives unrestricted privileges, he is entitled to have his land farmed in a style likely to compensate him for such liberality, and so that no impoverishment ensues. Now these are matters of arrangement between the landlord and tenant, and in my humble opinion can be best carried out with advantage under the auspices of an enlightened and upright agent, whose business-like acquirements fit him to stand between the two—to guard the landlord's property from injury, and the tenant from being wronged or oppressed; or to give such advice and assistance as from time to time may be sought for, or the various deviations from accustomed practice may require at his hands.

The *Modern Land Agent*, then, must be a first-rate agriculturist. In theory and practice his aim should be to keep a-head of the tenantry over whom he is called to preside: his knowledge must embrace agriculture in all its phases, and he ought to be well versed in all the sciences connected with its onward progress. The construction of a lease, or the management of accounts, may be done by, and is more properly the business of, the solicitor and accountant respectively; but the full and complete development of all the latent powers of the soil, of every soil—of every geological formation of soil, must ultimately be the work of the accomplished agriculturist. This requires a practical knowledge of the conduct and business of the farm in all its varied departments, and under all its varied aspects and vicissitudes which the alternations of climate, or the nature and condition of the soil under culture, present continually. The Modern Agent, then, must be a truly practical farmer—fertile in every expedient connected with farm management, and with the proper and most effective means to put into active power and draw forth the utmost resources of the soil cultivated. The best course to promote thorough pulverization, the best course to promote cleanliness and fertility under a heavy routine of cropping, the best systems and practice of draining—in fact, every farm operation of moment ought to engage his most careful attention, and upon which he ought to obtain a clear and decided

judgment, founded upon the most minute experience. But the Modern Agent must not only be an intelligent practical man, but a scientific farmer. He ought to be well read in scientific agriculture; he ought to be well versed in geology, or the formation of soils, and to be able carefully to investigate their requirements; agricultural chemistry, or the knowledge of constituents applied for the renovation or improvement of soils, or as top-dressings for crops; botany; vegetable physiology, or the knowledge of cereals, grasses, roots, &c., and their adaptation to certain soils or rotations, and modes of culture and uses, &c., &c.; animal physiology, in so far as relates to the formation and habits of the domestic animals, and their adaptation to certain soils, localities, and their food and management; agricultural mechanics, or the knowledge of implements and machinery best qualified to cultivate the soil and prepare the grain and food for market or stock; architecture, or so much of it as relates to farm-buildings and the requisites for stock, &c., and the many little requirements which modern innovations upon old farm practice involve. The all-important

thing lies in this:—The Agent ought to be so thoroughly informed upon all matters connected with the great improvements which have been made in every department of agriculture during the past half-century, and so alive to the various theories and promulgations of still greater advancement in its practice and science which are constantly appearing before the public, as to be qualified to decide judiciously upon every innovation upon accustomed practice made by the tenantry under his cognizance: his great aim should be, to give them every facility and encouragement to expend their capital to enhance production and add to the fertility of their farms by the exercise of their own knowledge, skill, and enterprising industry.

It is in the exhibition of this confidence and this mutual good understanding between agent and tenant, I repeat, that the free, full, and complete development of British agriculture will be achieved, and thus confer upon the British people one of the greatest blessings a nation can receive—an almost independent provision for its pressing wants, its daily supplies of food and clothing.

#### THE DEVONSHIRE SYSTEM OF MAKING BREAD.

The actual making of dough is pretty nearly the same in all parts of the kingdom, therefore I will not waste time in describing the quantities of flour, water, barm, and salt used, but proceed at once to the baking process. The baking in Devonshire is usually done on the hearth; neither oven nor grate is to be seen. The fuel used for cooking is generally faggot wood, the tops and spray of elm trees growing in the hedge-rows on the farm; hazel abounds in the hedge-rows, accompanied by a long list of plants, ligneous and herbaceous, which to the botanist is highly interesting. Brambles, traveller's joy, briars, ivy, and thorn are samples of what is to be seen there; and these, faggoted, form the ordinary farm-house fuel, to which may be added "moke," which is composed of wheaten straw and the skins of apples that have been pressed dry in the manufacture of cyder. I may here remark, in passing, that the ashes from this fuel is worth 8d. a bushel, and is kept dry and used like guano for the growth of turnips.

This being the character of the fire-place, and the fuel such as I have described, it may well be wondered at that wheaten bread could be baked at all; and under the circumstances, to see it well done seems little short of a miracle. In some parts, it is said that the dough is put in the embers at night, and in the morning the bread is found baked without ever being looked at, or in any way interfering with the business of the day. This I only have on hearsay; but the system I am now about to describe is what I am feeding my family with, and what I am eating myself, and that from choice, although we have excellent bakers in the village.

To bake a nine-pound loaf, it is necessary to have a plate of cast-iron, about 15 inches in diameter and  $\frac{3}{4}$ ths of an inch thick. This is called the bake-stone, and constitutes the oven-bottom. The bake-stone is first heated, and if too hot is tried by a dusting of flour; if the flour is burnt brown the bake-

stone is too hot for the dough, and yet it must be just at the burning point to be right. The bake-stone is laid flat upon the clean hearth-stones, and the dough, in shape of a bullet, is placed upon it; and a common cast-iron three-legged Dutch pot, called here a "kettle," is placed over the dough, and the bread is said to be in the oven. The size of the kettle is 14 inches in diameter and 7 inches deep, and must on no account be wider in the middle than it is at the mouth; otherwise the bread, when it rises and fills the kettle, could not be got out. A little fine wood-ashes is put round the joint of the kettle and bake-stone, to prevent air and smoke, &c., from entering. Straw is now burnt over the kettle until it is completely covered and imbedded in the embers of cut straw, barley chaff, or the like. Here the nine-pound loaf should remain for nearly three hours, when, if all goes right, it will have filled the kettle, and form a semi-globe, which is the true pattern of a Devonshire loaf, with a crust all over; whereas a Loudon quartern loaf has four soft sides, and is only crusty at top and bottom, cubical in shape and social in character, being one of many baked in the same oven. But our loaf has the whole oven to itself, and comes forth a solitary dome, defended by a crust like a castle; for there is no soft side or weak point, for mouse or man to pilfer from, in Devonshire bread.

I need scarcely add that this simple oven can be used for baking meat, potatoes, pastry, puddings, &c., and ought to be known in every mountain cottage. Three or four shillings would set up a family with one; and any charcoal, spray of burnt sticks, straw, furze, fern or the like, would do for fuel; indeed it is in its extreme simplicity, and adaptation to the greatest poverty, and the worst-known articles of fuel, that its chief merit lies. The rich can always command luxuries, and patents are constantly being taken out for cooking-stoves; but all this savours of the rich man superintending, and of the orna-

mental cottage, and is moreover adapted to coal fuel only, which, although it is no doubt the cheapest and best fuel where it is to be had, still, where the honest rustic has to grapple with hunger and misery on some lone hillside, patent cooking-stoves and coal stoves in the state of his affairs must be foreign and far from "household words" to him; and I strongly suspect that we should never have heard or read of the enslaved Israelites burning bricks with stubble wherewith to build the

gigantic Egyptian Pyramids, if Pharaoh had been master of coal pits; and if any one smile at the idea of baking bread as I have described, let him try to calculate from the accounts of travellers the millions upon millions of bricks that compose the Pyramids, and learn what perseverance may accomplish even with burning straw.

ALEX. FORSYTH.

*St. Mary's Church, Torquay, Devon.*

## THE SMITHFIELD AND BIRMINGHAM CATTLE SHOWS.

By F. ROBION DE LA TREHONNAIS.

[TRANSLATED FROM THE FRENCH JOURNAL OF PRACTICAL AGRICULTURE.]

A coincidence has characterized the period of the great agricultural celebrations which took place at the commencement of December in England, namely, the simultaneous meeting of the two great cattle shows of London and Birmingham. That of the latter city is moveable, being determined by the fair of fat animals which precedes the feast of Christmas; and this season chance has so ordered it, that the two shows should take place at the same time. The preceding year it happened that the competition, begun at Smithfield, was prolonged at Birmingham, and that the judgment pronounced by the London jury was sent to the other show, as to a tribunal of appeal, the animals which had figured at the first show thus reappearing at the second. This time the double competition was impossible, and the result has been, that we were better enabled to judge of the respective merits of the two exhibitions.

Whether it arose from the simultaneousness of the two shows, or the scarcity and dearness of forage, it cannot be denied that the Smithfield Show presented an appearance decidedly inferior to that of former years, in respect both to quality and quantity. With the exception of three or four animals, the Durhams were far from representing the excellence which distinguishes their race; but it is just to state that, in spite of this comparative inferiority, the two gold medals of the show were carried off by them—that for fat oxen being won by the Marquis of Exeter, and that for fat cows by Mr. Ambler. Mr. Stratton, whose success we have so frequently had occasion to report, obtained only the second prize. There were forty animals of this breed at the show. The Marquis of Exeter's ox fully justified the distinction awarded him; for we have never seen high condition so uniformly distributed over forms so beautifully symmetrical. It was purchased by one of the London butchers at the enormous price of £30, and was calculated to produce at least 15 cwt. of beef. Mr. Ambler's cow was a white one, and had already gained the medal at the Birmingham Show the previous year. It also was perfectly fattened, preserving under its high condition the beautiful construction of its form. Mr. Stratton's cow, when placed by the side of its rival, exhibited less uniformity in fattening. We remarked some slight bloating, which disfigured its otherwise handsome proportions. In spite of its extreme fatness, this cow was

found to be in calf, and its proprietor has taken it home to his dairy.

There were only twenty Herefords; but we must acknowledge, in spite of our predilections for the Durhams, that these generally eclipsed them, both in quality, symmetry, and precocity. On the other hand, it was difficult to believe, of all the animals of this class, and especially the most fleshy, that the age had been correctly declared, so fully were they developed and fleshed.

There were only seventeen Devons. The first prize in this class was carried off by the Earl of Leicester, for an ox two years and eleven months old, which was the admiration of all the amateurs. The second prize was awarded to Prince Albert. Generally the class of Devons was badly represented, with the exception of two or three good animals, and exhibited a marked falling-off.

There were ten specimens of the Scotch and Irish breeds, six of the Welsh, seven crossed breeds, and twelve of various breeds; in all, 112 animals of all kinds.

The class of Scotch breeds was well represented; the animals were generally of enormous size, and presented to the touch excellent qualities of flesh. Prince Albert had two animals of this class, one of which was sold to a London butcher for £70.

Our impression of the exhibition of the bovine breeds may be summed up in few words. It is, that we can still vouch to the progress which has manifested itself for many years in the taste of the breeders, in regard to the fattening of the animals. At the late exhibition, even amongst the pigs, we have not found a single animal of which the fattening was extravagant; with all, the touch was firm and elastic—an infallible indication of a considerable base of lean.

The ovine race was but indifferently represented, with the exception, however, of three magnificent Leicester sheep exhibited by Mr. R. L. Bradshaw, to whom were awarded all possible prizes and distinctions—namely, the first prize of £20 for long-woolled sheep, aged from one year to 22 months; the silver medal for the breeder by whom they were reared; and the grand gold medal for the handsomest animals of the ovine race in the exhibition: those who wish to form a just notion of the *beau-ideal* in sheep ought to study this splendid group. In our long experience of English exhibi-

tions, we can recal nothing more perfect. The other prizes for the long-woolled sheep were divided between the Marquis of Exeter, Mr. Foljambe, Lord Berners, &c.

The animals of crossed breeds, especially the Southdowns and Leicesters, were generally very handsome. The three sheep that gained the first prize and the silver medal were very remarkable. Aged only twenty months, their development was extraordinary; whilst the fineness of their fleece, the slenderness of their extremities, the amplitude and depth of their carcasses, and their quality of flesh, stamped them animals of transcendent merit, and would have sufficed, in these specimens alone, if need were, to establish the excellence of the results of crossing the Southdowns and Leicesters, even in regard to the production of meat for the butchers.

The short wools, with the exception of some groups of Sussex Downs, Hampshire Downs, and West Country Downs, were but feebly represented by the Southdowns. Mr. Rigden and the Duke of Richmond shared the principal honours of this class, since Jonas Webb has retired from the lists.

In the porcine race, Prince Albert carried off the principal awards—namely, the first prize of a silver medal for a lot of three pigs; second prize for another lot; and honourable mention for the third. Lord Radnor exhibited some handsome animals of the Coleshill stock, but they were far from shining by the side of the other breeds; and the breed itself is more and more abandoned in England, there being few, besides the nobleman who established it, now adhering to it. The large races were represented by enormous animals, but by the side of the small white breeds they stood no chance; for in precocity, facility of fattening, and quality of flesh, there was no serious comparison. The vulgar eye may be deceived by that huge, but flabby, inert, and lifeless mass of oily fat, accumulated over a filaceous and skinny muscle. The experienced breeder easily recognised the capital defects of these hippopotami, and scarcely cast a glance upon them in passing. To conclude: the porcine race was also less worthily represented than usual, as well in respect to number as quality.

The character of inferiority, however, of the exhibition of the various breeds of animals at the Smithfield show was redeemed by that of agricultural machines and implements. Those machines, which had almost all figured at the Paris Exhibition, have been described so well by our fellow-labourer M. Borie, that we shall not trouble the reader with any observations on that subject, except the simple remark that the distinctive feature of the Exhibition was the domestic character of the new inventions: portable mills for making flour for families, economic ovens, machines for making mincemeat, &c., &c., attracted general attention, and, above all, that of the housekeepers. We ought also to mention an apparatus for dressing sheep, which appeared to us very ingenious. It consists of a common trough, filled with the liquid, which forms the bath. By means of straps, they fasten a kind of grating of galvanized iron upon the back of the sheep. They then fasten the brace of a crane under

the belly of the sheep, which is alternately raised and let down, plunged into the bath, and withdrawn without jerking or struggling; and, above all, without the operators being obliged to plunge their arms into the liquid, which has been found to be very unhealthy. This apparatus was invented by Mr. Cuff, of Smithfield, and costs £4. All flockmasters ought to possess it, this operation being absolutely necessary for destroying the parasitic insects which attach themselves to the skin of the sheep.

We shall say very little about the Birmingham Show; first, because we were unable to witness it; and secondly, because it presents no new feature. The Herefords again carried off the gold medal. It has, however, been acknowledged that, in respect to uniformity and moderation of fattening, this exhibition was superior to that of Smithfield. But what has above all distinguished it, is the exhibition of fowls, which were excluded from the latter. Of these there were more than 5,000, and it was agreed that the Dorkings bore away the palm. At Birmingham there were no agricultural machines, but in revenge they admitted to the exhibition the breeding animals of the porcine race, which formed a distinct class.

These two exhibitions, in spite of their simultaneousness, drew together this year an incredible number of visitors. Never, even in the most favoured years, have we seen so compact or so curious and observant a crowd, examining with so much attention and interest the animals and implements exhibited. And this earnest public belonged not alone to the agricultural class, but included all classes of society. When shall we see in France a similar interest manifested for our agricultural displays, amongst the inhabitants of our cities? Last summer, a most interesting spectacle was provided in the Champ de Mars. There all the European races were represented by the magnificent animals, which, as it appears to us, were much more worth seeing than the caged monkeys and grotesque bears of the Jardin des Plantes; and yet the inhabitants of Paris appeared to have completely ignored the existence of this magnificent exhibition, which, for the excellence and merits of the animals exposed, and the perfect order and arrangement of its details, has never been surpassed, we might almost say, even in England.

WALTHAM AGRICULTURAL SOCIETY.—The competition in draining and plashing for the annual prizes given by his Grace the Duke of Rutland and T. C. Beasley, Esq., took place in the field called the West Wong, near Belvoir Castle, on Thursday, the 6th inst. The judges on the occasion for the plashing were Mr. Clarke, of Bescaby, and Mr. Parker, of Knippton Cottage; and for the draining, Mr. Hind, of Croxton, Mr. Wilders, of Redmile, and Mr. Guy, of Eaton. The premiums in both classes were well contested, the work being executed in a superior manner, and highly commended; there were 42 competitors for the draining, and 13 for the plashing. The judges found great difficulty in deciding who were most deserving the preference. The 1st prize of £2 10s. for the draining, was given to P. Leighton, of Muston; 2nd, £1 10s. to John Patchett, of Muston; 3rd, £1 to Thomas Geeson, of Redmile; 4th, 10s. to George Jarvis, of Redmile; 5th, 10s. to Chris. Harley, of Sproxton; 6th, 7s. 6d. to Robert Brendon, of Bottesford; 7th, 5s. to Robert Briggs, of Muston; 8th, 5s. to James Schofield, of Denton; 9th, 5s. to John Geeson, of Redmile; 10th, 5s. to William Coy, of Knippton. In the plashing, the first prize of £2 was given to John Dickenson, of Stonesby; 2nd, £1 to Wm. Caunt, of Branston; 3rd, 10s. to Richd. Ward, of Harston; 4th, 5s. to Wm. Christian, of Braunstone.

METEOROLOGICAL DIARY.

BAROMETER.			THERMOMETER.			WIND.		ATMOSPHERE.			WEAT'R.
1856.	8 a.m.	10p.m.	Min.	Max.	10p.m.	Direction.	Force.	8 a.m.	2 p.m.	10 p.m.	
	in. cts.	in. cts.									
Feb. 21	29.89	30.02	31	36	32	E. by N.	lively	cloudy	cloudy	cloudy	snow
22	30.09	29.97	29	39	37	W.N.W.	gentle	cloudy	cloudy	cloudy	drizzle
23	29.97	30.20	32	47	42	N. by W.	gentle	fine	fine	fine	dry
24	30.35	30.44	36	49	36	West	gentle	fine	sun	fine	dry
25	30.46	30.46	32	47	43	W. & S.W.	gentle	cloudy	cloudy	cloudy	dry
26	30.38	30.37	42	53	50	W. by N.	gentle	cloudy	sun	cloudy	dry
27	30.41	30.45	46	50	47	W. by N.	calm	cloudy	cloudy	cloudy	dry
28	30.49	30.49	44	46	43	E.S.E.	calm	cloudy	cloudy	cloudy	dry
2	30.48	30.56	40	53	40	E.S.E.	gentle	haze	sun	fine	dry
Mar. 1	30.56	30.58	36	44	43	East	var.	cloudy	cloudy	cloudy	dry
2	30.58	30.51	40	46	43	E. by N.	gentle	cloudy	cloudy	cloudy	dry
3	30.51	30.52	36	44	39	E. by N.	gentle	cloudy	cloudy	cloudy	dry
4	30.58	30.45	35	40	37	N. by E.	calm	cloudy	cloudy	cloudy	dry
5	30.35	30.28	33½	42	39	N. by E.	calm	cloudy	cloudy	cloudy	rain
6	30.16	30.15	36	44	39	North	airy	cloudy	cloudy	cloudy	dry
7	30.22	30.33	33	40	32	N. East	gentle	cloudy	cloudy	clear	dry
8	30.35	30.30	25	47	38	S. & S.W.	gentle	cloudy	sun	cloudy	dry
9	30.28	30.16	35	42	41	West	var.	cloudy	cloudy	cloudy	dry
10	30.14	30.10	32	47	42	W., N.E.	gentle	haze	sun	cloudy	dry
11	30.12	30.00	34	42	35	N. East	lively	cloudy	cloudy	cloudy	dry
12	29.94	29.94	25	37	35	E.N.E.	strong	fine	cloudy	fine	dry
13	29.94	30.04	29	42	35	E.N.E.	strong	fine	sun	fine	dry
14	30.10	30.10	32	46	36	East	strong	fine	sun	fine	dry
15	30.10	30.10	28	37	37	East	brisk	fine	cloudy	cloudy	dry
16	30.03	29.94	31	50	44	S. East	lively	fine	fine	cloudy	rain
17	29.94	29.94	38	44	42	S. East	gentle	cloudy	cloudy	cloudy	dry
18	29.94	29.80	38	52	47	E.S.E.	gentle	cloudy	cloudy	cloudy	dry
19	29.80	29.94	37	50	47	N.W.	gentle	cloudy	cloudy	cloudy	dry
20	29.98	29.98	43	48	40	Variable	gentle	cloudy	cloudy	cloudy	rain
21	29.98	29.97	45	47	42	N. Westerly	gentle	cloudy	cloudy	cloudy	hint of r.

ESTIMATED AVERAGES OF MARCH.

Barometer.		Thermometer.		
Highest.	Lowest.	High.	Low.	Mean.
30.77	29.27	66	24	43.9

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
41.7	35.16	38.94

WEATHER AND PHENOMENA.

February 21. Melting snow.—22. Drizzle, and change to east.—23. Great rise of heat.—24. Fine and sunny.—25, 6, 7. General temperature.—28. Damp and hazy.—29. Beautiful.

LUNATIONS.—Last quarter, 29th, 1h. 42m. morning.

March 1 to 7. Completely overcast; a sprinkling on the 5th evening.—8, 9. Rime and frost in morning.—10. Haze, then sunny.—12. Strong current after hoar frost.—13. Bright; wind piercing; lunar halo at 9 p.m.—14. Fine, and red sunset.—15. More calm.—16. Fine afternoon, followed by some

hours' rain, yielding 40 cents. of water—the first fall since the 21st of February, when the total of that month was only 0.888 of an inch.—17 to 21 inclusive. Scarcely a gleam; but generally still and almost calm.

EQUINOX, on 20th, morning.

LUNATIONS.—New moon, 6th, 8h. 39m. P.M.; first quarter, 13th, 2h. 36m. P.M.; full moon, 21st, 4h. 5m. P.M.

REMARKS CONNECTED WITH AGRICULTURE.

The peculiar state of the weather and its transitions tend to confirm our anticipations. An observer of nature could not fail in remarking that when periods of low and frosty temperature have alternated, during three successive months, with others of a directly opposite character, growing crops must remain at a stand-still. Many a time we have seen the young wheat in a far more forward state at Christmas than we now find it to be at the close of March. Yet, subdued and quiescent as is green herbage of most kinds, the general promise is benign. Rain has fallen in very little abundance, yet the earth is thoroughly moist.

Croydon, March 22.

JOHN TOWERS.

## CALENDAR OF AGRICULTURE.

The sowing of barley must be finished as quickly as possible. Sow lucerne and flax-seed, and apply the top-dressings of artificial manures. Sow grass-seed on barley and wheat tilths; use light harrows, and roll heavily. Sow vetches for a succeeding crop. Finish the preparation of grass and meadow-lands.

Towards the end of the month, sow mangelwurz by machine or drills, 28 inches apart, on lands well pulverized and dunged; steep the seed in weak solutions, encrust and dry with quicklime for sowing. Plant potatoes on land well prepared, dunged, and drilled, 30 inches apart; use strong sets of tubers newly cut—very moist farmyard dung, and in a large quantity; plant and cover the sets quickly, and roll down the drills. If lime is applied, use at least 200 bushels an acre, hot as possible, secured in a thatched heap from the previous summer and autumn: if the article be new, it may be carted to the field from the kilns, powdered, and immediately applied; or if time can be obtained, spread the hot cinders, broken very small before burning, evenly on the land, and the subsequent working will cover the lime, when the land will derive much benefit from the moist heat and damp exhalations evolved during the dissolution: this method is least expensive, but requires an early application.

Horse and hand-hoe all early drilled crops, as wheat, beans, peas, lucerne, and carrots, as may be required; begin in time, and allow no weeds to grow.

Begin to pare and burn rough lands for turnips and rape: lay the turfs in convenient heaps, and burn moderately to avoid extreme calcination; this is by far the best method yet known of reducing and bringing into cultivation the surface of waste lands, containing much inert, ligneous, and fibrous matter.

Begin to prepare and burn moss, and all peaty combustible substances into ashes for the turnip-drill; turfs, from ditch banks and road-sides, often suit well.

Early vetches, winter barley, watered meadows, and rye, will now be ready for ewes and lambs, and fattening stock; cut and place the food in racks, and fold the animals nightly on the reserved ground, two nights on a space, and two square yards to each sheep; fold in the same manner in good weather during all seasons of the year, on thin bare lands of any kind, grass or arable; this is a great improvement, and, not the least recommendation, a cheap one.

As the days grow long, stock of all kinds require more food, and the weather being drier, the more succulent the better. Supply milch cows liberally,

either steamed or in a natural state, or both. Suckle the calves twice a day at least; spare no trouble or expense—the animals will repay. Attend to store and fattening animals in the same manner; use swede-turnips, beet, and oil-cake; dry substances should be made moist, as chaff and the meals of grains; without juice, fattening does not thrive. Give to suckling calves in the pens some of the earliest green food, also bruised cake, linseed jellies, bean and barley meal, to push them forwards, and to prepare them to live without milk on grosser substances.

Feed abundantly and regularly with juicy food the ewes that have lambs; attend that the lambs have shelter and comfort, and remove the strongest animals to early meadows and clover. In want of home produce for food, use bruised cake and oats laid in troughs; cut into slices the beet and turnips as consumed, not to expose to drought; spare no trouble, nor any reasonable expense, at this critical period.

Sell fat cattle the foremost in condition. The season for curing bacon being over, the farrows must go on for store pigs, and for early fattening in autumn.

Early fat lambs will come in for sale, about the end of the month, when well managed.

In wet weather carry to the heaps in the fields all dung from the yards, and litter the yards for soiling.

Prepare most vigorously the turnip fallows, by ploughing, harrowing, and rolling. At convenience, plough clay fallows for wheat.

## THE LAW OF MANURE TOLLS.

It has recently been decided in the Queen's Bench, in the case of the Queen on the prosecution of Sinnott v. Freke, that a horse and cart employed by a dust-contractor in conveying street-sweepings (found in the case to be manure) from the city to a place of deposit, partly for the contractors' own use as manure, but principally for the purpose of sale as manure, are within the exemptions from toll in the Turnpike Act 5 and 6 Wm. IV. c. 18. As we are so inundated with questions on this subject, we may state that the principal provision in the above act is to the effect that "no toll shall be demanded or taken on any turnpike road, for or in respect of any horse, &c., cattle, or carriage, when employed in carrying or conveying only dung, soil, compost, or manure for land (*save and except lime*), and the necessary implements used for filling the manure, and the cloth that may have been used in covering any hay, clover, or straw, which may have been conveyed." A perusal of the above clause will correct an answer we gave about three weeks back. Uncrushed bones, which are taken through a turnpike to a farm, to be there crushed, and part of them there used for a manure, and the residue to be afterwards sold and to be used as manure at other places, are among the exemptions. Artificial manures in bags are also exempt, and judging from the language of Lord Campbell and Mr. Justice Wightman in the above case they would be so, even if only carried to a place of deposit to be sold again.

## AGRICULTURAL REPORTS.

## GENERAL AGRICULTURAL REPORT FOR MARCH.

The severe weather experienced during nearly the whole of this month—the wind having vibrated between the northward and eastward—has completely checked the progress of vegetation in all parts of the United Kingdom. Nevertheless, when we consider that forward springs are too frequently productive of bad results, it cannot be considered as unfavourable. True, the present prospect of the fields shows a great want of a milder atmosphere; but we are not disposed to regard this as a bad omen, or as an indication that the wheat crop is perilled. On this subject numerous conflicting opinions have come to hand from nearly every district in England. Some of our correspondents state that a large portion of the young plant has been destroyed by the severe frosts; others, that the wireworm has committed serious depredations. To some extent these statements are correct; but when we compare this year's losses with many former seasons, we are led to the conclusion that not a few of them bear the stamp of exaggeration, and that it will be unnecessary to re-sow much of the land now under wheat culture. The absence of rain has enabled our farmers to proceed with the sowing of Lent corn almost without interruption: hence the progress of out-door labours, up to this time, has been very rapid. Rain, however, is now much required on most of the light soils to bring the plants above ground. As regards the extent of land under wheat culture, we may observe that great efforts have been made to increase it in every quarter, notwithstanding the prospects of peace, and the probability of wheat selling next year at a lower range of value than at present. The rapid fluctuations in the prices of agricultural produce, but more particularly in wheat, have had considerable influence upon millers and others, who, for the most part, have refused to purchase beyond immediate wants. The consequence is, that prices continue to give way, notwithstanding that the imports of foreign produce have been very moderate, and that we have had no accumulation in warehouse. Now, the all-important questions requiring particular notice at this moment are—Have we average supplies of home-grown corn on hand? and shall we be able to import foreign wheat, spring corn, and flour in excess of our wants? The decline in the quotations—the result chiefly of panic—we attribute to the hopes

held out to us that an immense quantity of food will be imported from Russia during the summer months, and further that the United States have more to spare for shipment than is generally supposed. Now, we do not for one moment suppose that this country—which offers the best ready-money market to the surplus produce of the world, and which allows the free import of most consumable articles—will positively stand in need of food; in other words, we cannot proceed on the assumption that absolute scarcity can exist; but, at the same time, we feel convinced that the quantity of wheat likely to be received from both the northern and southern ports of Russia during the now coming season is greatly over-estimated. It does not require any great stretch of the imagination to understand that our last crop of wheat was considerably less than the growth of 1854, and that for the most part it has proved of very middling quality. Further, it is evident, from the returns made week by week of the transactions in our markets, that the supply in the hands of our farmers is rapidly decreasing. For our part, then, we are at a loss to understand upon what principle we are to have low prices; more especially as the wants of France are acknowledged to be extensive, and as it will be absolutely necessary for us to import grain from every quarter where it can be procured. But the decline in our quotations has operated as a severe check to shipments of both wheat and flour from the United States. From the large consumption going on, and the readiness with which food is still purchased on French account, the exports to the United Kingdom have sensibly diminished; and we are apprehensive that the aggregate imports from that quarter will fall considerably short of the estimates made some two or three months since. Evidently we are in this position:—We still require a very large supply of foreign food to meet consumption between this and the end of next harvest; and to assume that Russia will furnish us with more grain than we shall require, is an opinion which will only be justified by actual events.

The early lambing season has been by no means productive, arising in some measure from the inclemency of the season; and we regret to find that numerous flockmasters have suffered severe losses from the cause just alluded to. In the large grazing counties the supply of winter turnips, carrots, &c., has been exhausted, and it has been found necessary to have recourse to large quanti-

ties of dry food, which is still selling at unusually high rates, from its great scarcity. Both beasts and sheep, however, have been well in health; and a ready—we might say a tolerably profitable market has been found for the supplies disposed of.

The wool trade continues in a highly prosperous state. The great advance realized upon foreign and colonial wools at the last public sales, together with the small stocks of English, and the important modifications in the duties levied in France, added to the steady increase in our exports of woollen goods, have tended to keep up the excitement. Some of the dealers, however, contend that present rates are unsafe, and that we shall have a serious decline in them within a few months; but in our opinion the trade is recovering itself from a long period of depression, and it is plain that peace will exercise considerable influence upon the demand, and, further, that the fiscal changes just alluded to will increase the demand for both English and colonial wool. The trade in this important article in France has, we find, been greatly under-estimated, that is to say, if accounts before us are to be implicitly relied upon. We are informed that the total import of foreign wool into France in 1855 was not less than 83,000,000 lbs., against 57,400,000 lbs. in 1854; the shipments were 5,605,000 lbs. in the former, against 5,255,000 lbs. in the latter year. That the trade in France is rapidly on the increase does not admit of a doubt; and the most remarkable feature in connexion with the general demand is that we have consumed less wool in the past year than in 1854 or 1853. By way of illustration, we give the official returns:—

	1853. lbs.	1854. lbs.	1855. lbs.
Wool imported ..	117,248,182	104,854,482	97,855,739
— exported ..	11,697,004	24,467,284	29,414,062
Leaving for consumption .. }	105,551,178	80,387,198	68,441,677

The decrease in our imports in the two latter years may be chiefly attributed to the late Kaffir war, and, consequently, to the rapid decline in the shipments from the Cape. On the other hand, we find a great increase in our shipments, chiefly to France and Belgium; in which countries our long staples have been in demand for inferior clothing purposes, without a corresponding increase in value on this side. It would, therefore, appear that the woollen trade of England has suffered a serious and unexpected decline, from which, however, it appears to be steadily recovering. The decreased duties now levied upon wools imported into France will, in all probability, give a great impetus to the trade of that country; and it behoves our manufacturers to bestir themselves, or they will find French woollens superseding those

of English make in various quarters of the globe. It is not enough for us to know that prices of the raw material are rising, because the last Decree considerably lowered the import duties on wool imported into France *direct* from Australia. The present scale of duties, therefore, is calculated to increase direct shipments, and to draw from our markets many of those foreign buyers who for so many years have given a tone of stability to the trade in London. It becomes a question with those buyers whether English or colonial wools are the cheapest, irrespective of the differential duties.

The seed trade has ruled steady, and prices have shown a tendency to improve. Linseed and rape-seed have been, however, lower to purchase for arrival, from the prospects of peace.

In Ireland and Scotland matters generally have undergone very little change. The supplies of potatoes in the latter country are unusually large for the time of year.

### REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

Numerous fluctuations have taken place in the value of live stock during the month: there has, however, been a steady business doing both in beasts and sheep, at full average quotations. The supplies of food in our leading grazing districts having become very limited, much anxiety has been manifested on the subject of the health of stock in general; but we may observe that very few complaints have been made on this subject, though it is evident, from the condition in which the stock has lately appeared for sale, that many graziers have been compelled to dispose of beasts and sheep, especially the latter, at an earlier period than usual.

The imports of stock from abroad have been on a very limited scale; consequently, the demand has been almost wholly met by home-fed animals. During the month we imported the following supplies into London:—

	Head.
Beasts .....	1,383
Sheep .....	62
Calves .....	397
Total .....	1,842
Corresponding month in 1855 .....	2,103
„ 1854 .....	8,409
„ 1853 .....	10,884
„ 1852 .....	6,747
„ 1851 .....	8,381
„ 1850 .....	6,004

No doubt the extensive demand for stock in Holland has drawn from us our usual amount of imports; and we are led to believe, from information just at hand, that our arrivals this year will be considerably less than in 1855.

The total supplies of stock exhibited in the Great Metropolitan Market have been as under:—

	Head.
Beasts .....	22,623
Cows .....	470
Sheep and lambs .....	100,700
Calves .....	797
Pigs .....	2,140

COMPARISON OF SUPPLIES.

	1853.	1854.	1855.
Beasts .....	19,228	20,588	18,644
Cows .....	360	532	380
Sheep .....	85,680	93,060	88,790
Calves .....	1,614	1,091	835
Pigs .....	2,780	2,780	2,765

The arrivals from Norfolk, Suffolk, Essex, and Cambridgeshire, have been 10,000 Scots and short-horns; from other parts of England, 1,900 of various breeds; from Scotland, 1,500 Scots; and from Ireland, 319 beasts.

The early period at which Lent has fallen this year, has kept back the supply of lambs: the small number brought forward has realized high rates, viz., from 6s. 6d. up to 8s. per 8 lbs. Last year the top price in Smithfield was 6s.; in 1854, 7s. per 8 lbs. Prices of other stock have ruled as follows:—

	s. d.	s. d.
Beef.....from	2 10	to 4 10
Mutton .....	3 2	5 2
Veal.....	4 10	6 0
Pork.....	3 4	4 8

COMPARISON OF PRICES.

	March, 1853.		March, 1854.		March, 1855.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Beef ..	2 8	to 4 4	2 10	to 4 8	3 4	to 5 0
Mutton	3 10	5 4	3 2	5 2	3 4	5 2
Veal ..	3 4	4 8	4 4	5 8	3 10	5 4
Pork ..	2 10	4 0	3 4	4 10	3 2	4 4

The above prices for mutton refer to sheep in the wool. Shorn sheep have sold at 4s. 2d. to, in some instances, 4s. 6d. per 8 lbs. We are glad to find that many flock-masters have refrained from sending shorn sheep to market in the present inclement weather: if they were to consider their own interests better, they would not clip their sheep before the first week in April.

Newgate and Leadenhall have been well supplied with both town and country killed meat, in which a full average business has been transacted. Prices almost generally have ruled quite 2d. per 8 lbs. higher than in the previous month. Beef has sold at from 2s. 10d. to 4s. 4d.; mutton, 3s. to 4s. 4d.; lamb, 5s. 6d. to 6s. 8d.; veal, 4s. 4d. to 5s. 2d.; pork, 3s. 2d. to 4s. 8d. per 8 lbs. by the carcass.

DURHAM.

The weather during the last month and up to the present date has been highly auspicious for all kinds of out-door labour, and farmers have been enabled to make considerable progress in sowing: the work has thus far proceeded very

favourably, and the seed which has been committed to the ground has been well got in: large breadths of spring wheat have even in late situations been sown. With regard to autumn-sown wheats the reports are generally of a very satisfactory character; the plant, though strong and healthy, is not too forward for the season, and notwithstanding the dry open weather during the last month, we hear of few cases of premature luxuriance; and should Providence only favour us with a continuance of fine weather, the crop will be promising. The yield of the last crop was deficient, and quality very inferior. It is very satisfactory in having to inform you that the potato crop has been abundant, and of superior quality, and more free from disease than it had been since 1846. On some farms sowing has been finished; but such cases are extremely limited. The weather set in with great severity on the 6th December, with a slight covering of snow; the frost was most intense, and turnips suffered most severely from this visitation, and their feeding properties were much deteriorated. In exposed situations and light soils half of the crop was rotted on the ground; but on strong, loamy, and sheltered situations they were not injured to that extent: in consequence of the great destruction in the crop it is now nearly exhausted, and stock of every description have done badly, and been hurried to market in a half-fat state, and have not remunerated the grazier for his outlay of capital and the purchase of artificial manures. Should we have a late spring, fodder will be very scarce. Our corn markets have an upward tendency, and nearly recovered what they gave way. There is at present a good demand for wool at advanced prices. At the hinds' hiring for married men and their families, at Darlington on the first Monday in March, there was no advance in wages: they were hired at from 12s. to 15s. per week, with perquisites; house and fire, potatoes, and two bushels of wheat at the end of the year, if deserving. Day labourers 18s. per week; drainers 21s. ditto.—March 18.

NORTH NORTHUMBERLAND.

With the exception of the last week of February, and first three days of the current month, the weather for the last six weeks has been cold to an extreme, and very visible traces are still left of the havoc effected by the windy element on the 6th ult. The only pleasing result was the almost entire breaking up of the snow on the hills, the mountain range of the Cheviots having up to that day been under a white covering for quite three months. During the last fourteen days of February, a large breadth of spring wheats were sown under very favourable auspices; subsequently, where the land was to plough, or had been allowed to get too dry, it has worked lumpy, and the finish on heavy loams is rather untidy. Beans have been put in well, and a large portion of oat-seed has been put in the land: where early ploughed, working free with a fine mould; where lately ploughed, circumstances are reversed. A continuance of dry, withering, frosty weather has baked all such soil like bricks; and we must either wait until a little rain renders it pliable, or reduce to tilth by great excess of labour. Of barley very little is yet sown; nor do we see any inducement to commence, so long as the ungenial weather checks vegetation. Turnips are mostly cleared from the field; and where the store pit of swedes or other hardy bulbs are not in good keeping, cattle and sheep must either be forced on the market, or mete it out on very short allowance. Straw provender is the exception, being plentiful; but green herbage of all descriptions very scant. Our young grasses and clovers are very backward. Go where we will, shepherd and flockmaster asks, "What will be done with the ewes and lambs?" Nothing but care and hand-feeding can save them from hunger-taint: at the same time the lairage is sound and free from wet, scarcely a dew having fallen for the last month. Winter and all autumn-sown wheat is very backward over the entire eastern district of the county. The plant may be safe; but to this day we can barely see a field which might not be mistaken for a naked fallow at a few hundred yards' distance. We augur no bad result from such appearance at this period, and for forty years past have nearly in every instance seen the finest crops of grain and clovers after a dry February and March; and it is perhaps fortunate that vegetation has been so kept in abeyance, as we rest in hope that an all-wise Providence will vouchsafe us a season of refreshing showers in April and May. We are just on the eve of our lambing season, over all the

cultivated district; and, so far, the produce seems to fall quite equal to former seasons. Lambs are healthy, but the ewes are very short of milk, and the shepherd requires his nursing-bottle constantly replenished from the cow-house. On the hill farms, they seldom expect lambs before the second week in April; and we hope ere then a little green herbage will spring up, to feed the numerous flocks of bleaters on the Cheviot range of mountains. In rural economy the farm labour is a little more abundant than the past season: the open dry weather has encouraged constant energy at all field operations: large breadths of land have received a second ploughing for swedes, potatoes, &c.; and where any filth is to get out, there has been an unusual dry season for hand-picking. The intense winter frosts in December and January have so completely pulverized early-ploughed clay loams, that we may

fairly anticipate a prospect for an early and large breadth of swedes. We need barely notice the strange fluctuations recently in the corn markets; nor have we any speculative opinion to offer to our agricultural brethren, as we fancy "supply and demand" are the great ruling tests to equalize prices. Too much productive land may have got into the hands of speculative merchants, and not a little is done by a sort of middlemen, who, in combined groups, act the part of salesmen for numerous distant merchants and farmers, in the large markets. Such gentlemen bring up a large or scanty supply at pleasure; hence the needy miller is forced to have a weekly quota for working up. Stacks in the yard about a medium at this time of season. A great bulk of the wheat thrashed out; little store in the granary of any farmer. Oats yield light.—March 21st.

## AGRICULTURAL INTELLIGENCE, FAIRS, &c.

**BANBURY FAIR** may be considered as satisfactory. There was a good supply of fat beef, which sold at reduced prices, viz., 4s. to 4s. 4d. per stone. The store trade was well supplied, and good cattle brought rather enhanced prices. The supply of fat mutton was quite equal to the demand, and sold—shorn sheep 3s. to 4s., in the wool 4s. 6d. to 4s. 8d. per stone. Store sheep were in demand.

**BARNSTAPLE GREAT MARKET.**—The supply of cattle was very limited, and business dull in store beasts, while fat ones fetched a ready price at 10s. per score. The sheep market was scanty, but business brisk for fat sheep, which realized 7½d. and 8d. per lb. Couples from 25s. to 40s. Pigs, 9s. 6d. to 10s. per score.

**BEDALE FAIR.**—We had an average supply of fat stock, of very nice quality, which had ready demand at last market's prices. A good show of lean stock and in-calving cows at late rates. During the day a good clearance was made. Beef, 6s. 3d. to 7s. per stone; mutton, 6d. to 7d. per lb.

**BISHOPSTOKE MONTHLY CHEESE MARKET.**—There was a good supply. The demand was not brisk, and a good share remained unsold. Prices may be quoted: Skims 35s. to 38s., half-ditto 54s. to 58s., doubles 58s. to 63s., Somersets 66s. to 70s., Cheddar 72s. to 78s.

**BLAIRGOWRIE FORTNIGHTLY MARKET.**—There was a large attendance. The number of cattle less than at former markets, and the quality inferior. The prices given a fortnight ago were barely obtained, and there was little inclination to buy. Best ox beef may be quoted at 8s. 9d., middling and inferior sorts from 7s. to 8s. 3d. per Dutch stone. A few milchers, some of which were of good quality, sold readily at prices from £10 to £15 each.

**BROMYARD FAIR.**—There was not so large a supply of barren stock and cows and calves as have been seen upon former occasions, but both sold well. Very few fat sheep on offer, and high prices asked. Store sheep were rather flat.

**BODMIN FAIR** was thinly attended, and supplied with but few cattle or sheep. Prices were good, farmers asking 7d. per lb. for sheep. Mr. Rowse, of Lancoffe, Bodmin, was as usual the successful competitor for the garlands, three having been awarded to him, two for the best oxen, and one for a fat cow. The other garland was awarded to Mr. F. Parkyn, of St. Veep.

**BRIDGNORTH FAIR** was but very indifferently stocked, and had few attendants. Sheep averaged from 7d. to 7½d. per lb.; good cows sold freely at 6½d. per lb. There was a tolerably good show of cheese, the best household selling at 5d. per lb. and upwards.

**CAMELFORD FAIR** was very thinly supplied with cattle of all sorts, and business was exceedingly dull. Scarcely any sales were effected.

**CLITHEROE FORTNIGHTLY MARKET.**—The supply of stock was very limited, and the attendance of traders scarce. Little business was done. No fat stock shown. There were a few calvers, which had a slow sale at lower prices. No mutton.

**GISBURNE FORTNIGHTLY MARKET.**—There was a fair show of calvers, which went at something lower than last fair. Few fat beasts in the market of moderate quality. Sales were made at about 6d. per lb.

**GLOUCESTER MONTHLY MARKET** was thinly supplied with beef and mutton, and its quality was of a very indifferent kind. The demand was good, consequently prices ruled high. Beef, 6½d. to 6¾d. per lb.; Mutton, 7d. to 7½d.

**HAY FAIR.**—The cold easterly winds of last week had a most depressing effect upon our usually large Easter fair. There was but a small show of stock and very few purchasers. Those offerers of stock that were fortunate enough to meet with buyers realized about the usually good prices obtained of late, but very few cattle changed hands. In the horse fair, good cart horses were caught up instantly at very high rates, as were also good hacks, at very remunerating prices. There was, however, but a very small show.

**KELSO FORTNIGHTLY MARKET.**—There was the largest supply of cattle we have had this season, the most of which were of excellent quality. There was a good attendance of buyers, and it was a quick selling market at prices rather higher than at our previous market. Almost the whole were readily disposed of. The current prices were from 6s. 3d. to 7s. per stone. There was a middling show of sheep, mostly hogs, for which the demand was not so brisk. Fat sheep brought about 7d. per lb. A large show of cows, which met with rather dull sale at prices about 20s. each below last market; Ayrshire, from £8 to £12; short-horned, from £13 to £16.

**KETTERING FAIR** was thinly supplied with both beasts and sheep, but those pitched found ready sale at good prices. There were some fine fat sheep exhibited.

**KIDDERMINSTER FAIR** was very scantily supplied with cattle, good stock being especially scarce. The attendance of buyers also was poor, and therefore but little business done. Prices ranged from 6d. to 6½d. for beef, and 6½d. to 7d. for mutton.

**LINCOLN FAT STOCK MARKET** was well supplied with both beasts and sheep, the sale for which was far from brisk. Beef realized from 7s. 6d. to 7s. 9d. per stone, and mutton in the wool 7d. per lb.; clipped sheep, 6d. per lb.

**LUDLOW FAIR** was moderately supplied with every description of stock, and for store animals high prices were obtained; 6d. was the top price for beef, and mutton averaged fully 7d. per lb. Pigs were remarkably dear. There was a demand for good horses at high rates.

**MAILTON FAIR.**—There was a moderate supply of cattle, which had only dull sale at about late quotations. A large number of pigs had moderate demand at fully last week's prices. A good show of meat had fair sale. Beef and mutton 5d. to 7d., veal 6½d. to 8½d., pork 5d. to 7d. per lb.; pork pigs 6s. 9d., hams 7s. 6d. per stone. The horse show had a very short supply of horses, the best kinds of which were in good demand at high prices.

**MUIR OF ORD MARKET** was pretty numerously attended. From three to four thousand Cheviot hogs, some widders, and a limited number of cattle and horses were exposed for sale. The quality of those hogs exposed was, on the whole, better than might have been expected, as last year was an unfavourable one for lambs, and turnips have not lasted the usual period this spring. Prices were much the same as last year—from £17 to £22 per clad score. The

following are amongst the largest lots sold: Mr. Macrae, Auchmore, Cheviot wedder hogs, at £20 10s.; Mr. Jackson, at £22; Mr. Mackenzie, Ord, and Mr. Mason, Gortuleg, at £21 and £20 respectively; Mr. Fraser, Easter Lovat, at £20; Mr. Cameron, Dream, at £21 15s., &c. Fully a third of the stock was unsold.

**NORTHAMPTON FAIR.**—Fat sheep in rather limited supply; most of them were sold. Best wethers in the wool made 4s. 10d. to 5s. per 8lbs., out of the wool from 4s. to 4s. 2d. The supply of fat beasts was also rather short; best fat beef made from 4s. 4d. to 4s. 8d. per 8lbs. In store beasts the supply was moderate, and consisted chiefly of very fine Herefords, with a few lots of black Welch beasts; also some very useful home-bred barren cows in good condition, and new milch and down-calving cows. A fair amount of business was transacted. In the horse fair there was not much doing; some good cob horses found a ready sale.

**NORWICH TOMBLAND FAIR, March 20.**—(From our own Correspondent.)—This great and annual fair commenced with a small show of Scots and shorthorns, and other store cattle; buyers were cautious, and sales dull at—for Scots 4s. to 4s. 6d., shorthorns 3s. 6d. to 4s. per stone when fat: at these prices a clearance was not effected. Fat beasts 7s. to 7s. 6d., very prime 8s. per stone. The pens all filled; hoggets a larger number than have been shown for years; buyers numerous, and nearly all sold at the following prices: poor and ordinary 20s. to 22s., middling 25s. to 28s., fresh in condition 33s. to 36s., prime 40s. to 44s., and fat hoggets 48s. to 50s. per head; although prices were not in general satisfactory, in consequence of the scarcity of keep during the summer months, combined with the bad state of the turnip crop, and the high prices of artificial food, still they made quite as much as was anticipated, and a fair clearance was effected. This fair may justly be termed one of the best in England for store sheep. Fat sheep in their wool 8s. 6d., naked 7s. to 7s. 6d. per stone. We may justly notice the exhibitors of the best and greatest number of hoggets: Messrs. Shearman, George Rolle, Leedes, Claxton, Weston, Coome, Gayford, and other dealers, Fromore and Preedy salesmen; all of whom made a good clearance. In horses a large amount of business was transacted at prices varying from 35l. to 40l., 50l. to 60l. per head, the best horses being in the greatest request.

**PENRYN FAIR** was scantily supplied, and but little business was transacted. Good beef realized 56s. per cwt.; sheep, 7d. per lb.

**PONTEFRAC T FAIR.**—The show of stallions was larger than on former occasions. The show of horses was very inferior. There was a great quantity of fat beasts in the fair, which sold at good prices, and were chiefly bought by butchers in the neighbourhood.

**ROSS FAIR** was very flat. Best wether mutton sold for 7½d.; ewes, 7d. per lb. Fat cattle fetched 7d., but there was not much business done. There were few good horses, and this portion of the fair was very dull.

**SHAFESBURY FAIR.**—There was a good show of stock, and high prices were realized.

**SHREWSBURY MARKET.**—The Lent beef sold for 6d. per lb.; some few smart things a shade over; fat calves, 6½d.; fat wether sheep full 7d.; ewes and lambs from 40s. to 50s. per couple; useful store cattle in demand at full prices, also cows and calves; fat pigs 6d. per lb., and stores selling at very high prices.

**SOMERTON FAIR** was well attended. Beef sold readily at 10s. 6d. to 11s. per score; mutton, 7d. per lb.; and all kinds of poor stock sold at advanced prices. There was a great number of pigs penned, and prices generally had an upward tendency.

**TADCASTER FORTNIGHTLY MARKET.**—The stock had a fair demand. Beef, 7s. to 7s. 9d.; bacon pigs, 6s. per stone; mutton, 7d. per lb.

**TORRINGTON GREAT MARKET.**—In comparison with former periods, the supply of beasts driven in exhibited a great decline. Of the number shown about 550 exchanged hands, the sale being brisk at the opening of the market. The following are the quotations:—Fat bullocks, 10s. to 10s. 3d. per score; cows and calves, £11 to £13 10s.; oxen, £26 to £32; prime oxen, £34 to £44; steers, three to four years old, £22 to 24 guineas; ditto, two to three years old, £16 to £24; ditto, one to two years old, £8 to £11 the pair; lean

bullocks, 6s. to 7s. per score. Sheep were very limited, and a small amount of business done at the following rates:—Fat sheep, 6½d. to 7d. per lb.; hogs, 20s. to 25s. each.

**WORCESTER FAIR.**—There was a large attendance of buyers, and a good show of stock. Great demand for good cows, all of which were sold. Cows and calves a great many on offer, and prices ranged somewhat lower. Very few sheep. Scanty supply of horses, and but little business done. Pigs plentiful, and all sold. Beef and mutton sold readily at advanced prices; beef, 6½d. to 7d.; mutton, 7d. to 7½d.; pork, 6d. to 6½d. per lb.

**YORK FORTNIGHTLY MARKET.**—We had a fair supply of fat beasts, which were met by a moderate demand, at from 6s. 9d. to 7s., and prime fed at 7s. 3d. per stone. Of mutton sheep there was an average show; in wool, 6½d. to 7d.; clipped, 5½d. per lb. Grazing sheep were in greater supply than demand; hogs of pure breed and quality having the decided call of the market, while inferior and cross-breeds were a drug; the former, in wool, 7d.; clipped, 5½d. per lb.; and many were unsold. A large number of lean beasts was displayed, which met a limited demand, at prices tending downwards. Calving and dairy cows were also in supply above demand, at lower rates than last fair.

**HOP MARKET.**

**BOROUGH, Monday, March 24.**

The choicest samples of Kent and Sussex Hops continue in moderate demand, at fully the prices of last week.

Inferior descriptions are very dull of sale, at nominal quotations.

HART & WILSON.

**POTATO MARKETS.**

**SOUTHWARK WATERSIDE.**

**MONDAY, MARCH 24.**

During the past week the arrivals coastwise have been moderate, but fully equal to the demand, which is still very limited for the season of the year.

The following are this day's quotations:—

	s.	d.	s.	d.
York Regents .....	50	0	to	80 0
Kent and Essex do. ....	50	0		70 0
East Lothian do. ....	55	0		60 0
Ditto, Reds .....	50	0		55 0
Perth, Forfar, and Fifeshire Regents.....	50	0		60 0
Ditto, Reds .....	40	0		45 0
Aberdeenshire and North Country Reds .....	30	0		35 0

**BOROUGH AND SPITALFIELDS.**

**MONDAY, March 24.**

Our markets continue to be well supplied with potatoes coastwise and by railway. For all kinds the demand is heavy, and prices are barely supported. York Regents, 75s. to 85s.; Kent and Essex do., 70s. to 80s.; Scotch do., 60s. to 70s.; Cups, 45s. to 50s.; Middlings, 40s. to 45s.; Lincolns, 50s. to 60s.; Blues, 50s. to 60s. per ton.

**ENGLISH BUTTER MARKET.**

**MARCH 24.**

We note the market as very firm for all descriptions of Butter.

Dorset, fine new milk.....	130s. to 134s. per cwt.
Do. middling .....	110s. to 116s.
Fresh .....	12s. 16s. per doz. lbs.

**BELFAST, (Friday last.)**—Butter: Shipping price, 106s. to 112s. per cwt.; firkins and crocks, 10¾d. to 11¾d. per lb. Bacon, 58s. to 64s.; Hams, prime, 74s. to 78s., second quality, 64s. to 68s. per cwt.; prime mess Pork, 90s. 6d. to 95s. 6d. per brl.; Pork, 55s. to 58s.; Beef, 105s. to 140s. per tierce; Irish Lard, in bladders, 74s. to 76s.; kegs or firkins, 68s. to 70s. per cwt.

March	Butter.		Bacon.		Dried Hams,		Mess Pork.	
	per cwt.		per cwt.		per cwt.		per brl.	
21.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1852..	78 0	84 0	42 0	45 0	54 0	60 0	67 0	70 0
1853..	86 0	93 0	56 0	53 0	70 0	74 0	80 6	90 0
1854..	95 0	102 0	54 0	60 0	70 0	70 0	87 0	90 0
1855..	96 0	106 0	56 0	60 0	70 0	74 0	92 6	95 0
1856..	106 0	112 0	58 0	64 0	74 0	78 0	94 0	95 0



Cossack .....	12	by Hetman Platoff, out of Joannina, by Priam	started 19, won 8	won the Derby	untried.	—	Neasham, Darlington ..	Mr. Cookson .....	15 sovs. (45 mares)
Cotherstone .....	16	by Touchstone, out of Emma, by Whisker ..	started 11, won 7	won the Derby	55	Pumicestone .....	Althorp, Northampton ..	Mr. Elliott .....	12 gs. (20 mares)
Cowl .....	14	by Bay Middleton, out of Crucifix, by Priam ..	started 18, won 5	won Buckenham S. ....	24	Dervish .....	Leybourne, Maidstone ..	Mr. Tweed .....	15 gs.
Crozier .....	12	by Lane-cast, out of Crucifix, by Priam .....	started 18, won 3	won £650 at Ascot .....	5	Simon Pure .....	Ardee, Louth, Ireland ..	Mr. Halch .....	4 snvs., h. b. 2 sovs.
Cruiser .....	4	by Venison, dam by Little Red Rover .....	started 1 .....	second for Criterion .....	untried.	Lambton .....	Raxwille Paddocks .....	T. Bateson .....	10 gs.
Cure, The .....	15	by Physician, out of Morsel, by Mulatto .....	started 26, won 16	won the Claret .....	8	—	Catierick .....	Mr. C. Pybus ..	10 sovs.
Dagobert .....	6	by Ion, dam by Langar .....	started 12, won 3	won Chesterfield Stakes ..	untried.	—	Bishop Monckton, Ripon ..	—	10 gs., h. b. 2 gs.
Damask .....	9	by Touchstone, out of Moss Rose, by Blacklock	started 3, won 1	received a match forfeit.	untried.	—	Willenden .....	Mr. Phillips .....	5 gs., h. b. 3 gs.
Daniel O'Rourke ..	7	by Birdcatcher, out of Forget-me-not, by Het-	started 10, won 2	won the Derby .....	untried.	—	Sledmere, Malton .....	—	10 gs.
Dear-me! .....	6	by Melbourne, out of Ennui, by Bay Middleton	started 45, won 7	won £130 at Goodwood	untried.	—	Henwood, Bolton-le-	Mr. Redhead .....	5 gs., h. b. 2 1/2 gs.
Dervish .....	5	by Cowl, out of Duchess of Kent, by Belshazzar	started 12, won 5	won Prince of Wales' St.	untried.	—	Knowsly, Prescott .....	T. Forshaw .....	5 gs., h. b. 2 1/2 gs.
Eicot .....	7	by Venison, dam (half-bred) by Defence .....	started 7, won 3	won Woodcote Stakes ..	untried.	—	Manborough .....	Mr. Dixon .....	5 gs., h. b. 2 1/2 gs.
Era, The .....	16	by Plenipotentiary, dam by Whisker .....	started 26, won 7	won Liverpool Cup .....	3	Puncture .....	Langric Ferry, Selby .....	Mr. R. Hepworth	7 gs., h. b. 2 gs.
Essedarius .....	10	by Gladiator, dam by Velocipede .....	started 8, won 2	won Somersetshire S. ....	untried.	—	Wood Hill, Sheffield ..	—	8 gs.
Fallow Buck .....	11	by Venison, out of Plenary, by Emilius .....	never appeared ..	—	1	Deerhound .....	Liss, Hanis .....	Mr. W. Ayling ..	5 gs., h. b. 2 sovs.
Fernhill .....	6	by Natwit, out of Arethusa, by Elis .....	started 34, won 11	won Metrop. Handicap ..	untried.	—	Wrawby, Brigg .....	Mr. Ashton .....	7 gs., h. b. 3 gs. &c.
Filbert .....	7	by Venison, out of Celia, by Touchstone .....	started 36, won 10	won the Claret .....	untried.	—	Halling Court, Rochester ..	Mr. Wyatt .....	5 gs.
Filius .....	6	by Venison, out of Birliday, by Pantaloon ..	started 9, won 1	won £1,600 at Goodwood	untried.	—	Plopton, Harrogate .....	Mr. Groves .....	7 gs., h. b. 2 gs.
Flatcatcher .....	11	by Touchstone, out of Decoy, by Filho-da-Puta	started 26, won 16	won 2,000 Gs. Stakes ..	18	Courtenay .....	Oulton, Birmingham ..	Mr. Taylor .....	7 gs., h. b. 3 gs.
Flying Buck, The ..	6	by Venison, out of Vania, by Lottery .....	ever appeared ..	—	5	Mary Copp .....	Plopton, Harrogate ..	Mr. Groves .....	40 gs. (30 mares, full)
Flying Dutchman ..	10	by Bay Middleton, out of Barbelle, by Sandbeck	started 16, won 15	won the Derby .....	5	Oleaster .....	Turf Tavern, Doncaster ..	Mess. Weatherby	4 sovs., h. b. 2 sovs.
Footstool .....	13	by The Saddler, out of frudge, by Tramp .....	started 24, won 9	won Swinley Stakes .....	16	Troussau .....	Queen's Hill, Cheltenham ..	W. Hiron .....	10 gs., h. b. 3 1/2 gs.
Foxberry .....	17	by Voltaire, out of Matilda, by Comus .....	started 39, won 9	won Glasgow Cup .....	16	—	Easby, Richmond, York ..	Mr. Jaques .....	10 sovs.
Gameboy .....	14	by Tomboy, out of Lady Moore Carew, by Trump	never appeared ..	—	3	Namur .....	Theobald's Farm, Stock-	Mr. S. Matthews	10 sovs.
Grecian .....	8	by Epirus, out of Jenny Jumps, by Rococo ..	started 4, won 2	won July Stakes .....	untried.	—	Lowowld, Sussex .....	Mr. Scuit .....	10 gs., h. b. 5 gs.
Grey Tommy .....	7	by Sleight-of-Hand, dam by Comus .....	started 10, won 3	won £180 at Reading ..	untried.	—	Ardee, Louth, Ireland ..	Mr. Hatch .....	4 sovs., h. b. 2 sovs.
Grimston .....	13	by Verulam, out of Morsel, by Waxy .....	started 36, won 14	won Goodwood Cup .....	untried.	—	Aldford, Chester .....	T. Packer .....	5 gs.
Grosvenor .....	8	by Touchstone, out of Miss Beverley, by Stockport	started 3, won 1	won Plymouth Vase ..	78	King Tom .....	Doddinghill, Wiltlesden	T. Bullock .....	15 gs. (40 mares)
Harkaway .....	22	by Economist, dam by Naboclish .....	started 38, won 25	won Goodwood Cup (2).	untried.	—	Great Grimby .....	Mr. S. Williams	5 sovs., h. b. 3 sovs.
Helmet .....	5	by Cowi, out of Minerva, by Muley Moloch ..	started 18, won 4	won 2,000 Gs. Stakes ..	3	—	Birch Farm, Oswaldkirk ..	Mr. Hardcastle ..	10 sovs.
Hermit, The .....	5	by Bay Middleton, out of Jenny Lind, by	started 10, won 5	won Emperor's Plate ..	untried.	—	Danebury, Stockbridge ..	—	5 gs.
Hero, The .....	13	by Touchstone	started 37, won 29	won Glasgow Stakes .....	untried.	—	Woburn Abbey, Beds. ..	Mr. Groves .....	10 gs.
Hesperus .....	7	by Bay Middleton, out of Plenary, by Emilius	started 14, won 8	won New Stakes .....	1	Diana .....	Plopton, Knarsboro' ..	Mr. J. Ashton .....	5 gs., h. b. 2 gs.
Hobbs Noble .....	7	by Pantaloon, out of Phryne, by Touchstone ..	started 14, won 5	won Stockton Plate .....	2	Mary .....	Wrawby, Brigg .....	W. Daykins .....	5 gs., h. b. 2 1/2 gs.
Humphrey .....	21	by Sandbeck, out of Oceana, by Cerberus ..	started 46, won 16	won the Port .....	1	High Priest .....	Turf Tavern, Doncaster ..	W. Robinson .....	10 sovs.
Hurworth .....	6	by Birdcatcher, out of Wasp, by Muley Moloch	never appeared ..	—	20	Hungerford .....	Ashton, Lancaster .....	Mr. S. Rogers .....	10 gs.
Idle Boy .....	11	by Harkaway, out of Idle, by Sir Hercules ..	started 9 .....	won Great York Stakes ..	2	—	Newmarket .....	Mess. Weatherby	15 gs. (30 mares)
Joe Lovell .....	14	by Jerry, out of Turquoise, by Selim .....	started 22, won 11	won Newmarket S. ....	untried.	—	Willesden .....	Mr. Hardcastle ..	5 gs., h. b. 2 1/2 gs.
John o' Gaunt .....	15	by Velocipede, out of Cyprian, by Partizan ..	started 0, won 3	ran second for Derby ..	untried.	—	Oswaldkirk, York .....	—	10 gs.
King Caradoc .....	18	by Taurus, out of Mona, by Partizan .....	started 35, won 23	ran second for Derby ..	untried.	—	Weather Hill, Hornsea ..	Mr. Markham ..	6 gs., h. b. 2 gs.
King Tom .....	5	by Prince Caradoc, out of Miss Julia Bennett,	never appeared ..	—	3	—	Mentmore, Bucks .....	Mr. Hill .....	20 gs.
Kingston .....	8	by Muley Moloch	started 6, won 3	won Goodwood Cup .....	3	—	Ackworth, Pontefract ..	Mr. Blenkiron ..	20 gs.
Kingston .....	4	by Harkaway, out of Pocahontas, by Glencoe	started 12, won 4	—	3	—	Middle Park, Eltham ..	—	—
Kingston .....	7	by Tearaway, out of Foinnuala, by Birdcatcher	started 43, won 17 1/2	—	3	—	—	—	—

STALLIONS FOR THE SEASON 1856—(Continued).

Name.	Colour.	Age.	Pedigree.	Performances.	Principal Performance.	No. of winners out by.	Sire of	Standing at	Apply to	Price.
Knight of Arend	chestnut	9	by The Doctor, out of Blue Bonnet, by Touchstone	started 6, won 4	won the Port	untried.	—	Agglethorpe, Middleham	—	10 gs., h. b. 5 gs.
Knight of Gwynne	brown	9	by Gilbert Gurney, out of Senweed, by Slane	started 17, won 5	won Newton St. Leger.	untried.	—	Plompton, Harrogate	Mr. Groves	5 gs.
Koh-i-noor	chestnut	7	by The Libel, out of Miss Kitty Cockle, by Cadland	started 17, won 4	won Cheshire Stakes	untried.	—	Bushbury, Wolverhampton	Mr. Daily	10 gs., h. b. 3 gs.
Launcelot	brown	19	by Emma, by Whisker	started 10, won 6	won St. Leger.	23	Portia	Salutation, Doncaster	—	10 gs.
Leopold	chestnut	7	by Phlegon, out of Marinella, by Southsayer	started 7, won 2	won Ascot Vase	untried.	—	Menimore, Leighton Buzzard	Mr. Markham	7 gs., h. b. 3 gs.
Leybourne	chestnut	8	by Epirus, out of Lady Strut, by Defence	started 45, won 11	won £160 at Goodwood	untried.	—	Pidley, Hants	Mr. Ekins	5 gs., h. b. 2½ gs.
Libel, The	brown	14	by Pantaloon, out of Pasquinade, by Camel	started 7, won 3	won Chester St. Leget.	10	Truth	Duddinghill, Willesden	T. Bullock	10 gs., h. b. 6 gs.
Little Known	bay	20	by Muley, out of Lacerta, by Zofiac	started 2	—	2	Miss Ann	Ladykirk, Berwick	C. Bitten	5 sovs.
Longbow	bay	9	by Ithuriel, out of Miss Bowe, by Cation	started 21, won 13	won Stewards' Cup	untried.	—	Knowsley, Presscott	F. Forshaw	10 gs.
Lord Fauconbergh	bay	6	by Irish Birdcatcher, out of Alice Hawthorne, by Muley Moloch	started 19, won 1	won a Royal Plate	untried.	—	Rose-street, Edinburgh	Mr. M'Adam	6 gs. (30 mares)
Lothario	bay	16	by Lanercost, out of Moggy, by Sultan	started 22, won 6	won Liverpool Cup	3	Fuze	Duddinghill, Willesden	T. Bullock	5 gs.
Loup-Garou	brown	10	by Ganerco, out of Moonbeam, by Tomboy	started 6, won 1	received £15 ft.	2	Coroner	Redlands, Reading	Mr. Lediard	15 gs. (30 mares)
Magnes	bay	7	by Touchstone, out of Latitude, by Langar	started 4	—	untried.	—	Swalcliffe, Banbury	Mr. Gulliver	10 gs.
Magnet, The	bay	14	by Camel, out of The Queen of the Vale, by Tarrare	started 15, won 11	won Granby Handicap	untried.	—	Audlem, Nantwich	Mr. Lisle	6 gs., h. b. 3 gs., &c.
Marley Hill	brown	5	by Melbourne, out of Mowerina, by Touchstone	started 4, won 1	won £220 at Newcastle	untried.	—	Skerne, Driffield	Mr. Stockdale	5 gs., h. b. 2 gs.
Marsyas	chestnut	5	by Orlando, out of Malibran, by Whisker	started 7, won 3	won July Stakes	untried.	—	Middle Park, Eltham	Mr. Blenkiron	5 gs., h. b. 2½ gs.
Mathematician	bay	10	by Emilius, out of Maria, by Whisker	started 16, won 5	won Ebor Handicap	2	Monge	White Hart, Newmarket	F. Chapman	7 gs., h. b. 2 gs.
Melbourne	brown	22	by Humphrey Clinker, dam by Cervantes	started 18, won 9	won the Palatine S.	91	West Australian	Cawston, Rugby	Mr. Hemming	25 gs. (20 mares)
Mickey Free	brown	15	by Isnael or Irish Birdcatcher, out of Annie, by Wanderer	started 23, won 12	won Cleveland Cup	4	May Blossom	Kirkby, Tadcaster	Mr. Scott	5 gs.
Midas	chestnut	8	by Beiram, out of Merope, by Voltaire	started 25, won 9	won Newmarket St. Leger	untried.	—	Barghley, Stamford	Mr. H. Rose	10 gs.
Mildew	chestnut	9	by Slane, out of Semeseria, by Voltaire	started 21, won 10	won Ascot Vase	1	Blast	Easby, Richmond, York	Mr. Jaques	10 gs., h. b. 2½ gs.
Moortcock	brown	14	by Heron, dam by Young Phantom	started 8, won 4	won a Plate	untried.	—	Knighton, Radnor	Mr. F. Griffiths	5 sovs.
Mortimer	bay	5	by Slane, dam by Glencoe	never appeared	—	untried.	—	Newmarket	Messrs. Barrow	7 gs., h. b. 3 gs.
Nabob	black	7	by The Nob, out of Hester, by Canel	started 26, won 6	won Chesterfield Cup	untried.	—	Findon	Mr. Goater	10 sovs.
Neastam	bay	8	by Hetman Platoff, out of Wasp, by Muley Moloch	started 16, won 3	won Northumberland P.	untried.	—	Middle Park, Eltham	Mr. Blenkiron	6 gs., h. b. 3 gs.
Newcourt	bay	13	by Sir Hercules, out of Sylph, by Spectre	started 19, won 8	won Hereford Stakes	untried.	—	Althorp, Northampton	Mr. Elliott	10 gs. (20 mares)
Newminster	bay	8	by Touchstone, out of Beeswing, by Dr. Syntax	started 16, won 2	won St. Leger	untried.	—	Tiekhill Castle, Northampton	Mr. Hornshaw	10 gs.
Nutwith	bay	16	by Tomboy, dam by Corvus	started 7, won 3	won St. Leger	17	Cobnut	Barghley, Stamford	Mr. H. Rose	20 gs. (25 mares)
Orestes	bay	6	by Orlando, dam by Bay Middleton	started 23, won 9	won Woodcock Stakes	untried.	—	Kettleby-Thorpe, Brigg	Mr. Hobson	10 gs.
Orpheus	chestnut	7	by Orlando, out of Malibran, by Whisker	started 24, won 6	won Granby Handicap	untried.	—	Winterringham, Malton	—	5 gs., h. b. 2 gs.
Pelion	brown	6	by Ion, out of Ma Mie, by Jerry	started 16, won 8	won Eglinton Stakes	untried.	—	Newmarket	Messrs. Barrow	10 gs.
Phenomenon	bay	11	by Old Phenomenon, out of a Lincoln mare	—	—	—	—	Cholwell, Totness	Mr. Watson	2 sovs.
Phlegon	bay	16	by Beiram, out of Lucia, by Reveller	started 6, won 2	won G. Duke Michael S.	9	Leopold	Barghley, Stamford	Mr. H. Rose	10 gs.
Pitsford	chestnut	9	by Epirus, out of Miss Horwood, by the Saddler	started 23, won 9	won 2,000 gs. Stakes	untried.	—	Duddinghill, Willesden	J. Bullock	8 gs., h. b. 5 gs.
Planet	bay	12	by Bay Middleton, out of Plenary, by Emilius	started 9, won 4	won Molecomb Stakes	7	Ceres	Roydon, Diss	T. Slater	10 gs.

Pompey .....	brown ..	16	by Emilius, out of Variation, by Bustard ..	started 26, won 10	won Gt. York. Hand. (2)	7	Nancy .....	Burton Pidesea, Hull ..	Mr. Baxter .....	10 gs.
Poynton .....	bay .....	13	by Touchstone, out of Lady Stafford, by Comis ..	started 6, won 8	won Great Yorkshire S.	6	Lady Vernon .....	Monk Bar, York .....	—	5 sovs., h. b. 2 sovs.
Prime Minister .....	brown ..	8	by Melbourne, out of Pantalonnade, by Pantaloon ..	started 31, won 8	won the Port .....	untried.	—	Barnes Lodge, King's ..	D. Miles .....	5 gs., h. b. 2½ gs.
Prince Arthur .....	bay .....	5	by Orlando, out of The Princess, by Slane .....	started 3, won 1	won Column Stakes .....	untried.	—	Nuthourne, Emsworth ..	—	5 gs.
Professor Buck .....	bay .....	5	by Melbourne, dam by Pantaloon .....	started 9, won 2	won £100 at Knutsford ..	untried.	—	Delamere, Tarporley ..	—	5 sovs., h. b. 2½ sovs.
Ptolemy .....	bay .....	5	by Pyrrhus the First, out of Celeste, by Muley ..	started 6, won 10	won £170 at Doncaster ..	untried.	—	Addington, Croydon .....	Mr. Walker .....	5 gs., h. b. 3 gs.
Pyrrhus the First .....	chestnut ..	13	by Epirus, out of Fortress, by Defence .....	started 13, won 8	won the Derby .....	14	Virago .....	Willesden Paddocks ..	Mr. Phillips .....	30 gs. (35 mares)
Ratan .....	chestnut ..	15	by Buzzard, dam by Pictou .....	started 9, won 4	won the Criterion .....	13	Penang .....	Dean's Hill, Stafford ..	Mr. Painter .....	7 gs., h. b. 3½ gs.
Rataplan .....	chestnut ..	6	by The Baron, out of Pocahontas, by Glencoe ..	started 71, won 42	won 21 Royal Plates .....	untried.	—	Tiekhill Castle Farm ..	W. Horsham .....	25 gs. (20 mares)
Ravensbone .....	bay .....	10	by Venison, out of Specimen, by Rowton .....	started 1 .....	—	untried.	—	Theobald's Farm, Stock ..	Mr. Matthews ..	5 sovs.
Roland .....	bay .....	10	by The Saddler, out of Executrix, by Liverpool ..	started 15, won 2	won Wolverhampton S ..	untried.	—	Plompton, Harrogate ..	Mr. Groves .....	—
Sageguard .....	chestnut ..	24	by Defence, dam by Selim .....	never appeared ..	won the Cuen st.-Chase ..	7	Agis .....	Longstock, Stockbridge ..	—	15 gs.
Saucy Boy .....	—	—	by Arthur, dam by Mameluke .....	horse .....	—	untried.	—	Willesden Paddocks ..	Mr. Phillips .....	5 gs., h. b. 3 gs.
Siracol .....	brown ..	16	by Sheet Anchor, out of Nanette, by Parisian ..	started 5 .....	—	2	Tobolski .....	Borough's, Hendon ..	G. Rutherford ..	5 gs., h. b. 2 gs.
Sir Tatton Sykes .....	bay .....	13	by Melbourne, dam by Margrave .....	started 12, won 4	won St. Leger .....	6	Mr. Sykes .....	Walton, Banstead .....	Mr. S. Rayner ..	21 gs. (25 mares)
Slane .....	bay .....	23	by Royal Oak, dam by Orville .....	started 18, won 5	won Waterloo Shield ..	93	The Princess ..	Rawcliffe, York .....	T. Bateson .....	20 gs.
Snowdon Dunhill bay .....	bay .....	6	by Iago, out of Daughter of Toscar, by Bay ..	started 47, won 13	won Union Cup .....	untried.	—	Dalby, Terrington .....	—	5 gs., h. b. 2 gs.
Spanish Jack .....	brown ..	13	by Don John, out of Miss Lydia, by Walton ..	started 3, won 1	won £70 at Newton .....	1	Donna .....	Beekham .....	—	6 gs., h. b. 4 gs.
St. Lawrence .....	brown ..	19	by Skylark or Lapwing, out of Helen, by Black ..	started 53, won 23	won the Chester Cup ..	11	Saucebox .....	Lowfold, Petworth .....	Mr. Seutt .....	10 gs., h. b. 5 gs.
Stockwell .....	chestnut ..	7	by The Baron, out of Pocahontas, by Glencoe ..	started 21, won 12	won St. Leger .....	untried.	—	Kirby, Tadcaster .....	Mr. Scott .....	30 gs. (30 mares, full)
Storm .....	bay .....	8	by Touchstone, out of Ghuznee, by Pantaloon ..	started 2, won 1	won £460 at Doncaster ..	2	Mountain Breeze ..	Rehlands, Reading .....	Mr. Letland ..	10 gs.
Surplice .....	brown ..	14	by Touchstone, out of Cruetix, by Priam .....	started 16, won 3	won the Derby .....	6	Honily .....	Turf Tavern, Doncaster ..	Mess. Weatherby ..	20 gs. (35 mares)
Sweetmeat .....	brown ..	14	by Gladiator, out of Lollypop, by Starch .....	started 24, won 22	won Queen's Vase .....	20	Mincemeat .....	Stanton, Shiffnal .....	Mr. Eyke .....	10 gs. (3 mares, full)
Swinfon .....	bay .....	10	by Mulatto, out of Ringlet, by Whisker .....	never appeared ..	—	—	Tyre .....	Wentworth, Rotherham ..	T. Hoess .....	5 sovs., h. b. 1 sov.
Tadmor .....	brown ..	10	by Ion, out of Palmyra, by Sultan .....	started 11, won 3	won Gratwicke Stakes ..	4	—	Roydon, Diss .....	T. Slater .....	10 gs.
Teddington .....	chestnut ..	8	by Orlando, out of Miss Twickenham, by St ..	started 18, won 10	won the Derby .....	untried.	—	Dean's Hill, Staff. rd ..	Mr. Painter .....	30 sovs. (20 mares)
Theon .....	brown ..	14	by Emilius, out of Maria, by Whisker .....	started 6, won 3	won Doncaster Two-yr. S ..	15	Alcoran .....	Boston .....	Mr. P. Snaith ..	2½ gs.
Touchstone (Vg.) .....	brown ..	6	by Touchstone, dam by Discount .....	never appeared ..	—	untried.	—	Hatherton, Crewe .....	Mr. Harper .....	7 gs., h. b. 3 gs.
Taurus .....	bay .....	10	by Taurus, out of Charissa, by Defence .....	started 2, won 3	won Chesterfield Cup ..	untried.	—	Knockhill, Ecclefechan ..	R. Menzies .....	5 gs.
Ugly Buck .....	bay .....	15	by Venison, out of Monstrosity, by Plenipo ..	started 5, won 3	won 2,000 gs. Stakes .....	17	Ammonia .....	Berry Hill, Stoke-on ..	Mr. Parby .....	5 gs., h. b. 3 gs.
Umbriel .....	bay .....	6	by Touchstone or Melbourne, out of Verbena, ..	started 15, won 10	won Great York Stakes ..	untried.	—	Trent .....	—	—
Vanderdecken .....	brown ..	6	by Bay Middleton, out of Barbelle, by Sandbeck ..	started 18, won 4	won Cheshire Stakes .....	untried.	—	Burghley, Stamford ..	Mr. Rose .....	15 sovs.
Vatican .....	bay .....	10	by Venison, out of Vat, by Langar .....	started 27, won 1	won Newmarket S .....	untried.	—	Hambleton, Thirsk .....	Mr. Stebbing ..	5 sovs.
Volligeur .....	brown ..	9	by Voltaire, out of Martha Lynn, by Mulatto ..	started 11, won 5	won the Derby .....	untried.	—	Middlesham, York .....	Mr. S. Boon .....	15 gs. (35 mares, full)
Vortex .....	brown ..	7	by Voltaire, out of Martha Lynn, by Mulatto ..	started 3 .....	—	untried.	—	Northampton .....	Mr. Merrick .....	7 gs., h. b. 3 gs.
Weatherbit .....	brown ..	11	by Sheet Anchor, out of Miss Letty, by Priam ..	started 8, won 3	won Four-year-old S .....	11	Weathergage .....	Newmarket .....	—	15 sovs.
West Australian .....	bay .....	6	by Melbourne, out of Mowena, by Touchstone ..	started 11, won 1	won the Derby .....	untried.	—	Kirby, Tadcaster .....	Mr. Seutt .....	30 gs. (30 mares, full)
Wild Dayrell .....	brown ..	4	by Ion, out of Ellen Middleton, by Bay Mid ..	started 4, won 3	won the Derby .....	untried.	—	Chilton Foliat, Hun ..	Mr. Seutt .....	30 gs. (2 mares)
Windhound .....	brown ..	9	by Pantaloon, out of Phryne, by Touchstone ..	started 6, won 1	won £74 at Reading .....	1	Wandering Willie ..	Caston, Rugby .....	Mr. Henmin .....	11 sovs., dams of
Wood-Pigeon .....	bay .....	11	by Velocipede, out of Amina, by Sultan .....	started 17, won 7	won Ascot Stakes .....	2	Dove .....	Burghley, Stamford ..	Mr. H. Rose ..	10 gs. [winners 5½]

## REVIEW OF THE CORN TRADE.

The past week has again evinced fluctuation of opinion as regards grain prices, but the tendency has been almost universally down, the London market being most prominent in the decline. The high prices that have obtained in a time of war seem to have left the impression on some minds that they were solely traceable to it, and consequently that on its cessation, without regard to other circumstances, low rates must speedily be dominant. Many of our correspondents think otherwise, and we think so, on very good grounds; though till stocks, by the general falling-off of supplies, indicate an approach to exhaustion, there is still room for a temporary reduction. It is clear, however, that five months have to be provided for as respects our own country, France, Belgium, and other parts—that the weekly deliveries into London are falling off, as well as at many of the country markets—that Russia can send little before next harvest—that America, unless stimulated to greater efforts, is not likely to ship over 3,000,000 qrs. of wheat for all Europe; and it even becomes doubtful whether her surplus is equal to this, should there be the temptation of *good prices*; whereas the relative position of the markets would leave the inference that England was absolutely independent of foreign help, and though facts from all quarters show exactly the reverse; while the spring, which at one time looked forward, has been marked by excessive cold. A genial change in the weather would, however, speedily advance the growth of the wheat plant, which in backward districts is very diminutive, though there is less complaint of the depredations of insects than were lately made. Our own decline has sensibly influenced France and the near continental markets, which is calculated to deceive the public as to general stocks, and ultimately place us in a position of difficulty, as America seems little inclined to answer the summons to reduce rates, excepting in the article of maize, which has this season met with unusual neglect, upon the supposed sufficiency of the wheat crop to meet every demand for export. Floating cargoes have been offering at greatly reduced rates, several parcels of Egyptian wheat being sold for Ireland, for the purpose of distillation, at 37s. to 38s. per qr., leaving an enormous loss upon the price free on board, and diverting a necessary of life from its legitimate purpose, as well as diminishing the nation's stores. We are persuaded, when peace is signed, sounder calculations will be made, and the doubtful but important

problem, "how much we are to have," will be nearer a true solution, and produce more equable markets.

The deliveries last week were 77,410 qrs. wheat, at 67s. 5d., against 82,905 qrs. last season. The foreign imports for the week ending 19th March, into the principal ports of England, in wheat and flour, were 31,515 qrs.

Monday's market commenced on a supply of 5,069 native and 7,788 qrs. foreign wheat, more than half of which was from India and New Orleans, in about equal proportions. The exports were 1,614 qrs. The morning's supply from Essex and Kent was good, but not large, most of the samples being in much improved condition. The languid tone of the close of the previous week was increased to a heavy decline, about equal to the advance of the former Monday, say 4s. to 5s. per qr. for all qualities, though early in the morning some sales were effected at the Kentish stands, at the reduction of 3s. only. Millers at this price showed no eagerness to clear the market, and a fair portion was left for disposal next day. The trade in foreign was nearly or quite suspended; and in the absence of business, without any disposition to press sales, prices continued nominally as before. On Wednesday the supply per coast was 1,620, that from abroad being 14,570 qrs. The wheat left over, as well as that fresh arrived, was held at the rates of the previous day, but sales were by no means brisk. By Friday the English supply was only increased 800 qrs., but on the foreign there was a further addition of 9,000 qrs. Though prices were generally well supported, business proceeded at a slow rate, and all through the week foreign was neglected, excepting picked parcels, where holders were inclined to sell on moderate terms.

Country flour amounted on Monday to 11,761 sks; but the foreign consisted of 150 sks. and 10,563 brls. from New York and New Orleans. Exports, only 113 sacks. This trade partook of the dullness in wheat, but not to the same extent, quotations for Norfolks being reduced 2s., making the top price 48s. per sack; and there was an equal fall on American barrels: at these rates transactions passed heavily. On Wednesday the coast arrival of country flour was 2,080 sacks, the foreign consisting of 11,160 sacks from Spain. This latter, however, having been long expected, did not much influence prices of foreign, though sales were difficult; but Norfolks could not be sold unless 1s. less was accepted. There was little ad-

dition coastwise on Friday, viz., about 400 sacks, with no more foreign, and the trade, though not active, showed more tone, holders of Norfolk not being inclined to sell under 48s. per sack.

Monday's barley arrivals were insignificant, viz., 1,375 British, and 40 foreign. This limited supply, however, did not further excite the market, there having been of late a continuous rise, and buyers being provided for immediate wants, they were content to wait for another opportunity. The rates of all kinds, especially the finest malting, were well maintained. On Wednesday there arrived coastwise 2,360 qrs., with 980 from the continent, without any change in the features of the trade, and on Friday it closed heavily on a total supply of 3,490 English, and nothing further from abroad.

The malt trade showed further signs of animation, but no quotable advance on any quality in this state of demand.

In the entire absence of Irish there was a fair supply of foreign oats on Monday, say, 16,832 qrs.,  $\frac{1}{3}$ d of which were from Holland. The British addition was only 1,300 qrs., or less than the exports, which were 1,642 qrs. The features of this trade underwent no change. There being a quiet demand for all good qualities at former prices, which seem to have reached so low a point that consumers can hardly look for any further reduction excepting in occasional gluts. Wednesday brought 910 qrs. per coast, 4,110 qrs. Irish, and 12,110 qrs. foreign, when there was a fair business, without change of rates. On Friday the further additions were only 100 qrs. English, and 1,000 qrs. foreign. This short arrival, however, was sufficient for the business of the day, which was limited, at unaltered prices.

Both beans and peas were unusually short; the former amounting to only 460 qrs., and the latter to 292 qrs., both almost exclusively English. There was, however, no rally in the prices of either, and the seed-time being advanced, maple peas, which had been forced up by it, were less sought, and seem not likely to realize the late rates. Duns, on the contrary, seem at a price to make pig-feeding remunerative. White boilers, though so high early in the season, have remained neglected.

Linseed, with only 2,882 qrs. as the supply, remains in favour for cattle-feed, and cakes continue to fetch good prices, though no advance can be quoted in either case. There are now low offers at Riga and Petersburg for future delivery.

The cloverseed trade being at its height, a fair business is effected at full prices, the near continental markets being all dearer, and Hambro' keeping up the quotations of white seed. Trefoil

also keeps dear, and in demand; but tares have given way from the first quotations 10s. per qr., the supply having exceeded the inquiry.

In hempseed, mustardseed, rapeseed, and other descriptions, little change can be noted.

The country markets, though nearly all dull and cheaper, have not fully responded to the metropolitan decline. At Birmingham, on the last market day, a slight improvement was realized. At Boston and Manchester the former rates were fully realized; at Leeds, Devizes, and Stockton-on-Tees, they were only 2s. less; at Spalding, Uxbridge, Hitchin, Gainsborough, and Lynn, they were 2s. to 3s. cheaper; at Hull, Louth, St. Ives, Bury St. Edmunds, Braintree, Bishop's Stortford, Gloucester, Bristol, Melton Mowbray, Newmarket, Market Rasen, and Sleaford, the fall was 3s. to 4s. per qr. Liverpool, on Tuesday, with liberal supplies, found a fair consumptive demand at a decline of 2d. to 3d. per 70lbs., on the best quality wheat, and 1d. more on inferior, with spring corn unchanged. On Friday there was a firmer market for wheat and everything else. Scarcely any difference has been noted in the prices of spring corn, though the tendency has been down in some markets 1s. for barley, as well as beans.

The Scotch markets last held have been influenced by southern reports. Glasgow found a dull trade in wheat at 1s. per qr. decline, and barley was 3d. to 6d. per 320lbs. down, with little doing in oats or meal. Edinburgh and Leith were in sympathy with these advices, and note a declension.

Ireland, with small supplies in most of her markets, generally quotes easier rates for wheat; Dublin 1s. to 1s. 6d. cheaper per barrel, barley 6d. to 1s., good oats as dear, inferior 6d. lower. Limerick, Clonmel, and Belfast give similar reports.

Last Friday's market at Paris was exceedingly dull in flour; the four marks being without offer or inquiry, nominal price 87 to 88 f. per 139 kilos (55s. 6d. English per sack). Next Wednesday, sales are to take place of 4,200 sacks of country flour, with 2,420 sacks of foreign and American wheat, and 500 sacks of small beans. The country markets generally note a decline in wheat, varying from 10 cents to 1 f. 50 c. per hec. (3d. to 3s. 4d. per qr.), the greatest reduction being at Lille. Bourdeaux notes no change, but a sale was announced there of 6,500 hecs. wheat and 3,890 brls. American flour, for the 2nd of April. At Havre, on the same day, there was also to be one of 10,000 brls. first quality flour, and 1,200 brls. on account of average. Trade was excessively dull, there being no demand whatever, but every disposition on the part of holders to realize. The former sales realized low rates, say fine quality 35 f. per 120 kilos. It was equally dull at Marseilles, business being limited to

a few orders for delivery of African wheat during the month at 43 f. to 43 f. 50 c. per 160 litres.

Fine weather, dry and cold, has been experienced at Antwerp, where grain prices have undergone no change: 32 f. 65 c. per 80 kilos. have been paid for fine quality native wheat. A parcel of Galatz rye has brought 20 f. 65 c., American 21 f. 80 c., home-grown 19 f. 95 f. per 70 kilos.

At Liege there has been a rise of 1 f. 25 c. upon wheat, prices being 39 f. to 40f. per 103 kilos. Rye, on the contrary, has declined 25 c., being quoted 27 f. 25 c. to 23 f. 25 c. per 94 kilos. Ninove also reports an enhancement on a small supply of wheat, latest quotations being 30 f. 80 c. to 31 f. 50 c. per hect. (71s. 6d. per qr.)

Last Tuesday very little change was experienced at Cologne, Berlin, and Neuss, business being quiet at these several places. Some of the Dutch markets quote an advance, viz., Maestricht, to the extent of 8 c. to 17 c. per hect. on wheat, with some improvement on all other grain.

Very little business has been doing at Konigsberg or Danzig; Rye, however, at the latter place is firm, at 25 f. to 25 f. 25 c. per hect. of 72½ kilos.

A consumptive demand has been experienced at Bremen at about former rates. Stettin is lower for wheat, a few transactions having taken place for spring delivery at 29 f. 25 c. to 29 f. to 26 c. per hect. (66s. 7d. per qr.); rye, 18 f. 75 c. to 20 f. 50 c., according to time of delivery; barley finds few buyers at 16 frs. (36s. 4d.). Very little has been doing in grain or flour at Riga. A few sales of rye have been made of Esthonia at 128 s. r., and 120 s. r. for Russian quality. Wheat and barley are exhausted: at the end of February there were only 3,500 hec. wheat, and 720 hec. barley, and of rye only 21,800 hec. Wheat is in favour at St. Petersburg, extra fine quality Cubanka bringing 20 f. 90 c. per hect. (47s. 6d. per qr.); good ordinary sorts 19 f. 75 c. (45s. per qr.); white 17 f. 50 c. to 18 f. 60 c. per hect. (42s. 4d. per qr.); rye also was more in request at 12 f. 80 c.; linseed much sought at 16 f. 50 c. to 18 f. per hect. (37s. 6d. per qr.), both on the spot and for delivery in August.

With small arrivals at Algiers little is passing: wheat on the spot 31 f. 50 c. to 32 c. per 100 kilos. Tunis quotes lower rates, viz., 27 f. 50 c. Hamburg has experienced some fluctuations before Easter, there being a lively demand for grain at full price; but since then business has ceased, with sellers anxious. Wheat 59 to 60 lbs. is nominally worth 71s. 6d. to 72s. per qr.; from outports 59½ to 60 lbs. wheat is offered at 68s. free on board. Barley and oats are firm and in demand. Cloverseed is in favour at former prices.

The Venetian wheat market is dull, but prices are not lower, 24 f. 25 c. to 26 c. per hect. (59s. 2d. per qr.) being the last quotations. Some want of maize in the interior begins to be felt, which is much welcomed, business having been exceedingly quiet. Oats also have been sold for Lombardy at 9 f. 75 c. per hect. (22s. per qr.). Rice was falling.

New York prices have receded 25 cents on the lower grades of flour, but on fine qualities there is scarcely any reduction. Wheat also, from the limited stock of fine, maintains its prices, though the dulness of accounts from England makes more disposition to sell, and on the opening of canal navigation large supplies are expected. Common to good stale flour 6 d. 75 c. to 7 d.

IMPERIAL AVERAGES.

FOR THE LAST SIX WEEKS.

WEEK ENDING:	Wheat.		Barley.		Oats.		Rye.		Beans		Peas.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Feb. 16, 1856..	71	7	37	2	23	10	50	4	42	7	41	6
Feb. 23, 1856..	69	2	35	8	23	6	45	4	41	7	39	6
March 1, 1856..	69	7	35	6	23	9	47	2	41	5	39	5
March 8, 1856..	69	11	35	11	24	1	46	6	40	10	40	3
March 15, 1856..	67	11	36	3	23	2	43	2	41	0	10	3
March 22, 1856..	67	5	37	2	23	2	43	5	40	7	39	6
Aggregate average of last six weeks	69	3	36	3	23	7	46	0	41	4	40	1
Comparative avge. same time last year	68	2	30	9	25	3	40	10	41	7	39	6
DUTIES .....	1	0	1	0	1	0	1	0	1	0	1	0

COMPARATIVE PRICES AND QUANTITIES OF CORN.

Averages from last Friday's Gazette.			Averages from the corresponding Gazette in 1854.		
	Qrs.	Av.		Qrs.	Av.
	s.	d.		s.	d.
Wheat....	77,410 ..	67 5	Wheat....	82,905 ..	66 6
Barley....	67,730 ..	37 2	Barley....	60,943 ..	29 9
Oats ....	20,364 ..	23 2	Oats ....	28,404 ..	25 0
Rye.....	186 ..	43 5	Rye.....	419 ..	39 1
Beans....	5,513 ..	40 7	Beans....	5,201 ..	40 0
Peas ....	1,011 ..	39 6	Peas ....	1,339 ..	38 9

DIAGRAM SHOWING THE FLUCTUATIONS IN THE AVERAGE PRICE OF WHEAT DURING THE SIX WEEKS ENDING MARCH 22, 1856.

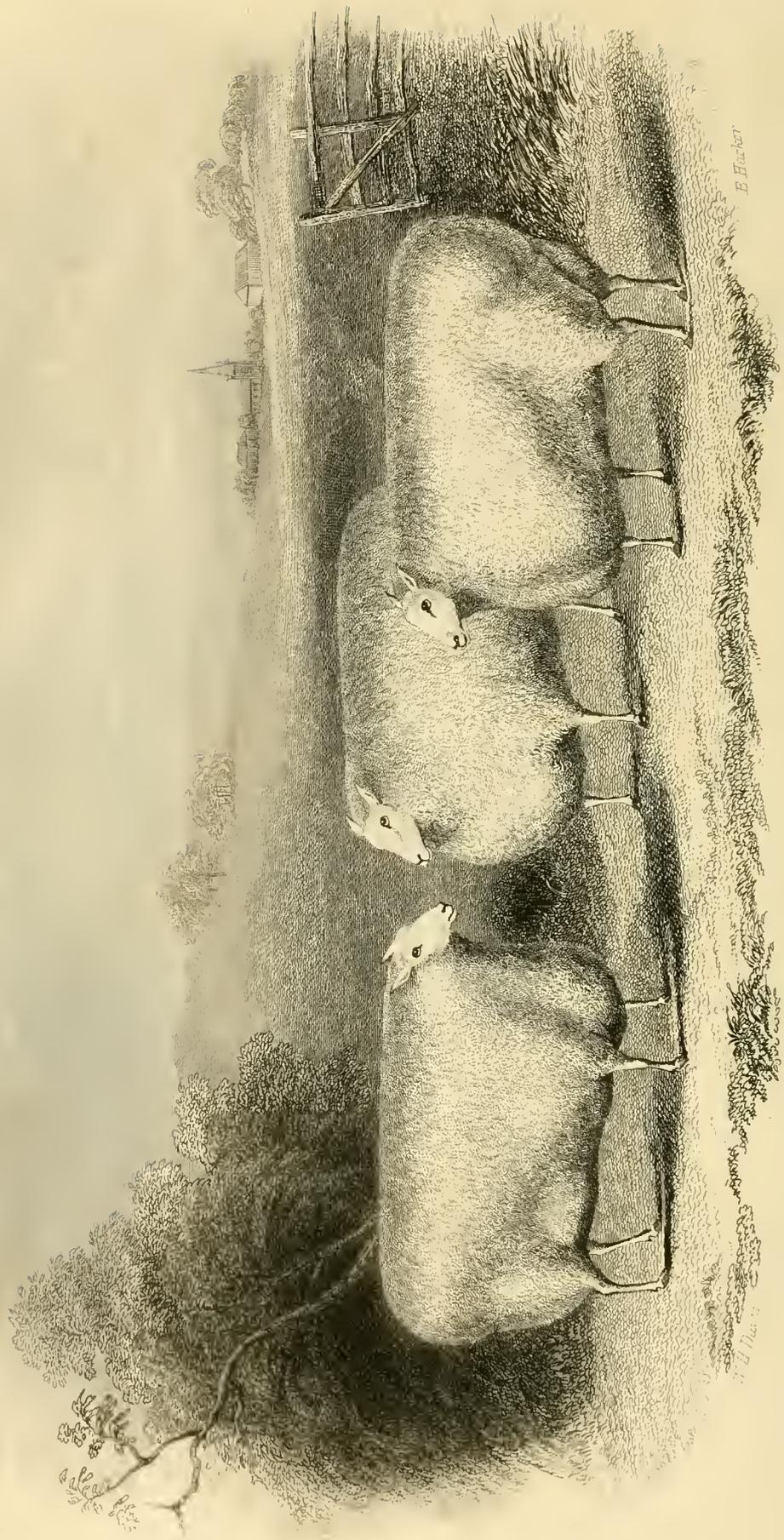
PRICE.	Feb. 16.	Feb. 23.	March 1.	March 8.	Mar. 15.	Mar. 22.
71s. 7d.	..	..	..	..	..	..
69s. 11d.	..	..	..	..	..	..
69s. 7d.	..	..	..	..	..	..
69s. 2d.	..	..	..	..	..	..
67s. 11d.	..	..	..	..	..	..
67s. 5d.	..	..	..	..	..	..

PRICES OF SEEDS.

BRITISH SEEDS.

Cloverseed, red, (per cwt.) .....	77s. to 92s.
Ditto white .....	80s. to 110s.
Trefoil, (per cwt.) .....	36s. to 50s.
Tares, winter (per bushel) .....	7s. 6d. to 8s. 0d.
Coriander (per cwt.) .....	20s. to 24s.
Caraway (per cwt.)... new .. s. to 50s., old .. s. to .. s.	60s. to 62s.
Canary (per qr.) .....	00s. to 00s.
Hempseed (none) .....	00s. to 00s.
Linseed (p. qr.) sowing .. s. to 73s., crushing 66s. to 67s.	
Linseed Cakes (per ton) .....	£13 0s. to £13 10s.
Rapeseed (per qr.) .....	new 88s. to 90s.
Ditto Cake (per ton) .....	£7 0s. to £7 10s.

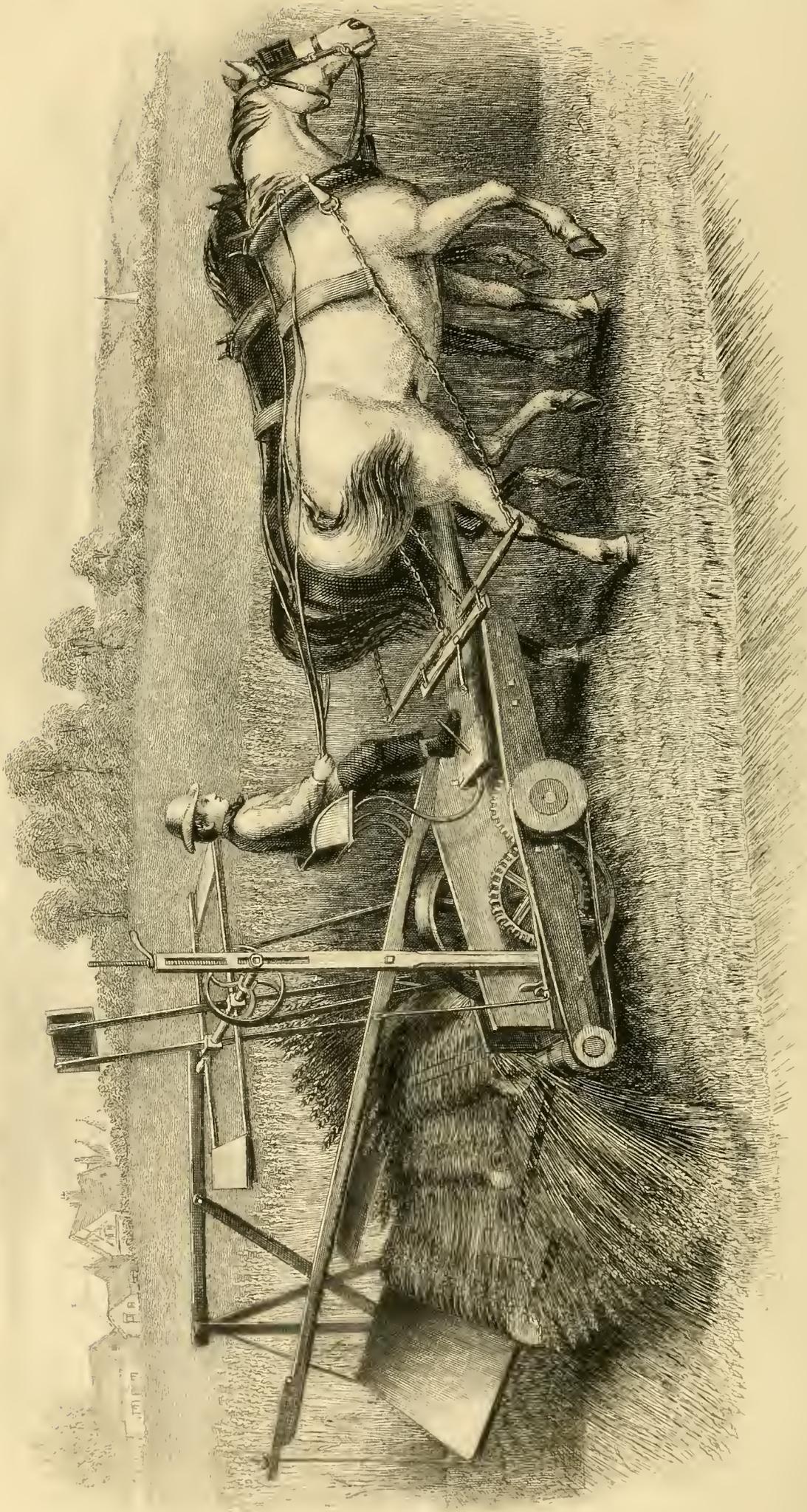




*Three Leicester Wethers*

*The property of Robert Lee, Brimsdown, Esq. of Purley in this Hill near Cabbam, for which the First Prize and a Gold and Silver Medals were awarded at the Smithfield Club Cattle Show, Dec. 2 1856*





Engraved by J. H. Pugh

### *The Wormsley Thresher*

As improved & exhibited by Messrs. Burgess & Coys. of Margate, Essex, and to which the First Prize of the A. S. C. of England was awarded at the adjacent Court at Leeds, April & Bristol, August 1855.

Patented by Messrs. Burgess & Coys. of Margate, Essex, 1854.

# THE FARMER'S MAGAZINE.

MAY, 1856.

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## PLATE I.

### THREE IMPROVED LEICESTER SHEARLING WETHERS,

BRED BY AND THE PROPERTY OF ROBERT LEE BRADSHAW, ESQ., OF BURLEY-ON-THE-HILL,  
NEAR OAKHAM,

For which the first prize, and Gold and Silver Medals, were awarded at the Smithfield Club Cattle Show, December, 1855.

These Wethers were bred and fed by Mr. R. L. Bradshaw, and obtained the first prize of £10, in class 15, at the Rutland Agricultural Society's Christmas Show, held at Oakham, December 5th, 1855; and at the Smithfield Club Cattle Show, 1855, the first prize of £20, Silver Medal to the breeder, and the Gold Medal to the exhibitor of the best pen of long-woolled sheep in any of the classes.

They were considered by many practical men, who have been regular attendants at the Rutland Agricultural Show, to be the best pen of sheep that have ever been exhibited there; and it is only just to remark that Mr. Bradshaw obtained at the Rutland Show this last year, six first prizes for long-woolled sheep, a feat which has never been accomplished by any other exhibitor.

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## PLATE II.

### Mc CORMICK'S REAPER.

(For description see page 459.)

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## THE GROWTH OF GRASS.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

One of the chief arguments in support of a system of agricultural statistics is based upon the supposed increase of knowledge which it will impart to the farmer. If this is found by experience to be a correct conclusion, if such returns shall fairly show, amongst other facts, that the growth of grass—the produce of hay has been, in the year when the return is made, good, bad, or indifferent, such knowledge can hardly fail of being useful both to the producer and the consumer. But then the knowledge will be *ex post facto*—it will chiefly convey returns of the *past* season: it will in but a small degree relate to the growing crop, or afford us in this respect any information as to the pros-

pects of the farmer. As, however, such additions to our information are most desirable, let us inquire if there are any other sources from whence a general conclusion as to the present state of any particular standard crop can be obtained; let us test it by the grass crop, and let us examine if at this great season of its growth the rain-gauge and the thermometer aid us in the enquiry—if the records of the meteorologist usefully point to the origin of good and deficient harvests.

Now we find from these too-much-neglected sources of information that there is a close connection between the phenomena of our climate and the production of grass. Mr. B. Simpson

(*Jour. R. A. S.*, vol. xi., p. 649), when speaking of the growth of the ordinary grasses, has noted some of the results obtained by these kind of observations—that the grasses vegetate when the air is at any temperature above the freezing point of water, and when that of the soil ranges from 36° to 40°, but that any temperature below this entirely prevents their growth. On the other hand, unless the air be very moist, grass will scarcely vegetate with a degree of heat greater than 66°, unless the ground be moistened naturally or artificially. It vegetates best when the air is at the point of saturation with aqueous vapour; whilst on a dry porous subsoil, and in a dry atmosphere, the pastures are during the summer months burnt up by the drought. From many careful observations made in our own country as to the quantity of stock kept, and the length of the grass in different seasons, as well as by the data furnished by Humboldt and others, Mr. Simpson arrived at these general conclusions with respect to the influence of climate on the growth of grass:—1st. That the growth of grass is always proportionate to the heat of the air, if a sufficiency of moisture be present in the atmosphere. 2ndly. That in our climate the moisture present is rarely sufficient to allow the temperature to have full effect, when that temperature exceeds 56°; but that if moisture be artificially supplied, as by irrigation, to catch-water meadows, that then vegetation will still proceed in proportion to the heat. 3rdly. That when the temperature of the air is between 36° and 41°, the grasses will only vegetate with a fifth part of the force that it will when the temperature is 56°. Thus the land that will keep ten sheep per acre in the latter case, will only keep two in the former. That from 41° to 46° its growth is two-fifths, or double that of its growth when the temperature is under 41°, and it will then keep four sheep instead of two. Again, from 46° of temperature to 50° its growth will rise to seven-tenths, or it will keep on the same ground from five to seven sheep; and from 50° to 56° it generally, unless assisted by an artificial addition of moisture, arrives at its maximum; but if the month of June be very moist it will continue to grow with an increase of force up to 60°.

In the last two years, we have experienced seasons remarkable for deficient hay-crops: cold and dry spring months have prevented the rapid growth of the grass, till the time of hay-making had arrived. The observation of the rain-gauge and the thermometer, during the spring months of these seasons, warned us of the deficient nature of the coming harvest. The following little table gives in inches the fall of rain in Surrey, in March, April, and May, in 1854 and 1855, and the average depth for each month, from which it will be seen that in

March and April of those two years the fall was far below the average:—

	Average.	1854.	1855.	1856.
March....	1.35	0.14	1.13	0.30
April.....	1.80	0.17	0.10	1.92
May.....	1.81	3.34	2.32	---

It will be remarked by the reader that during these years, the rainfalls of March and April have been as far below the average amount, as that of May has been above it; and moreover, as regards the month of April, the rainfall of the present year has been already (to April 28) very considerably in advance of that of the corresponding month of the two preceding seasons. This increase of moisture has also been, up to the period when I am writing, attended with a higher temperature than in the seasons of 1854 and 1855. In the following table will be found an abridged copy of a register of a thermometer, hanging on the north side of a house at Croydon, 5 feet from the ground, and six inches from the wall, taken at  $\frac{1}{2}$  past 9 o'clock, a.m. :—

		1854.	1855.	1856.
March .. . . . .	1	32°	35°	35°
„	5	37	38	38
„	10	45	29	37
„	15	43	33	35
„	20	35	41	40
„	25	40	32	38
„	30	47	35	35
April.....	1	45	34	45
„	5	45	37	45
„	10	46	43	42
„	15	46	52	44
„	20	53	43	41
„	25	37	37	54
„	30	43	38	
May.....	1	47	41	
„	5	47	37	
„	10	43	50	
„	15	51	40	
„	20	49	54	
„	25	52	64	
„	30	50	39	

From the higher temperature of 1856 shown by this table, taken in connection with the increased rainfall of the present April, we may draw the conclusion that, as these phenomena are common at least to the south of England, the same greater bulk of grass which we now see around us, than in the corresponding periods in the years 1854-55, will lead to a far better produce of hay than we have gathered in for the last two seasons.

The close connection indeed which exists between the moisture and mean temperature of different years, and the growth of both the ordinary and cereal grasses, might surely be more closely and

more profitably noted by the agriculturist; but he can hardly safely base his calculations on the result of such observations without the rain-gauge and the thermometer—both instruments easily provided at the cost of a few shillings. Let my readers only remember how much the cultivation of different districts is influenced by the climate in which they are placed, and he will the more readily feel induced to conclude that the field of such observations may yet be profitably extended. How necessary it is for moisture and warmth to be combined for the growth of the grasses, is shown amongst other evidence by the not always well understood result of draining pastures. Mr. Parkes showed, some time since, by his experiments on a boggy soil, that by draining it its temperature was raised by from 2° to 9° (*ib.*, vol. v., p. 142.) Here we have the case of too much moisture—great evaporation—an injurious amount of cold—a deficient supply of air in the soil. The drainage of such soils makes the grasses, which tenant them, grow more luxuriantly, since, whilst these lands thus lose their superfluous moisture, their temperature is increased. It is not always, however, that the grazier attends with sufficient care to the true effect which is commonly produced by the improved drainage of inferior grass lands. Mr. Robert Smith some time since dwelt upon these short-comings, in his prize essay on the management of grass-land (*ib.*, vol. ix., p. 13): he spoke from close observation when he remarked that “in low swampy situations, a few really deep drains, laid round or across the fields according to situation, have frequently the effect of not only laying the particular field dry, but many of the surrounding ponds; in fact, the worse the land the deeper the drains should be. Yet the remark that land has been over-drained is familiar in many districts; hence it is inferred that the pastures have been spoiled. Now this inference is inapplicable to the draining, the soil being changed for the better! The food of the aquatic grasses having been removed, they become dry and inactive: it is true the existing grasses become more like stubble than grass. But having so far changed the soil, it is equally necessary to change the herbage, by other agents—such as suitable top-dressings to sweeten

and increase the herbage, that the truly important branch of close feeding may be effected. The pasture then becomes gradually improved, and nature supplies her indigenous grasses, suitable to the then improved character of the soil, as the aquatic or other spurious grasses in the absence of their food decline.”

Nature indeed ever gives us the truest suggestions: it is by our too commonly neglecting to profit by them that we do not gather-in better harvests. We already see much that the thermometer and the rain-gauge can only measure exactly; but then by our unaided observations we often arrive at conclusions which they in far less time might have determined. The traveller who crosses our island from east to west, in his way beholds, by the different systems of cultivation, an illustration of these practical and meteorological observations. Mr. N. Whitley, in his valuable prize essay on the connection which exists between the climate and the agriculture of different localities (*ib.*, p. 42), has noted the larger growth of green food in the warm and moist climate of the western side of our island in connection with its lighter and more porous soils. He remarks very truly, that whilst the dry atmosphere and generally heavy soils of the eastern plains of England are well adapted for the perfection of wheat, the cool summers and humid air of the western coast and of Scotland are better fitted for the production of roots and fodder. The structure of the soil is also open and porous, and, except in some few clayey districts, the large quantity of rain is readily absorbed. Ireland has the most humid climate, but it has also the most friable soil. If the clay of the lias or of the Weald of Kent were largely developed in Ireland, it would present a scene of cold sterility.

I have thus briefly glanced at a few of the useful results of attending to the effects of climate upon agriculture; the field of profitable observation is, however, evidently not nearly exhausted; and I venture to commend the study to my readers, with much confidence of useful results, and in any case they will be certain not only to receive instruction, but are sure to participate in that pleasure which ever attends the search after knowledge.

## THE CULTIVATION OF CLAY SOILS.

Manifold are the miseries to which the sons of clay are heirs; but it is only in these modern days that the remark has been extended to those who farm or dwell on clay soils. These complainings have during the last quarter of a century certainly been materially increased. A deeper sense of the discomforts of a

clay soil is everywhere entertained; and even the suburban cockneys find out certain disagreeable properties belonging to their “London basin clay.” The foundations of their houses built upon it are insecure; the “nasty damp” from it will ascend into their houses; the soil around the cesspools wont let

the sewage soak away; nothing, indeed, except strawberries and roses seem to enjoy themselves on it, in damp weather. And then the clay farmer, amid his wheat and beans, sighs over the reports from Smithfield, thinks enviously of the Norfolk barley soils—those sunny lands where the plough team can work in any season; of those happy stock farms, and their valuable flocks of Southdowns, that can be kept on the turnips in all weathers—crops that have not yet been depreciated in value, and probably that never will. We have been reminded of these small miseries during the past few days, when examining the farming of a stiff clay district, and by two excellent lectures on the difficulties of clay farming—the first by Mr. Voelker, before the members of the Bath and West of England Society; and the last by Mr. C. W. Hoskyns, before the members of the Society of Arts. Both these able lecturers dwelt long on the difficulties of clay farming; and both of them alluded to various plans for the amelioration of these soils. The discussion is the more useful, since it has occurred at a season of the year when March winds usually allow the farmer's teams to again have access to the "stiff" lands. This long winter exclusion from the soil Mr. Hoskyns touched upon with the feeling of a farmer who had acutely felt the adhesive clay sticking to his boots, and impeding his onward progress. In such a plight, his hopes of mechanical aid evidently are directed to the steam plough. It is in vain, he thinks (as far as a clay farmer is concerned), that, in autumn, fallowings with powerful modern scarifiers are suggested. "The farmer of the clays," he tells us, "may listen with admiring envy to the virtues of an instrument whose wholesale power of extirpating the annual weed crop bids fair to reduce the bare fallow to its narrowest necessary limits, but in the majority of seasons he dare not use it. The utmost exertions of his team are required to get his ploughing done, and his wheat sown, in the few weeks after harvest when his land is in a proper condition for tillage. Had he but an implement that would work *night and day* during those six critical weeks of September and October, when his grain is harvested, and before the November fogs and rain set in, he would indeed be a debtor to mechanical skill; but the want of this often leaves him overtaken by the approach of winter, with many a task unfinished, that comes with redoubled pressure upon the hurried days of springtime. Unless the mighty power of steam will befriend us here, I see no loophole of escape from the unequal struggle which has been going on, and is every day widening the distance in the race, between the light soils and the heavy."

Leaving for a time the great implement-makers of England to their earnest efforts to produce a steam

cultivator, a machine which shall aid the clay farmers to render their holdings somewhat more capable of becoming stock farms—leaving these scientific engineers to the most difficult problem they will one day resolve—we may, perhaps, usefully glance at another mode of proceeding. Whilst they are striving to find a new machine for these stubborn soils, let us remember what we deem the too partial, and yet practically successful, efforts to adapt the clay soils to the implements already in our possession—to convert, in fact, the heavy clays into root-producing lands.

It is now nearly a century since Mr. Coke, of Holkham, came into possession of a soil that, like the clays, was nearly barren, from containing too large a proportion of one earth. He despaired of finding a machine that would compress sufficiently his drifting sands; but then he thought of the clays—the adhesive marls—and he added these to his worthless sands, till wheat crops were grown, and flocks were fed, on lands where rabbits had starved. If the reader will refer to the accounts of Norfolk husbandry, he will find that 200 cubic yards of clay per acre—and even far more than this—has not been an unusual quantity thus profitably applied by the farmers whom Coke bred (*Jour. Roy. Ag. Soc.*, vol. v., pp. 312, 316; vol. iii., p. 233).

Now, although we all know that sand is not commonly so accessible to the clay farmer as clay or marl is obtainable by the holders of sandy soils, yet is there not a ready substitute for sand to be found in clay-burning? And has this practice been ever yet attempted on a scale in any way equal to its profitable limits? Is not clay to be burnt in many places as cheaply as the clayings or marlings of the light-land farmers? We are aware of what has been done in this way; for instance, we know that the farmers of the Essex Roothings burn and spread over their adhesive clays 150 cubic yards of the soil per acre—that they *repeat this* every few years, at an expense of £3 or £4 per acre (*ibid.*, vol. iv., p. 267); and hence we perceive that at an expense of, say £12 or £14 per acre, the *entire soil*, say six inches deep, might be converted into a light turnip land, workable in all weathers. We do not contend that such an expensive operation would be remunerative in all situations; but we are convinced that many a cold clay farm might be thus permanently warmed up, the amount of moisture in its soils reduced, and that of their atmospheric gases increased to an extent that would, perhaps, keep pace with an annually increasing demand for stock farms—Farms that will ever be coveted, not only as the most pleasant, but as the most uniformly profitable of all holdings.

## THE BREEDING OF HACKS AND HUNTERS BY FARMERS.

There is now, we believe, little doubt but that the horse-show at Chelmsford will be as complete in all its classes as either of the two excellent displays of this kind of stock at Lincoln and Carlisle. Although not yet officially announced, the necessary funds, we are assured, will be supplied by the local Committee, and the Hunter and Roadster premiums forthwith drawn out. This is as it should be. In fact, after the success which has lately attended these sections, it would have been worse than impolitic not to have persevered with them. There are many reasons why such breeds should have the best attention of an agricultural society. The country requires and would make a more extended use of them. Either in peace or war, hacks and hunters will always have their price. The farmer, so far, would scarcely appear sufficiently alive to this. It is, in short, just one of those points on which he still wants a little more pressing. Even beyond this, such entries add materially to the attractions of the show and the fame of the Society. There are few agriculturists but who in some way or other have the feeling of a sportsman, and none who could turn away with indifference from a well-bred good-looking horse. He is still one of England's chief pets and boasts.

Still the first consideration for the Council must very properly be as to how far the Society is warranted in encouraging the sort of horse which will be thus brought together. There are some of us yet who can only look at a thorough-bred one as a race-horse, or, in other words, with a becoming mixture of tremor and dismay. He appears on this scene, however, in no such character. The judges who selected Ravenshill or the British Yeoman did so with no regard to their performances as race-horses. Their very pedigrees, even, have little or no weight. They become commended solely as the best stamp of stallion for stock, the farmer or grazier may turn to a good account. And we hope to find them not commended in vain.

The days of inattention and indifference to breeding are nearly passed away. On the other hand, something like a general care is now evinced in the selection of proper animals. We send hundreds of miles and bid up to hundreds of pounds for a good bull, or even a pure-bred ram. A litter of pigs is almost equally a matter of forethought and judgment; while at last even cocks and hens are valued for their kinds and crosses. The cause of this is a very simple one: it has been found to pay. The best sorts will always

command the best prices; while with a little care it is almost as easy to have the good as the bad.

If this will apply to any animal, it surely will to the horse. There is scarcely a man, who farms to any extent, who does not, year after year, breed a light sort of colt or two. And commonly how does he do this? Rarely with as much thought as he does a pig or a Cochin China. Any sort of mare is put to any horse that may be handy; and then, when, at the end of two or three years, the produce is sold at a low figure, it is discovered that this business does not pay. It would be very odd if it did. Beef and mutton, of however inferior a quality, will always bring something from the butcher. But the hack or hunter colt is above all the animal on the breeding of which some little attention and outlay must be expended. The return for it will come ten and twenty-fold. Further, be it remembered, that, once dropped, it costs as much to rear, break, and make the haphazard weed, as it will a nag that shall fetch as much as a Shorthorn bull, or a Southdown tup—of the very best sorts, of course.

An established authority on all relating to the horse has just brought out another of his amusing and useful little volumes, in which this is well put. "How to Make Money by Horses" is the agreeable title of the work, and *Harry Hieover* the well-known nom-de-plume under which the author proclaims his secret. The farmer is naturally amongst the first of those with whom he communicates—in this wise: "I never did know or hear of a common kind of mare put to a common kind of horse producing anything much better than themselves. It will thus be seen there can be no profit in breeding a direct sort of very middling animal, under any circumstances; and the slightest ill luck must entail inevitable loss. Farmers seem to forget that a little additional hay and oats, a little more expenditure in the first cost of the mare, five sovereigns for a sire quite good enough to get hunters or fine harness horses—instead of one sovereign to some wretch of a sire who will beget stock good for nothing—and a little additional care and attention, will just make the difference of possessing an animal, at four years old, worth from seventy to a hundred, instead of one whose value, at the same age, will range from twenty-five to forty pounds. . . . On no land breed inferior common horses. If such would live and thrive on provender in quantity and quality on a par with their own scantiness

of merit, they might, and probably would, pay; but it will be found they will not. They will about require just so much as they never will pay for."

The Royal Agricultural Society of England has the opportunity of doing much to correct the very common mistake here adverted to. Of our three national societies this is the only one which has hitherto commanded anything like a generally good show of all varieties of the English horse; while we have no doubt that this may, with a little more *promptness*, still be considerably improved on. It is a feature, too, that our neighbours might take up with advantage. The French people—the masses, says Monsieur Lavergne, have scarcely yet learnt

to appreciate the exhibitions of agriculture. It is with difficulty they can be induced to attend. We know of nothing that would go so far to attract them as the addition of horse classes. To the Parisian, especially, it would be, as we take it, an irresistible bait; and we trust by another year to see the Yorkshire, Suffolk, Cleveland, and Norfolks, up even to the best-descended and shaped thorough-bred horses, as duly honoured in the list of what we can supply, as Shorthorns or Herefords, Leicesters or Southdowns. In a national point of view, no country can but benefit by attention to the best breeds of horses—an opinion in which, if we know anything of his tastes, the Emperor himself would very readily concur.

### THE WORK AND HOW TO DO IT.

The third lecture, of which I possess but a slight outline, I had thought of throwing into a connected form. But I have not meddled with it; so, fragmentary as it is, you have it good reader as it now lies before me.

F. R. S.

"I don't know how far a certain prejudice has got possession of your minds, but I know that it does weigh with some labourers against savings'-banks—I will mention it.

"Some men think that when a man is known to save, he is liable to have his wages reduced by his master or else to be frequently refused work, on the plea that he can rest idle with less inconvenience than others. At first sight there seems some truth in this way of thinking; but the more one dwells upon it, the more one sees through it as a piece of shallow nonsense. Depend upon it, masters are generally too much alive to their own interests to dislike a man that saves. They look, I know, with a marked respect on a man who has put by a pound or two. A fellow that can give change for a sovereign or half-sovereign on pay-night stands a notch higher, I assure you, in his employer's estimation. This is because the habit of saving implies in the possessor of it the possession of other good habits—he must be steady and respectable. With regard to myself, friends, a receipt from a savings'-bank would be the best recommendation you could bring me. I should say—'I will strain a point to give that man work: he must be thrifty, industrious, sober; a friend to himself and his family, he is more likely to prove a friend to me.'

"And you may depend upon it, there is a great change come over the public mind with respect to labourers. I wish, too, to prepare you for the better state of things implied by this change. The experience is going forth that there is a worth and quality

in the work of a respectable thinking man, that more than compensates any extra expense. In the country, masters are just awakening to this truth; employers in the manufacturing districts have been long awake to it. A great deal of property is entrusted to your hands: if you are in the habit of taking care of your own property, you necessarily have greater thought for the property of other people. A man cannot estimate the value of property who does not feel the difficulty of acquiring it, and of course such a person is not fit to be trusted. A savings'-bank does much to form this habit, and is the very thing we require then.

"I might be misunderstood in some quarters, were I to say that I desire to elevate labourers into *capitalists*, but I certainly do mean it; for in the sense I use the word capital, it is necessary to the equalization and improvement of your condition as labourers. Wealth has been the subject of many bitter attacks, but there are two sides to this question: it is the abundance of this world's goods that tendeth to vice, and vanity, and discontent; such is your position that with all your strife to accumulate will you, I think, friends, remain on the better side of the question; your gains will come under the head 'little riches,' and this, the proverb says, 'is a good thing.'

"Think of the blessing this little fund is to the sick man, and what a stimulus it is to him when he is well; what a just pride, too, does he derive from it! And doing well in this way suggests and leads to doing well in other ways. Think how such a fund may be made to stay up the life of a declining parent; how it may educate the family, and enable the owner to open his hand to distress, and taste the sweets of generosity! And there is an immediate benefit derivable from saving: it proves a preservative

from many extravagances and vices. Temptations present themselves, the mind's eye travels to the little hoard at the bank, and they are resisted: indeed, and I speak to you honestly, when the habit of saving is formed, a great revolution takes place in the character; irregularities and improper self-indulgences disappear, and steadiness, sobriety, and self-restriction take their place.

"Hanging on the wall is a table, formed to show what a certain weekly contribution paid at the Windsor and Eton Savings'-bank would amount in a certain term of years, interest being at £3 8s. 5d. per cent. It is a highly instructive table:—

Weeks	1s. per week.	11s. 6d. per week.	2s. per week.	3s. per week.	4s. per week.	5s. per week.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
2	2 12 7½	3 19 0	5 5 4½	7 18 3½	10 11 1½	13 3 10
3	5 6 11	8 0 6	10 14 4	16 1 10	21 9 5	26 16 6
4	8 3 1½	12 4 11	16 6 10½	24 10 11½	32 15 0½	40 18 7
5	11 1 1½	16 12 3	22 3 3½	33 5 11	44 8 6	55 10 3
6	14 1 3 4½	22 2 5	28 8 7½	42 6 10½	56 9 9½	70 12 0½
7	17 3 7 4½	25 15 9	34 8 1 1½	51 14 0	68 19 4½	86 4 1
8	20 7 7 2½	30 12 4	40 16 7½	61 7 7½	81 17 5	102 6 8
9	23 14 2½	35 12 2	47 9 10	71 7 7½	95 4 4½	119 0 5½
10	27 2 10	40 15 5	54 7 5½	81 14 7½	109 0 7½	136 5 7½
11	30 13 10½	46 2 3	61 9 10½	92 8 7	123 0 1½	154 2 7½
12	34 7 4	51 12 8	68 17 1	103 9 11	138 1 6	
13	38 3 3½	57 6 10½	76 9 4½	114 18 9½		
14	42 1 10	63 5 2	84 6 10½	126 15 6		
15	46 3 3 1½	69 7 7	92 9 9	139 0 5½		
16	50 7 7 2	75 13 5½	100 18 2	151 13 9½		
17	54 14 2	82 4 1	109 12 5½			
18	59 4 0	88 19 1	118 12 8½			
19	63 16 11½	95 18 8	127 19 1			
20	68 13 1 5½	103 3 1½	137 11 9½			
	73 12 5½	110 12 6½	147 11 2			

"Before we part this evening, I wish to point out to you one of the great enemies with which the labouring man has to contend, one of the greatest enemies to savings'-banks—the Poor Laws, I mean. I wish to inspire you with a horror of pauperism,

Pauperism will rob you as it has robbed thousands, unless you have a care, of energy, self-respect, independence, in a word all that is worth having and worth living for. Beware of pauperism!

"I overheard a conversation, not long since, between a mother and her daughter. The daughter was just going to housekeeping, and the good mother was giving her some sound advice about thriftiness, and saving a part of the gudeman's weekly earnings. 'But mother,' said the girl, 'we get but little, and the parish will relieve us when we want it.'

"The girl was right; the parish will relieve you, but it fixes a sort of moral brand upon all whom it relieves. Yes, it will relieve, but not without degrading you. The more you get such relief, the more you want it; like any other vice, it grows upon you. When you find that other people will maintain you, you turn idle and say, 'Well then, they may;' but an utterable and melancholy change must come over the character before this decay of good feeling can take place. The glare of a great inexhaustible public fund for the relief of the needy and idle is enough, I grant, to tempt many from the paths of industry and independence; but bitter is the bread it supplies to the clamorous mouths. It is a bread that has a subtle poison mixed up with it—a poison that begins its work of corruption on the inner life, eats the vital principle out of the man, and leaves the husk to give forth but an offensive odour, polluting the air of society.

"The poor-laws were designed to help the poor; but those who made them distrusted the virtues of the English labouring poor, and so got sadly wrong. It turns out that the poor are the principal sufferers by the poor-laws. Every other class has its compensation. The expense the manufacturer and farmer incurs to support pauperism is paid back to him in the shape of a reduction in the wages of his workmen; and to the landowner it is repaid by a reduction in the price of all manufactured articles. It is only himself that is really to be impoverished. Yes, that is the correct word. He *appears* to be pensioned, *but he is really impoverished*, for pauperism acts towards the reduction of wages.

"For these reasons, shun this enemy—one of the most formidable you have to fear, in this neighbourhood particularly, where it seems to have taken such deep hold. A man leaning on the poor-laws has no inducement to economise, and loses all relish for the social virtues, the domestic delights, the manly cheerfulness, that make home happy, and life a pleasure.

"It would be a joy to me to see springing up over this land, an erect, sturdy, well paid, and well principled peasantry. Every advantage that you win by your own industry and sobriety is matter of heartfelt gratitude to me. My hope is to see the two classes, now parted by much jealousy and foolish ignorance of each other, masters and workmen,

brought nearer to each other in the bonds of a better understanding. To bring in this 'good time coming,' let me request your practical encouragement of our effort to serve you. *Speed the Bank!*"

Some years ago a Parliamentary Committee sat upon the combination laws. Upon referring to the minutes of that committee, I find that a Mr. Oldfield and Mr. Eli Chadwick were called upon to produce evidence. Mr. Oldfield was asked "Whether he could suggest any means to prevent the inconvenience of combination?" He replied that it could only be done "by the Government preventing accumulation in the hands of the poor." Mr. Chadwick made the same reply to the same question.

Both replies evince an amount of ignorance, prejudice, and careless indifference as to the causes of combination quite lamentable in educated and sensible men. What a palpable closing of the eyes is this! It reminds one of the great Hume, who justifies the policy of Henry I. as more befits the man of the world than a philosopher, an historian, or a statesman. "When violence and usurpations are once begun," says he, "necessity *oblige*s a prince to continue in the same course, and engages him in measures, which his better judgment and sounder principles would otherwise have induced him to reject with warmth and indignation." And there is an analogous passage in one of the orations of Demosthenes, who, notwithstanding his wisdom, sometimes gave unwise counsel. It runs thus:—"It would be just to restore the democratical government in Rhodes; but even were it not just, still, observing what other states do, I think it would be advisable for its expediency. If all, indeed, would be just, then it would be shameful for the Athenians to be otherwise. But when all others provide themselves with means to injure, for us alone to abide by justice, and scruple to use advantages offered, I consider not as uprightness but weakness; and, in fact, I see all states regulating their rights, not by the equity of an act, but by their power of accomplishing."

The advice given by Messrs. Oldfield and Chadwick before the Parliamentary Committee is similarly shortsighted.

The act of funding, for the habit of accumulation will never lead the working classes to combine; but the lack of providential habits amongst the poor will always tend to discontent and its concomitants. To forbid the funding of wages amongst the labouring classes, is to confine them ever within the bonds of servitude, so that they shall have no hope of rising and obtaining a stake in the country. And where the great mass of the people are in this degraded state, with no encouragement to strive to better their condition, they grow reckless, and the strongest despotic government that can be forged, protected though it be by sword, bayonet, and terror, can withstand only for a time the upraising of a people's manhood thus insulted and brutalized. So fell Greece! And those who have read carefully the history of Rome will trace its decadence to the same element of reckless discontent amongst the lower orders—orders that comprised the majority of its population.

Far be it from me to seem in any way to favour th

absurd doctrine of universal equality; but I do see a want of security, a sign of decay, to that state where great gaps exist between the classes, for then am I assured that mutuality of interest (so truly essential to the strength, progress, and stability of a nation) is more or less absent; and if absent, there exists in place of it an element of popular disaffection, to the force of which many of the empires of the old world have succumbed. We know something of this lurking foe to England's future: many of us can put our finger here and there precisely over against where it is working! Be it ours to check, not ignorantly or wilfully to develope, this danger to the commonwealth.

Those who give the matter any thought will have no difficulty in perceiving that such an organization of society as gives us gradations amongst the labouring classes, must very much tend to the nation's well-being and security. The more, indeed, we can develope this mutuality of interest amongst all grades, the better.

But I have rather struck away from my direct line of remark, although what I have said bears heavily upon it. I was intending to say that my friend Mr. S. had to defend himself to many of his neighbours, who had heard reports of his lectures On Savings' Banks. It was stated that his remarks tended to favour combinations, and that the people were intending to make use of the advantages offered them for depositing their surplus, for the purpose of extorting a better wage from the farmers. He told me thus much, and slyly adds:—"I had not much trouble to protect my position. I drew out one or two lines to secure my rear, and gave a fair front, in order that when I had exhausted the patience of my antagonists in attack, I might myself run forward, without let or hindrance, to follow my advantage."

This is at most a foolish prejudice; but at all events the jealousy of the capitalist is nothing more or less than a practical admission that, with provident banks, there is a capability amongst the poor of becoming rich enough to be wholly independent of the supplies of the parish. We will get this much of good out of it. But we need not trouble ourselves much about this phase of the question, for capital will ever hold its own against labourers.

Still it is right that the poor shall have a claim to a say as to the amount of their remuneration; and if their sobriety and providence and intelligence gain for them this right, it should be fully accorded to them—and with a welcome. I would rather have about me a sturdy and well-principled set of men, who knew their work, and had the honesty to do it according to their knowledge—ay, even though they could strike once and away—than I would be pestered with a rabble of unprincipled fellows who neither knew nor cared for the value of their own or other people's property, all on the brink of starvation, and degraded by pauperism. Such are what the French writers allude to, when they use the words "*classes dangereux*." To lessen and irradicate this menacing element, the habits of providence, self-reliance, and sobriety must be inculcated; and then we are met with the accusation that to foster such habits is

to call up a power antagonistic to the masters. Well, if it be right for the people to be considered as serfs, and therefore having no right of property in their labour, then must we plead guilty. But those who may take this view of the case—not many let it be supposed—must bear in mind that there cannot be any virtue belonging to slaves; and if we admit that the great mass of our people, the foundation of the great national fabric, is without virtue, we imagine ourselves in the position of that man who bestrides a staved barrel of gunpowder, with a lighted torch in his hand.

But combinations come not of a people schooled to virtue; for virtue is a self-renunciation—a love of law and country—a preference of public and private interests, both arduous and painful. Such combination of work-people as we have to fear cannot be born of such sort: they have a quite different parentage. Their ancestry is Ignorance, Oppression, Starvation, Profligacy, Pauperism; and the distinctive features of the race they carry down from generation to generation, the mis-thriven crew.

May not the habit of accumulation, which produces a more reflective, sober, and rational peasantry, implying, as it surely does, prudence, forethought, and sobriety, prove the best guarantee against the immoral abuse of the little hoarded capital—a security, in fact, against combinations? This, I think, is the most rational conclusion to arrive at. The habits formed during a long-sustained effort to save will assuredly preserve a workman from throwing himself carelessly into any hasty and adventurous struggle with employers: his eye would be upon the small treasure, which he would be loath to waste.

You and I, good reader, know full well that enough has been done to deaden the self-respect of the labouring classes. Will it not be better for us to stem this downward current? Cannot we do something to foster a little healthy ambition in these “hewers of wood and drawers of water”? Ambition is a fine tonic. If by sobriety the work-people of this country rise to the power of becoming in a certain sense the regulators of trade, employers have this satisfaction—that the higher wages they may be called to give are well-laid out, and so expended as to save them (the masters) many heavy expenses that they would have to meet, in the case of their dealing with vicious and idle men, over and above simple payment of wages. The larger the ambition of labourers,

the less they multiply themselves; and I met with a reflection in a work of Dr. Chalmers that excels anything that I could say under this head:

“In proportion as the man becomes more reflective and virtuous, he seeks something higher than the gratification of mere animal tastes. There is to be observed a growing demand for certain objects of taste and decency, for greater leisure, a widely diffused education, a better style of accommodation than his father’s. And it is just by means of a more elevated standard than before, that marriages become later and less frequent. This we deem to be the precise ligament that binds together an improvement in the character with an improvement in the comfort of our peasantry, and makes a taste for certain conveniences the very stepping-stone by which a people do arrive at them. If these conveniences are regarded as essential ingredients to maintenance, then will a sense of their importance operate as a counteractive to the temptations of precipitate or imprudent matrimony.”

The conclusion therefore is, that the man who does not happen to deem as essential those decencies, &c., that can only be obtained through habits of superior economy—who deems rags, potatoes, and a hovel the sufficient accessories of domestic bliss—will rush improvidently into the married state.

The higher the scale of enjoyment in any society, the later the average of marriage. This remark follows naturally enough out of the above reflection. In the absence of a prospective economy, which of itself will push forward the date of marriage, there rests no ability with other classes to help the working community out of their degradation, “into which nothing can plunge them but their own recklessness and folly.” But I forget. I have a small extract yet to give from a communication just received from Mr. S. He says, in relation to what during one year has actually been accomplished by the savings’ bank established in the village of —:

“This bank embraces a population of 1,200; and from its commencement December, 1854, to December, 1855, the whole sum deposited was £235 12s. 3d. During the twelve-month sixty families of this small district have opened their accounts with the bank, and received an impulse from it on the side of economy and foresight. I hope I may have as good tidings to give you when I next write.”

But enough has been said on this subject, I think, to induce my readers to encourage the habits of funding amongst the poor to the utmost extent of their ability. It is past experience that guides us in the present; and if we desire to learn a lesson with respect to the proved benefits of savings’ banks, the evidences we seek are thickly strewn on every hand. F. R. S.

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## MR. WREN HOSKYN'S ON MODERN AGRICULTURE.

It has become the fashion to rank agriculture as a science. Our dull, plodding, clod-compelling forefathers, who carried on their farm operations with as little variety as the movements of a horse in a mill, are now regarded as “things before the Flood.” We are, as it were, standing upon an eminence, from which we faintly may discern Practice toiling on in the distance in one monotonous round, with

its legs sticking in miry clay, warning off all intruders in the shape of improved implements and book information, progressing with its long fallows and straw-fed animals, and grumbling, as it goes on, that the weather did not suit the occasion, or the crops yield adequately to the pains taken for their production. Again in another direction, the eye discovers beautiful, but vaguely and undefined, Science teaching its

anxious listeners the truths obtained from chemistry, mechanics, geology, and many other masters, which, like the glass of Banquo, show as many more.

The exemplification of this matter has fallen into hands well qualified by acquirement and intellectual endowment to render subjects in themselves dry and uninteresting, delightful and attractive. Mr. Wren Hoskyns deals in the poetry of agriculture, and under his touch the rude ore suddenly becomes transmuted into richly-refined metal. Dealing with details, in themselves uncouth and forbidding, all their inequalities appear smooth, whilst the musical measure of his rhythm tickles the ear and engages the attention. Many realities, like "cloud-capp'd towers," melt into thin air, whilst airy nothings "obtain a local habitation and a name."

So far we feel inclined to yield the laurel of classic worth and poetic attainment, to one whose lecture, recently delivered before the Society of Arts, exhibits the true poetry of farming. Ere this the pursuit acknowledged men of practice and science only; but now we can add one who clothes the rudest subject with the most imaginative and attractive language; and to ears only that nature has not made musical does he attune his lyre in vain. But, unhappily, the feelings of the audience, that became inspired and revelled in his music, do not reach the souls of those who by thousands read the verse unaccompanied by the melody. Wit second-hand is no longer wit. The epigram loses its point when squeezed into shape: like the jelly-bag it is said to represent, it collapses into a form that art refuses to recognize. Argil again becomes clay, silica becomes sand and gravel, ammonia nitrogen, carbon and phosphates resolve themselves into farmyard manure. The cessation of war may bring with peace low prices for agricultural produce, and then if "the mountain will not come to the Prophet"—as it will fail to do with wheat reduced to forty shillings per quarter—then, in plain language, "the Prophet must go to the mountain." And, the cost of the production must be brought down sufficiently low, or else the quantity be increased to meet the difference in ratio, equivalent to remedy the deficiency.

Interesting and amusing as the lecture of Mr. Wren Hoskyns is confessed to be, yet strip it of its appendages of language and style, it contains little more than the practical have experienced perhaps without knowing why, or the scientific have recommended without describing how. The results have still been attained; and, after all, he has only shown that the main obstacle to farming advancement is deficiency of capital, and the great obstruction to its development, the absence of security to skill and investment.

In one particular, at least, Mr. Hoskyns has fallen into what may be said to be a universal error.

He treats of land as a mere machine by which corn ricks and beef and mutton can be manufactured *ad libitum*. "If you only keep up *high pressure*," he says, "by manuring, and also keep the land clean from weeds, the idea of *exhaustion* by cropping is a *chimera*." But who is there, that, combining practice with his science, after having cultivated highly and manured in the best manner, has not often at last reaped a blighted and deficient crop; whilst his neighbour who has trusted to good cultivation and natural resources of the soil, has shown an abundant one? Such are the contingencies of farming, that it will fail equally from either extreme; and whatever the success of Mr. Wren Hoskyns upon the Clay Farm that he has so graphically chronicled, some other "coppery lights" certainly have not shone out to the end with increase of light but have faded away, and at last gone out, without a trace of their former glory remaining.

The truth is, that farming is attended with hazard and uncertainty—from the effect of seasons, blights, and mildew, as well as by sudden fluctuations in prices, so great as to render it what it had always been considered, and what it always must be—a pursuit dependent upon external causes, over which the farmer has no control whatever, and of which he is, at the same time, so conscious that beyond any other, he of necessity looks up to Providence for a blessing upon his endeavours. "He sows the seed, and trusts the rest to Heaven."

Still in many particulars we concur with the views of this able writer, especially when he treats of land as a machine which ought not to be shackled by unnecessary restrictions in its use. In this he only supports the views of the farmers of this kingdom, as represented by the members of the London Club, in the resolution arrived at, in the very same week, "that the agreement or lease that will give the farmer security of tenure during the occupation, with compensation for unexhausted improvements at the end of term, will be the best to give a stimulus to agriculture." Mr. Wren Hoskyns likens the farm to a mill, in which if the best machinery is not put, the balance of profit is lost in useless labour and expense. If then the tenant of the mill should not be allowed sufficient time by his lease to induce him to place in the best description of machinery, as well as liberty of action allowed him to work it with advantage, how far could he be expected to look forward to a profitable result in his undertaking?

With too many writers, the main object of farming is kept out of view:—the profit; and it is from the neglect of persons strong in capital, as regards this particular, that they ultimately fail of maintaining their position for any length of time together as actual farmers. The best implements and the largest capital will not be found sufficient alone to produce

a return sufficient to ensure beneficial results. Sound practical experience must be also added, and close personal attendance combined; for not only must every act of husbandry be done well and in the right manner, but to obtain success it must also be done at the right time. It is by attending to minutiae that profits are made, and especially as affects the application of manual labour. A concentration of it upon the several objects, and a due superintendence of it in accordance, is one great secret in the matter; and it is from these particulars not receiving due attention that persons who carry out their business by agents do not succeed so well as those who are deeply and personally interested, in attending in detail to these points. If we associate with this immediate supervision—sufficient capital and machinery to economise and facilitate the labour; sufficient horse and manual power to carry it out; sufficient guano or other substitutes to produce the principal portion of the green and root crops, and to raise the corn crops to a fair standard of perfection without hazarding the opposite extreme—we give in our estimation the most certain mode for insuring success.

The production of a large proportion of fatted cattle and sheep, upon any farm, by oilcake and external aid, must always be attended with hazard as regards the profit. A return from such sources can never be depended upon, in any given year; and it is only upon an average of years that such estimates may be based. Poor indeed would the lot of the grazier frequently be, who looked to his oxen and sheep for a direct return of profit. Combined, however, with the cultivation of a proportionate quantity of arable land, repayment would accrue in another direction, and probably when it might be most needed; for, at all events, the crops in amount would generally be in proportion to the quantity of beef and mutton

produced, and thus the two judiciously combined would in the end produce the most desirable result.

The keeping clay lands of a tenacious description clean from couch and weeds for any long time together, without considerable fallowing during the summer months, we hold to be impossible. We do not say it cannot be effected. Would the cost bestowed be paid by the difference of mode of cultivation? With dry autumnal months much can be accomplished with the means at hand, upon strong clay lands; but with late harvests and wet autumns, every one acquainted with farming must have felt the difficulty of cleaning them. With light friable soils it is, however, exactly the reverse; a great deal at all times can be effected, as from their nature, couch and weeds may be pulled out and eradicated by machines calculated for that purpose, and, on being removed from the soil, the land may be maintained in a state sufficiently clean to admit of grain crops yearly to be taken in succession.

Happy as we are in yielding to Mr. Wren Hoskyns a due word of praise for the very pleasing manner in which he has elucidated his subject, still we confess we are not disposed to follow him by commending such portions of it as we think are of a Utopian character, and totally beyond the province of a tenant farmer to launch into. The occasion, the prices, the realities in farming matters, give a stimulus to its pursuit, unheard of since the termination of last war; and so long as good crops and remunerative prices are obtained, so long will that feeling prevail. But whatever advantages are held out by the application of science, they will all become more or less inoperative, to effect any great advance in a pursuit whensoever prices will not compensate producers for the outlay demanded.

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### THE SALE OF CORN—BY LAW OR CUSTOM?

The key-stone of commerce is credit. In this country more especially it is the very life-blood of all trading; as without it the spirit of business would at once droop and die. We trust, moreover, not merely to a man's means, but equally to his word. The same confidence which induces us to rely on the one prompts us to be as satisfied with the other. Many of the heaviest transactions are carried through, with nothing more to show or depend on than the mutual good faith of the contracting parties. It is a word and a blow—"Your hand to it;" and the bargain is struck.

Perhaps in the practice of no calling is this kind of dealing more general than in that of agriculture. The farmer buys and sells alike by it. It would

puzzle most of us to find anything beyond an occasional letter or so, as the contract for either the purchase or sale of corn and stock. All is done by word of mouth. We pick our store beasts from the drove, and return them fat to market—pitch our corn, or show the sample, asking and receiving nothing more than the good faith of a man's word to settle the business between us. It is seldom, either, that more is required. When, however, such a guarantee does fail, it behoves us to ascertain how far law or custom sanctions a system, that has generally been proved to work so conveniently, and so well.

A case involving such considerations, and of peculiar interest to both the buyers and sellers of

corn, has just been heard and decided. It came before the Brentwood County Court only last week; Mr. Eve, a gentleman farming extensively at North Ockendon, being the plaintiff, and Mr. Woodfine, a miller at Brentwood, the defendant. According to the report in a local paper, it appears that on the thirtieth of last January Mr. Eve received from his bailiff three samples of wheat, representing a bulk of eighty quarters. These he took with him to the following Romford market, where he sold thirty quarters to Mr. Nokes, thirty to Mr. James; and the remaining twenty to Mr. Woodfine, at the market price of seventy-six shillings a quarter. The wheat was in due course delivered to the three purchasers named, when Mr. Woodfine alone refused to take it; his reason for doing so being that it was not equal to sample. Mr. Eve, on the other hand, contended that it was; but having the bulk thrown on his hands he was compelled to transfer it to Chelmsford, where he resold it at a loss of six shillings a quarter. For this difference, with the additional expense of carriage, he brought Mr. Woodfine into the County Court.

At the first glance, and to a non-legal observer, the point at issue here would seem to be a very simple one. Was the delivery equal to the sample or not? If it was not, Mr. Woodfine was manifestly justified in refusing to abide by his contract. If, on the contrary, the bulk was as good as what he bought by, he was in equity as clearly called upon to stand to his word. Mr. Eve came to prove it was, while we must remember that we have the collateral evidence of two other buyers who *were* satisfied with what they had received. The dispute, however, in a court of law would admit of no such line of argument. The statement for the plaintiff was at once met by the defendant's solicitor with the laconic reply:—*"Under the statute of Frauds there is no case at all."* Upon this the following important conversation ensued between the judge and the representatives of the parties of the suit:—

His Honour: There is no acceptance in writing.

Mr. Preston (for the defendant): None at all.

Mr. Rawlings: I know that: we rely upon the sample.

His Honour: Mr. Preston will meet you by relying upon the statute of Frauds.

Mr. Rawlings: We have nothing else to rely upon. If I show the bulk equal to the sample, I ask you to give a verdict.

His Honour: How do you get over the statute of Frauds? There is nothing in writing to bind the parties.

Mr. Rawlings: There is not. We rely on the custom of the market.

His Honour: Yes, but the sample does not form part of the bulk delivered—it does not go towards making up the quantity. Can you show that there is an express bargain that the sample should form part of the bulk?

Mr. Rawlings: No.

His Honour: Then it would be impossible for you to show a custom, unless the farmers and merchants came forward to say that that is the custom. If you can prove such to be the mode

of dealing in this neighbourhood that is another thing—I am only speaking of ordinary expenses.

Mr. Rawlings: I take it that Mr. Woodfine would have had a right of action against Mr. Eve if he had not delivered it.

His Honour: It is not a contract. If you never get beyond a mere parole contract for goods over £10, and don't put that in writing, the law says, that shall not be enforced. Up to £10 you can go, but not beyond.

Mr. Rawlings: Then it comes to this—if 2,000 or 3,000 qrs. of wheat are bought by a party and the market falls the next day, he could refuse it.

His Honour: The statute of Frauds binds me.

Mr. Preston: I should like to have the case tried upon the merits.

His Honour: Oh! no, if you rely upon the statute of Frauds do so. Let us not spend four or five hours in hearing the evidence, and then be no forwarder by your again putting in the statute of Frauds.

Mr. Preston: Yes; but Mr. Rawlings says it is in consequence of a fall in the markets that the corn was refused.

His Honour: Well, Mr. Eve will now understand that Mr. Woodfine buys by the statute of Frauds.

The verdict went, of course, for the defendant, with expenses. The judge, in fact, could scarcely rule otherwise than he did; for Mr. Woodfine's own advocate, notwithstanding his subsequent remark as to trying the case on its merits, cited at the very outset the statute of Frauds as the point in his favour. Against this Mr. Eve had only to offer the custom of the market; and this we really think, if only persevered with, might have gained him his cause, or at least the opportunity of having it fairly tested, instead of being at once put out of court by a law which was here simply not justice. "Can you prove such to be the mode of dealing in this neighbourhood?" distinctly asks the judge. That is, can you prove it is the custom to buy by sample to be delivered in bulk, without an acceptance in writing, or the sample itself forming part of what is to be sent in? Could Mr. Eve have proved this—and surely there could have been nothing more easy—his case must have proceeded on its merits, and Mr. Woodfine have had to ground his refusal not on any statute of frauds, but the absolute fact that the corn was not as good as that he bought it for. *Mos pro lege* is a phrase well known enough to our best lawyers; and we believe this custom is sufficiently recognised and acted on to give it all the force of law. The judge, indeed, clearly intimated his readiness to admit as much, on any proof being given of its existence.

The question, we repeat, is one of some importance. Do our corn merchants buy under the shelter of the statute of Frauds; or, on the other hand, as admitting the custom of the market? There is no mistake in the actual law of the matter. The Legislature, in fact, systematically refuses to sanction any merely verbal contracts of this kind. For anything above ten pounds, to be binding in the eye of the law there must be either a written agreement; an earnest in part payment; or an actual acceptance and receipt of part. The very "hand sales" of the north of England and parts of Wales, where

the seller always has your hand on a bargain being struck for a horse or a beast, have no force over this ten pounds limit but that of custom. The 17th section of the statute of Frauds, upon which the Romford case went, is, as far as law can go, quite as decisive against the present system of buying and selling corn :—

“ And be it enacted that no contract for the sale of any goods, wares, or merchandizes, for the price of £10 or upwards, shall be allowed to be good, except the buyer shall accept part of the goods so sold, and actually receive the same, or give something in earnest to bind the bargain, or in part payment, or that some note or memorandum in writing of the said bargain be made and signed by the party to be charged by such contract, or their agents thereunto lawfully authorized.”

We are well aware of the practice on Mark-lane

of a buyer deferring to the following market-day the completion of his purchase. But this, as we take it, is—or ought to be, if not abused—entirely a question of sample. If the bulk be as good as what he bought by, we imagine the custom of the market would compel him to abide by his bargain ; whereas the statute of Frauds would as certainly not. It is this custom, —but another word for justice—that we should like to see a little more clearly established ; and it is with this view that we have directed attention to Mr. Eve's case. Had the custom here received that recognition it should have done, we might have looked to a far more searching inquiry and satisfactory adjustment.

### THE PROSPECTS OF LAND-DRAINAGE.

While our political cotemporaries are discussing the prospects of our political parties, we will endeavour to draw attention to the prospects and principles of parties in the land-draining world. In England party enters into the consideration of questions which might be deemed the most remote from its influence, and the draining of land is not exempt from party warfare. There is the party of the deep drainers *par excellence*—those who contend that on all soils depth will compensate for width of interval. It should rather be said there was such a party, for we believe it is now all but extinct, though not till considerable sums had been expended on the strength of the assumption, and not always with the most successful results. Then, again, there is the party of those who lay their drains at regular intervals of eight or of ten yards, according to the nature of the soil, but insist, whatever the soil and sub-soil, on a minimum depth of four feet. There are others who ridicule the system of equi-distant drains, which they have nicknamed the *gridiron* system ; and who, while they insist on the above minimum depth, lay their drains at unequal intervals. They reject the principles of the Keythorpe drainers, who regulate both depth and distance by means of trial-holes. By these they ascertain the depth at which water enters the hole, the height to which it rises in the hole, and the relative height of the water in the different holes. In this way they determine the depth of their drains ; and they regulate the distance by the distances at which a drain will clear a trial-hole of water. Such a jog-trot, common-place, and practical mode of proceeding may be all very well for mere land-drainers ; but it is beneath the dignity of draining engineers. While they reject so simple and practical a mode of determining the proper width of interval and depth of drain, they have not told us, we repeat, by what principle they themselves are guided in laying their drains at irregular intervals. Is it that, as has been said of poor Smith of Deanston, they have not got hold of one ? or is it a secret of draining-craft which they will not disclose ? To free the land of water after making

it percolate three feet of soil will not satisfy these eminent men. They compare this to getting rid of water by surface grips ; and getting rid of it too quickly. By so doing we lose, they tell us, the collateral advantages ; that is to say, we lose the benefit to be derived from the percolation of water through the extra foot of soil. Now, if the Keythorpe drainers are to be believed, they save from 30 to 50 per cent. in the cost of draining a given area, estimated in perches of drain and number of pipes to the acre, which may be valued at whatever may be the local prices. As those draining engineers who insist on the extra foot of depth for the sake of the collateral advantages do not profess to drain for less than £5 per acre for labour and materials, it follows that they expend from 30s. to 50s. per acre for the sake of the benefit to be obtained by the percolation of water through the extra foot of soil. It may be worth while, therefore, to inquire what is the money-value of the collateral advantages conferred by filtering the rain through that extra foot. The paper of Professor Way, in the *Journal* of the Royal Agricultural Society, will furnish data for the calculation which we commend to the consideration of our draining engineers. Let us not, however, be misunderstood ; we are not arguing against drains deeper than three feet, where you find by trial-holes that the water does not enter the hole freely till a greater depth than three feet is obtained. All we contend for is, that if a soil is obtained of the depth of three feet, the advocates of deeper drains must be prepared to prove that the benefits derived from the extra depth have a money value equivalent to the difference in the expense of draining incurred by it. Neither can we admit the argument in favour of deep drains founded on the fact of the deep drains of Mr. Mechi having run with liquid manure, as stated by that gentleman at the Society of Arts. That argument has the fault of proving too much. It proves that the manure was running to waste ; and is, therefore, an argument either against deep drains or liquid manure, or the two in combination, or the execution of the drains in that

particular case. As little can we admit an argument in favour of deep drains founded on the discharge of water from Mr. Mechi's celebrated drain. We forget how many gallons a-day it yields; nor does it much matter, for it is very evident that it is much greater than the annual rainfall on his farm. He must, therefore, either be draining his neighbours' land for them, prompted by his well-known public spirit, or he is making free with their water supply. It is very clear that Mr. Mechi's must be a case of spring draining. We hear much about land draining and spring draining, but we doubt whether those who use the terms have a very clear perception of their difference. They are certainly two distinct things, but they graduate into one another so imperceptibly that it is not always very easy to draw the line of demarcation between them. Again, we reject the argument in favour of deep drains, that is, in favour of drains of more than a minimum depth of three feet, founded on the depth to which roots of wheat have been traced. They will run any depth in a crack, just as the roots of wurzel will run great distances when they get into a drain. No one, however, contended—at least, no one ever proved that the wheat or the wurzel was the better for this anomalous development of roots, any more than that a goose is the better for having an enlargement of the liver induced by a cruel process in order that it may be made into a Perigord pie.

In laying down general principles for the improvement of the soil, we cannot do better than take for our guide those soils which are naturally the most fertile. Looking at the question from this point of view, we find that a homogeneous soil, permeable freely by water to the depth of three feet, provided it contains

such a proportion of aluminous earth as to be sufficiently retentive of moisture, with a sufficiency of calcareous matter and the other mineral constituents of plants, which soils contain in minute quantities, such a soil ranks as one of extraordinary fertility. If only two feet deep, it constitutes land much coveted by the farmer; and if only one foot deep, is by no means despised.

Another favourite argument for excessively deep drains is, that they are thereby placed beyond the reach of obstruction by roots of trees. This advantage, however, is neutralised in a great degree by another argument brought forward in favour of deep draining, to the effect that the deeper you drain the deeper will roots extend. In this way we may go on, till we drain down to the antipodes. To such length had the rage for under-draining gone at one time, that we have seen it gravely recommended by a draining engineer to under-drain with pipes a large tract of land intended to be planted with timber. This reminds us of the two morning guns in the "Critic," and Dangle's remark thereon, about some people always spoiling a good thing. In the present day our most rational and experienced land-drainers would rather leave land undrained than run the risk of throwing money away by placing drains in the vicinity of trees.

In conclusion, we again call upon some of our great draining engineers to furnish the public with a calculation of the money-value per acre of the collateral advantages to be gained by drains having a minimum depth of four feet, over those having a maximum depth of three feet. Vague statements will not do; it is calculations of profit and loss which are wanted.

## ON THE BARKS, &c., USED IN TANNING.

### CHAP. I.

Although much has been already done to utilize the barks of trees, and to turn them to account for the service of man in various ways, it is only of late years that chemical science and close analytical investigation are bringing out the comparative properties and more important uses of the inner and outer barks of trees. A long and extensive acquaintance with their properties is however necessary, in most instances, to test the asserted value and alleged benefits of many.

The collections which have been made, within the last few years for exhibition at the different local and European industrial shows, have brought many more prominently into notice for the use of the dyer. The pharmaceutical chemist has also obtained several new barks for the service of medicine; but a discussion on the properties and uses of these would be more fitted to a medical and pharmaceutical journal than to one devoted to agriculture and rural economy.

I shall confine myself chiefly, therefore, to the value of barks suited to the purposes of the tanner; and the

subject naturally divides itself into, first, the indigenous barks; and secondly, the foreign barks and other tanning substances, with some details as to the extraneous sources of supply. A few preliminary facts and observations on the extent of the leather trade may not, however, be out of place.

The importance of the leather trade may be estimated from the following figures. Exclusive of the hides and skins tanned, tawed, curried, &c., we imported in 1854 the following undressed skins—

Goat skins.....	585,143
Seal skins.....	661,552
Lamb skins.....	1,924,948
Sheep skins.....	779,373
Hides.....	601,199
Total No. ....	4,552,215

Besides these, there were imported 4,500,000 lbs. of leather, 578,136 pairs of boot-fronts, and 231,000 pairs of men's and women's shoes.

But to reduce the above to leather (although some probably are destined for other purposes), we will take the

	Tons.
Total imports of skins at .....	30,000
The common estimate is that one-fourth of our live stock are slaughtered annually; this will furnish us with, for the United Kingdom, 4,000,000 ox and cow hides, at 28lbs.....	50,000
500,000 calf skins, at 4lb.....	900
8,000,000 sheep and lambs' skins, at 1lb.....	3,570
100,000 horse hides, at 14lbs.....	625
100,000 goat skins, at 1lb.....	45
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Total leather produced .....	85,140

A portion, however, of these hides and skins are exported to the extent of about 5,000 tons.

Now there are about 500 tanneries in the United Kingdom, employing from 350,000 to 400,000 persons, directly or indirectly; and if the foregoing estimate be any way near the mark, about 80,000 tons of leather would be worth, at 2s. per lb., £17,920,000; but probably £30,000,000 would be nearer the manufactured value. The greater portion of this manufacture is used at home, the declared value of the exports of this branch of trade being only about £1,300,000. The home consumption of leather necessarily keeps pace with the increasing prosperity of the industrial classes. Recently, the demands for various purposes of the war have led to an enormous consumption of leather.

The uses of leather are so numerous that it is somewhat difficult, without any official data to fall back upon, to form any correct estimate of the extent of consumption. If we allow half the population of the United Kingdom (say 14,500,000 persons) to use two pair of shoes each per annum, and calculate them at but 5s. per pair, we get at a money value paid for this single article of £7,125,000. But there are numberless other uses of leather—for harness, fire-buckets and hose, portmanteaus, buff-leather, shamoy, gloves, parchment, book-binding, horse-hides, hog-skins for saddles, seal-skins, &c.

Coming, now, to the substances containing the principle essential to the conversion of skin into leather, we find these to be very numerous, and scattered over every quarter of the globe. Proximity of supply, and cheapness, necessarily guide the tanner in his choice of material in different localities.

If we take a recent year's imports of tanning substances at the current prices of the day, and add thereto the indigenous barks by estimate, we shall arrive at some approximate idea of this important branch of trade.

The imports, then, were, in 1854—

	£
Barks of all kinds, 420,641 cwt., at an average of £7 per ton .....	147,224
Sumach, 230,480 cwt., at 16s. per cwt.....	178,984
Valonia, 397,720 cwt., at £16 per ton .....	318,176
Terra japonica, 90,940 cwt., at £20 per ton ...	90,940
Cutch, 38,300 cwt., at £30 per ton .....	57,450
Divi divi, myrobolams, &c., 4,000 tons, at £12 per ton.....	48,000
The indigenous oak bark used may be taken at fully 200,000 tons, worth £6 per ton.....	1,200,000
Larch used in Scotland, probably 50,000 tons, at £4 per ton .....	200,000
The value of the leather made, about.....	16,000,000
<hr/>	
	£18,240,774

The imports of bark proper for tanners' and dyers' use, are mixed up in the Parliamentary returns, so that it is impossible to ascertain precisely the proportions of each; but the quarters whence they are received afford some idea. In 1854 the aggregate quantity of these barks imported amounted to 21,032 tons.

The following table shows the quantity, not only of the barks, but of other tanning materials imported in the last six years, in hundred-weights. Some of the substances, however, are applied to other purposes, but only in small proportions.

Year.	Bark for tanning & dyeing.	Sumach.	Valonia.	Terra Japonica.	Cutch.
	cwts.	cwts.	cwts.	cwts.	cwts.
1849....	368582	251800	333420	125660	43460
1850....	380674	258580	250520	91700	23440
1851....	460895	240500	212780	95660	48720
1852....	403930	195160	277400	64880	44720
1853....	412892	216720	343580	78080	9700
1854....	420641	230480	397720	90940	38300
<hr/>					
Total, cwts	2147614	1393240	1815420	546920	208340
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Average ..	407935	232206	302570	91153	34723

The imports of valonia now nearly equal the amount of bark imported; and from the great quantity of tannin it furnishes, valonia fetches twice the price of oak bark: the value of these acorn cups received in 1854 was upwards of £270,000. In aggregate value, sumach ranks next, and the various barks third in rotation.

The following were the sources of our supplies of foreign barks, for tanning and dyeing, in the years 1851 and 1853:—

	1851. cwts.	1853. cwts.
Sweden .....	641	..
Norway .....	7,830	.. 3,353
Denmark .....	1,187	.. 3,107
Prussia .....	6,050	..
Hanover .....	202	..
Hanseatic Towns .....	25,418	.. 14,904
Holland .....	83,926	.. 99,564
Belgium.....	192,503	.. 197,749
France .....	782	..
Portugal .....	64	..
Tuscany.....	10,164	.. 18,679
Morocco.....	29,072	.. 16,002
British Africa .....	5	..
Australia .....	40,649	.. 4,776
West Indies .....	72	..
United States .....	61,823	.. 50,693
New Granada .....	492	..
Peru .....	14	..
Two Sicilies .....	—	.. 3,926
Other parts .....	—	.. 139
<hr/>		
Total cwts.....	460,895	.. 412,892

In 1816 the imports of oak bark were under 5,000 tons, but in 1823 they had risen to 46,674 tons—a large quantity of corktree-bark was then included in the returns.

The consumption of indigenous oak bark in Great Britain is now fully 150,000 to 200,000 tons—many large brokers estimate the quantity at 300,000 tons—and we import, on the average of years, 53,500 tons of various tanning substances. Last year it amounted to

59,000 tons, the value of which was fully three-quarters of a million; whilst that of our own oak and other barks used could scarcely be less than one million and a-half sterling. Besides barks, various other substances—fruits, seeds, extracts, &c.—are imported for the use of the tanner, of which the chief are: valonia, camata and camatina, the acorn cup of a species of oak growing in the Levant; divi-divi, the wrinkled pods of *Casalpinia coriaria*, from South America and Central America; myrobolams, the dried fruit of various species of *Terminalia*, from the East Indies, &c.

By chemical process, the tanning principle is now extracted from barks and woods; and thus reduced to a small compass, the concentrated extracts are easily imported from distant quarters, saving the freight on bulky articles. In this form we receive gambier, terra japonica, cutch or catechu, and a variety of kinos.

OAK-BARK being the usual substance employed by the trade for tanning, the value and commercial utility of other barks and tanning principles are necessarily determined by comparison with it. Oak-bark is the main stay of the tanneries of the United Kingdom, both in London and the provinces, although larch-bark is now used to a considerable extent in Scotland. Before foreign commerce had increased so rapidly, and science had made those surprising discoveries which have greatly benefited the arts and manufactures, it was anticipated by old leather manufacturers that, if the trade and consumption increased at the ratio it was doing, a notorious deficiency of indigenous barks would become manifest, and the price would hence, at some day, reach £80 the load. This fear, however, has proved groundless; for although, during the last war, it advanced at one time to about half that price, yet in the past fourteen years it has only once reached £22 the load, and of late years has not varied to any considerable extent in price, £10 to £15 being about the marginal rates. From 2,000 to 5,000 tons per annum of foreign oak-bark have come in, to aid our supplies, Flemish fetching £5 10s. to £6 10s., and German Dutch £4 10s. to £5 10s. per ton.

P. L. S.

## AGRICULTURE IN FRANCE AND ENGLAND.

The *Spectator* has an article on the improvements in agricultural operations and implements which are deserving of particular attention. The comparison between the produce of England and France tends greatly to the honour of the English farmers. Great exhibitions like those of 1851 and 1855 comprise an agricultural show upon an international plan; and the advantages are on a scale proportionate to the difference between a separate state and a continent. The agricultural show used to be a mirror for a county; it was then a mirror for a kingdom; we were enabled to measure in some degree our progress, and we know how useful the comparison has been—first, in teaching the utility of particular diets as means of fattening; and secondly, in correcting the tendency to produce mere fat in beasts for the table. But by means of international exhibitions, we not only compare ourselves with ourselves, but with our neighbours; we gather lessons

from them; we teach lessons in turn; and by the comparison of different methods a *tertium quid* is struck out—a third idea which never occurred to either. The comparison between the two countries is highly favourable to our own, not only with reference to the immediate articles exhibited, but with reference to the general course of agriculture. “France,” says an eminent French writer quoted by Mr. Dennison, “has devoted herself too exclusively to the production of corn crops; England has aimed at corn through the production of green crops, the rearing of cattle, and the consequent supply of manure by which the land is renewed.” It is curious that this “grand circle” has been the subject of much enthusiastic writing by theoretical philosophers in France; while our more intelligent agricultural reformers were carrying out the course, quite unconscious of the pious practical poetry that they were performing. The gross results were remarkable. With an available surface equal to about half the extent of France, the British Islands produce more food for animals. If we take England alone, the disproportion is much larger. France produces about 6 hectolitres of wheat per hectare; England, 25 hectolitres. In the British Islands the vegetables produced form about two-thirds of the whole agricultural produce, and the animal products equal the vegetable. The number of sheep in France and the United Kingdom is about equal—about 35,000,000 in each; but in proportion to the land occupied the French sheep ought to be 60,000,000. Taking England alone, the proportion is still higher; England feeds 30,000,000 sheep on 15,000,000 hectares of land; France 35,000,000 on 53,000,000 hectares. Yet even this does not give the practical proportion: the weight of an English sheep is twice the weight of a French sheep; so that a given quantity of French land yields mutton in the proportion of 1 to 6 on English land. Two different principles appear to actuate the English and the French farmer—the English thinks of producing, the French of saving. Still it is only of late years that we are beginning to understand the extent to which capital may be invested in land—the amount of feeding that the land will take, particularly in the application of artificial manures. It is evident that the Exhibition in Paris has given a great stimulus to enquiry and comparison, by which the materials for this branch of agriculture can be brought into a collected view and their profits ascertained. In this country, we have carried out with great advantage the plan of public loans for the improvement of land, and the increased consumption of Peruvian guano and other manures shows how much encouragement the assistance has given. A wide comparison is peculiarly necessary to ascertain the results. If, as is probable from Mr. Lawes’ inquiries, the greatest profit in fattening and feeding cattle is attained by a just balance in the different constituents of food rather than the predominance of any one, we may infer that, independently of varieties in the qualities of land which have to be corrected, collective variety in the manure used upon any one place will be positively advantageous. How important is it to include in the area of land which furnishes the ground for this survey, France as well as England, and other countries besides! The progress of agricultural machinery is cheering, but encouraging for the future rather than a source of pride for the past. The use of steam in the rustic field has advanced very slowly indeed, notwithstanding its manifest advantage; but certainly we shall have no retrograde movement, and the Exhibition furnishes one of the best guarantees for that conclusion. “No farmer who has ever had a steam engine on his farm will ever again be without one; no farmer who has ever thrashed his corn with steam-power could bear again to see his horses toiling in the wearisome circle, now jerking onwards when the whip sounds, now brought almost to a stand-still when the machine is clogged by a careless feeder. The regular stroke of the untiring steam-engine gives excellence to the work, keeps everybody in his place, and introduces among men, even the most careless, something of its own exactness and precision.”

## STIERNSVARD'S SWEDISH CENTRIFUGAL CHURN.

Let the result be as it may, whether we "make a spoon or spoil a horn," an experiment is always interesting, and the process of churning before the council of the Royal Agricultural Society at its weekly meeting on the 12th inst. was no exception from the common rule. "Practice with Science" is the golden standard of the Society, and on the present occasion it had to thank Count Ambjörn Sparre and the Messrs. Burgess and Key, of Newgate-street, for the *practical treat* they with so much disinterestedness exhibited. Last year a varied amount of theoretical disquisition took place on dairying, let us this season have an equal amount of experimenting, and see which will be the most productive of good. There is certainly no branch of agriculture where Practice lags farther behind in the march of improvement, none which holds out to the pioneering genius of Progress a greater reward for successful results, than the dairy.

The Swedish churn, if inferior in its present imperfect state to its more successful rival, which has now for several years been meritoriously carrying everything before it, has at least the merit of introducing novelty in more senses of the word than one, so that it were difficult to say what results eventually may be. As the Vice-president justly observed, the American, when first introduced into this country, was by no means so successful as it now is; while the experiment performed on the 12th by Count Sparre did not appear to be so successful as those performed at Grignon, Paris, and other places in France, judging from authenticated credentials shown us; so that conclusions of a sweeping character must at least be postponed, leaving fair play and an open field for merit to receive her just reward.

To those who have not seen the Swedish churn, we may observe that it consists of a vertical cylinder, analogous to an old "plunge-churn," with vertical "dashers," on a hollow axis, at the lower end of which is a hollow horizontal centrifugal wheel. The centre of this wheel, from being also the centre of the axis, works on a pivot; and at the top of the axis is a small pinion, which gears in a large driving wheel, worked by a winch; the driving wheel and winch being fixed in a large frame, the churn and dashers being only so when at work, they being easily removed when filling and cleaning. The dashers are perforated, and extend the whole length of the churn, but only half way across it, there being fixed perforated dashers on its interior.

The object of the centrifugal wheel, and hollow axis communicating with it, is to throw air into the milk; consequently its velocity must be such as to overcome the pressure of the milk or cream, which otherwise would rise up in the interior of the axis to the level of the milk in the churn. This is effected by the large driving wheel and small pinion already mentioned.

But such a velocity would prove injurious to the quality of the butter—hence the reason of the fixed dashers, and movable ones only extending half way

from the axis to the interior circumference; for were the latter equal in length to the radius the agitation of the milk or cream would be more than doubled.

Again, even with this provision, the velocity of the dashers is too great—a result which was proved by the butter having lost its natural colour; while the velocity of the centrifugal wheel is, we fear, the reverse.

Both these objections, however, are easily obviated, being only against the details of mechanism and not the principles on which the churn is constructed. For example: the hollow axis of the centrifugal wheel can easily be made to work in the hollow axis of the dashers, so that the two move at different velocities. The driving wheels may be concentric, and fixed on the end of the winch shaft, so that the two pinions gear in the upper part of them, the interior one, having the greatest velocity, being driven by the exterior driving wheel, and the exterior pinion at less velocity by the interior driving one. Alterations of this kind are simple; the only difficulty, if there is one, being to obtain the results which they would produce.

But imperfect as the construction of the churn obviously is at present, the results which it produces merit the most deliberate investigation. In the first place, for instance, five quarts of new milk yielded in five minutes and one second churning,  $7\frac{1}{4}$  oz. of butter, the butter-milk being either fit for boiling or cooking in any way, or for cheesemaking. The butter was about an average as to quantity, but inferior as to quality, while the butter-milk was much superior to skimmed milk for labourers or cheese-making.

Anthony's American churn, again, only yielded from six quarts of the same sample of new milk, in six minutes,  $7\frac{1}{2}$  oz. of butter, the butter rather better coloured; the butter-milk the reverse, but containing of course more butter, and equally adapted for culinary or cheese-making purposes.

On the other hand, from the same sample of cream results were entirely in favour of the American churn, five quarts yielding  $3\frac{1}{2}$  lbs. of excellent butter in 14 minutes and 54 seconds, while its Swedish rival in 12 minutes and 7 seconds produced butter, but in such an imperfect state that the milk could not be separated from it. It was white in colour, having all the appearance of being injured by too quick driving, and too high a temperature, a result with which every dairyman is familiar; but the butter-milk was richer in colour and superior to that of its transatlantic opponent.

It must here, however, be stated, in fairness to the principle on which the Swedish churn is constructed, that the butter did not receive proper treatment, there being no means of gathering it with the dashers. Every dairyman is familiar with the professional handicraft required to work the dashers after the butter is coming, and what a mess he would make of it, were he forced at this time to turn the whole into a tub, and commence "dashing" with "cold hands" in water, especially if the churn had been "over driven," and the butter "burst" as it is technically termed in some provinces, "over-done" in others, &c.

Into the many chemical questions involved, our space will

not permit us to enter at present, but we can hardly pass over one thing—the difference in the colour of the butter and butter-milk—without an observation. How is it, for instance, accounted for? How is it that the butter-milk is rich in colour and flavour when the churn is over-driven, and the butter white and badly flavoured? and *vice versa*? Does the white butter contain a larger per-centage of margarine and less oleine than the richly coloured and flavoured sample? We know that it is whiter in winter than in summer, and that in the former season it contains greatly less butter-oil, especially in cases where no artificial heat is used to sour the cream or milk before churning. Is it the butter-oil therefore that gives the colour? and does the rapid driving separate it from the margarine, leaving it in the butter-milk?

We have often heard this question answered in the affirma-

tive, but have never seen its truth tested by experiment in the laboratory. It has been ascertained, however, that the margarine of butter liquefies at a temperature of 118 deg. Fahrenheit, but the oleine at 32 deg. (Johnston), while at from 61 deg. to 66 deg. its fluidity is such as to separate readily from the margarine (Thomson). We have here, therefore, something like presumptive evidence that when milk or cream is over-churned at this latter temperature, a separation of the oleine from the margarine may be effected by the action of the dashers; that the former may be mixed with the milk; and that the latter, after this has taken place, may cohere loosely together in the manner witnessed on such occasions, the white colour of the margarine and excess of casein being thus easily accounted for, while the oleine gives a richer colour and flavour to the butter-milk.

## ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

SIR,—We should feel obliged by your inserting in the *Mark Lane Express* the enclosed Report, with which, as judges at the Carlisle Meeting, we furnished the R. E. A. Society. We are not aware why ours was the only report which did not appear in the present number of the Journal; but we consider it due to ourselves to make it public, lest it should be supposed that we neglected to perform the duties the Society demanded of us; and we also think the implement makers should be aware of the grounds on which we made the awards in a very useful and meritorious class of implements.

We are, Sir, your very obedient servants,

T. W. GRANGER,  
CLARE SEWELL READ.

March 27, 1856.

[We have much pleasure in publishing the following report as requested; while we may add that we heard Mr. Wren Hoskyns explain, at a recent Weekly Council Meeting, that the omission arose solely from this copy having been accidentally mislaid.—EDIT. M. L. E.]

### OFFICIAL REPORT OF THE JUDGES OF DRILLS, ETC., AT THE ROYAL AGRICULTURAL SOCIETY'S CARLISLE MEETING IN JULY, 1855.

**DRILLS.**—In this department we experienced considerable difficulty in awarding the prize, from the close competition between the drills of Messrs. Hornsby and Garrett. The Messrs. Garrett have applied Chambers' distributor to their manure drills, by which means as little as three bushels per acre of concentrated manure can be deposited. This produced in that particular a decided superiority in their general purpose drill, and in that for drilling turnips on the flat, and those prizes were accordingly awarded to them. The excellency of the workmanship and materials employed by the Messrs. Hornsby secured for them the prizes for their corn and seed and small occupation corn drills. There was a particularly close contest between Messrs. Hornsby and Garretts' ridge drills, and also between Messrs. Garrett and Holmes' small occupation manure drills. After

considerable investigation we awarded the prizes to the drills of Messrs. Hornsby and Holmes, and felt perfectly justified in highly commending the Messrs. Garretts' very excellent machines.

The only *liquid manure drills* shown were those of Mr. Chandler, at the stand of Messrs. R. and J. Reeves. Two were selected for trial; the old one with buckets, and the "new implement," having only holes at the bottom of the liquid cistern, which are kept clear by stirrers. Both equally well delivered water mixed with superphosphate; but on being filled with the thick drainage from a dung heap and the short manure from a pigsty, the buckets showed their superiority by regularly delivering all the liquid from the cistern. We therefore awarded the prize to the old drill; but think that for light manure the new one may be very useful, and of course it is more simple in its construction, and can be made at less expense.

The only two *broadcast manure distributors* at the show, Chambers' and Holmes', were tried together. Both worked well. First they were required to sow four bushels per acre of dry ashes, and then the same quantity of fine salt; afterwards a like amount of very wet manure, and then as much as 100 bushels per acre of lime, salt, and ashes. We awarded the prize to Mr. Chambers' distributor, and commended Messrs. Holmes', as a cheap and useful machine. The only objection that can be urged against Mr. Chambers' distributor is its great price (£21); could it be produced at a less cost, we feel sure that it would be much more generally used.

**Horse Hoes on Flat.**—It was impossible to find a proper field for the trial of these hoes, as no turnips are drilled on the flat in the vicinity of Carlisle. A field of broadcast rape was all that could be procured, and from such a trial we gave the prize to Messrs. Garretts' well-known hoe, and commended that of Mr. Smith.

**Revolving Horse Hoes** were first tried on a field of very large turnip plants, and choked. Then, again, on a field of younger plants, but irregular drills. The single hoe (Huckvale's) acted capitally, though the

other (Martin's), from the irregularity of the ridges, could not work so well.

The *Haymakers* were tried on a heavy swathe of fresh-mown grass. The morning was very wet, and the ground most unlevel; but these machines worked admirably. Messrs. Smith and Ashby's was the most perfect, especially in the back action or turning motion. As there were no prizes for haymakers on the list, and no essential improvement, we highly commended Messrs. Smith and Ashby's, and commended Mr. Nicholson's.

The *Horse Rakes* were severely tried on a very heavy wet crop of fresh grass after the haymakers had thrown it out. Considering the state of the grass the work was well performed, and we highly commended Messrs. Howard's rake, and commended that of Mr. Williams. Mr. Busby's rake worked very well.

The prize list contained no premiums for *Ridge Horse Hoes*; but several were tried: and we highly commended Messrs. Howard's hoe, on account of its good work and steadiness of draught; and commended Mr. Busby's hoe, as being an excellent and cheap

implement, the cost, without the harrow, being only £2. We likewise commended Mr. Sewell's *Drill Grubber*, as a useful implement on heavy soils.

The two *Drill-presses*, described as new implements, made by Messrs. Howard and Mr. Ball, both worked well. We think the wheels of Mr. Ball's presser require to be of a greater diameter. After the quantity of wheat on light lands which suffered from loss of plant last winter, we think these implements, which make a firm seed bed, and at the same time deposit and cover the corn, will become more appreciated.

Although there is no striking novelty which requires any further observation from us, we cannot conclude our report without expressing our satisfaction at the general usefulness, simplicity of construction, and good workmanship of those implements which came under our immediate observation.

T. W. GRANGER.

Aug., 1855.

CLARE SEWELL READ.

To W. Fisher Hobbs, Esq.,

Senior Steward of Implements, &c., &c.

## THE APPROACHING AGRICULTURAL SHOW IN PARIS.

“Breeding and fattening of animals for the butcher have made great progress in France within a few years. It is not without effort that this progress has been accomplished—it has been necessary to struggle against routine, to dethrone old prejudices, with the foreign aid of new practical and irrefutable demonstrations. Rendering to each the justice that is its due, it is to the example of England that we owe the greater part of the magnificent results obtained by our breeders. It is from the introduction into France of the Shorthorns that we date the new era that has resolutely commenced in our industrial agriculture.”

So says a home writer in a recent number of *La Presse*. He speaks, too, not merely for himself, but his country generally. France is affording ample acknowledgment, at this moment, of what she feels is here due to us. She is not content, however, with mere thanks only—not reflecting more on what has been accomplished by England's aid and example, than on what may be yet further achieved by the same means. Thus far the “industrial agriculture” of our neighbours has but begun to develop itself. It remains almost equally with us to say how much this shall be extended.

Happily, the Exhibition of Agricultural Stock and Implements as held in Paris last spring is not suffered to die away in that general display with which it was associated. The Agricultural Show is to be an annual one; in which the chief feature will, at least for the present, be not so much what

the French can themselves produce, as what they can attract from other countries. With this object they naturally enough turn first of all to England. “It is to the example of England that we owe the greater part of the magnificent results obtained by our breeders.” It is to us still they look for yet greater results, and it will be our own fault alone if this expectation be not realized. With the present facilities and inducements, as well as with all the prospective advantages to be attained, we believe the English exhibitor of either cattle or machinery owes no greater duty to himself than the bespeak of a place at the forthcoming Show in Paris.

Let us see what these facilities and advantages may be. To begin with, we are allowed to do as we please. With excellent discretion, the French Government have entrusted the arrangements to a committee, consisting for the chief part of eminent English agriculturists, to whose home experience is added what they saw in Paris last year. These are Mr. Amos and Mr. Denison, who on that occasion were the English Implement Jurors; Mr. Miles, who went over as President of the Royal Agricultural Society, and whose repute as a breeder of stock, and labours as a steward of implements, will qualify him for either branch of the duties on which he may be engaged; Mr. Fisher Hobbs and Mr. Milward, who were last year the English jurors for breeding stock, and whose official training at home gives them all those general recommendations we have just referred to; Professor Wilson, to whom

was entrusted the arrangement of the agricultural produce, as well as a place on the English jurors of implements—and last, though certainly not least, in this judicious selection, we have Mr. Brandreth Gibbs, who in 1855 had the arrangement of the implements, and whose very valuable services will no doubt be made as “generally useful” at the National Agricultural Exhibition of France, as they long have been in that of England. Let us add to these well-known names that of M. Gaillard de Ferry, Consul-General of France; and with his that of M. Eugène Tisserand, the commissioner appointed by “the Minister of Agriculture and Commerce,” and the committee is complete.

In the appointment of this committee, the expressed desire of the Imperial Government was to encourage an exhibition of breeding stock, poultry, and implements, on a far more extended scale than on the previous occasion. The consequence is, there is not a class of animal or invention ever found to be of service in the practice of English agriculture, but that has its due place in the prize sheet of the Paris show:—Shorthorn, Hereford, Devon, Sussex Alderney, Ayrshire, Polled Angus, Galloway, West Highland, and Kerry cattle, with room for all analogous breeds from England, Ireland, and Scotland. Southdown, Leicester, Cotswold, Kent, Cheviot, and black-faced sheep; and Dorking, Cochin-China, and other kinds of poultry. Part of what we have inserted here comes in a supplementary prize-sheet, chiefly due to the exertions of the Highland Society and its secretary, Mr. Hall Maxwell, who had only to ask and obtain this distinct recognition of the Scotch breeds of cattle and sheep, previously classed too generally with other varieties. The Government, acting on this suggestion, has even volunteered to go further, and has resolved to open separate classes for all or any other breeds not yet enumerated, provided there be not less than four or five animals entered in each class.

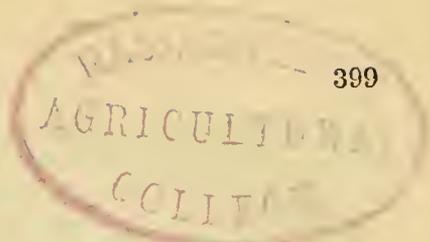
The prizes for implements will be on an equally liberal scale. We must assume, however, that we have no maker of any celebrity amongst us but has already determined on what he will “go for” in Paris. We may remind this important body of exhibitors that they will not on this occasion have to contend against that limited space which last year unavoidably caused so much disappointment. We may say, yet further, that the more they re-

spond to the invitation to supply what in France is so much wanted, if not quite as yet appreciated, the greater inducement will there be for the Government to reduce the duty on the importation of their inventions. With a little more acquaintance, the value of machinery will come to be recognized as readily as that of Shorthorn cattle or Southdown sheep; while no such “introduction” was ever yet to be obtained for a new connection. We may add here that, in addition to the prizes stated in the French Decree, there is now an offer of £20 and a medal for the best fixed steam engine for farm purposes.

The committee in England, not unmindful of the heavy expenses with which the transit of entries must be attended, have addressed themselves to the different railway companies, and we are assured there is every reason to believe the reductions they ask will be liberally entertained. Once landed on the other side of the channel, and the transit from the frontiers to Paris is *free*.

We shall hereafter give the Programme of the meeting so soon as we can have it perfect. In the mean time we have thought it better to make our readers thoroughly informed of the opportunity which awaits such of them as have anything of excellence on their homestead, or in their work-rooms. The French do far more than drily recognize our superiority. They do all in their power, not merely to honour, but to reward us. We question very much whether, if only duly cultivated, the English breeder of agricultural stock had, or will ever have, such a market for his produce as is now opening and extending itself over the whole of France. Beyond this, it is said, agents will attend the forthcoming meeting, instructed to purchase largely for other continental Powers. The implement maker, if he only *care* for it, will as surely have his turn. A nation which has already learnt to appreciate the thorough-bred horse and the pure Shorthorn, will not be long without wanting a proportionate supply of corn-crushers, chaff-cutters, and so gradually onward to “the fixed engine for farm purposes.”

The Third Napoleon is what is termed “a fortunate man.” Fortunate amongst other things in admirable forethought and sound judgment. His long experience of this country has taught him to feel where we excel. He openly asks our aid to advance an important art amongst his own people; and he shows it may be worth our while to give it.



RESUME OF THE OFFICIAL REPORT OF THE AGRICULTURAL PRODUCTS OF THE UNIVERSAL EXPOSITION.

[FROM THE REPORT OF THE SECRETARY, COUNT HERVE DE KERGOLOAY, IN THE JOURNAL D'AGRICULTURE PRATIQUE.]

Continental France has obtained 69 medals of the first class, 135 of the second class, and 94 honourable mentions. Besides these, she claims for Algeria 1 great medal of honour, 21 medals of the first class, 33 of the second, and 28 honourable mentions; and, for her other colonies, 1 medal of honour of the second class, and 1 honourable mention. She has gained, in all, 383 rewards out of the 826 adjudged to the different countries exhibiting. Austria has obtained 3 medals of honour, 41 medals of the first class, 36 of the second, 21 honourable mentions: in all, 101 rewards. Great Britain has obtained for herself 6 medals of honour, 10 medals of the first class, 12 of the second, and 8 honourable mentions; and, for her colonies, 16 medals of the first class, 17 of the second, and 3 honourable mentions: in all, 72 rewards.

The following table will show the number of prizes won by the remaining countries which exhibited.

	Medals of Honour.	Meds., 1st Class.	Meds., 2nd Class.	Hon. Men-tions.	Total Re-wards.
Grand Duchy of Baden .....	1	7	4	—	12
Belgium .....	—	13	14	4	31
Prussia .....	—	8	7	1	16
Denmark .....	—	8	2	1	11
Sweden and Norway .....	—	7	10	2	19
Greece .....	—	5	15	4	24
Tuscany .....	—	4	3	1	8
Spain .....	1	3	13	12	29
The Low Countries .....	—	3	5	1	9
United States ....	1	2	2	—	5
Piedmont .....	—	4	3	1	8
Wirttemberg .....	—	2	—	1	3
Turkey .....	—	1	5	6	12
Saxony .....	—	1	4	—	5
The Roman States..	—	1	1	—	2
Grand Duchy of Hesse .....	—	1	—	—	1
Switzerland .....	—	1	—	—	1
Mexico .....	—	1	—	—	1
The Dominican Republic .....	—	1	—	—	1
Paraguay .....	—	1	—	—	1
Tunis .....	—	—	1	—	1
Guatamala .....	—	—	1	—	1
Costa Rica .....	—	—	1	—	1

Portugal has obtained 2 medals of the first class, 4 of the second, and 4 honourable mentions; in all 10 rewards. It is true that it figures on the list of medals of honour, as having obtained one for the whole of its agricultural products—wheat, maize, &c.; but this is an error in the drawing up of the report.

It will be seen that in this distribution of rewards the part allotted to France has been large and illustrious. The progressive movement of its agriculture, the

development of which I traced since the commencement of the nineteenth century, in my report on the Universal Exposition of 1851, becomes more energetic year by year. It struggles against the inclemency of the seasons, which has diminished the products of the three last harvests; it is not stopped by the sacrifices of men and treasures, which a war, already so memorable, has exacted for these two years past. Every one who has examined with attention the various products which constitute the exposition of French agriculture, and compared them with those of other countries, will see clearly that henceforth they will have no reason to dread any competition.

Since 1849 France has been able to supply England with more wheat than Russia or the United States, seeing that the latter have only furnished her with 1,789,679 hectolitres, Russia with 1,741,029 hectolitres, and France with 2,151,866 hectolitres.

In 1850 the exportation of wheat from France surpassed the sum of 60,000,000f., and attained to 70,000,000f. in 1851; whilst our exports of agricultural food products of all kinds amounted in 1851 to the value of 258,205,352f., and in 1852 to that of 285,960,083f. If this movement has considerably slackened in these three latter years, the reason of it is the rise in the prices of all kinds of provisions, caused by the failure of the crops; but the experience of preceding years is sufficient to show that the agricultural products of France are sought for, and take their place proudly in the greatest markets of the world. The great encouragement which French agriculture has gained this day will tend to favour and develop this movement. It is also the most powerful resource for us to fall back on, in those years when the crops are damaged by the intemperature of the seasons. France has raised in good years 97,000,000 hectolitres of wheat, which represents the sustenance of 32,000,000 of individuals; and there are, unfortunately, more than 4,000,000 of our compatriots who are not in the habit of eating bread.

\* \* \* \* \*

Now that it has arrived at the termination of its labours, the jury claims to say a few words for itself. It was composed of 19 members, of whom the majority were French. Its labours have been pursued with a zeal and assiduity which never slackened throughout the whole of their task; and the most cordial agreement has never ceased to reign among its members. Always impartial, sometimes generous, it has never been under the influence of a narrow spirit, nor jealous of selfish nationality. In the same spirit it has met the widely different difficulties which presented themselves during

the examination of products or processes submitted to its judgment. Presided over in turns by its president, Count Gasparin, and its vice-president, Mr. Evelyn Denison, M.P., it has found in them the same loyalty, the same care, and the same zeal to defend the interests

which have been confided to them, and to make their decisions respected. The feelings of esteem and confidence contracted in the course of their connection as fellow-labourers will leave precious recollections in the hearts of all the members of the jury.

## THE AGRICULTURE OF BELGIUM.

[TRANSLATED FROM THE FRENCH JOURNAL OF PRACTICAL AGRICULTURE.]

BY BARON PEERS.

In the month of October last, the Superior Council of Agriculture of Belgium, convoked in virtue of the royal organic resolution of the 30th of August, 1850, by the Minister of the Interior, has had to declare itself on a question of vital importance to the agriculture of the country, so eminently agricultural, and which has at all times known how to impress upon the most noble of all industrial pursuits the indications of progress.

For the better understanding of these important debates, let us analyze previous events.

The Minister of the 12th of August, 1848, perceiving, upon his accession, the opportunity for instituting a host of measures favourable to rural interests, proceeded at once to decree a series of useful establishments, demanded in vain before his entry to power. In less than two months he had organized exhibitions and an agricultural congress. Professional instruction in agriculture, and in all those branches of knowledge directly attached to that immense trunk, had equally formed the object of his solicitude; and he had found means to impart a powerful impulse to the principle. Everything was regularly constituted. The Government had sought out, in order to reward them for their labours and achievements, those humble men who consecrate their lives to the well-being of all; they had raised agricultural labour to a par with all other industrial employments; re-established the husbandman in his own estimation, and in that of a society distracted by innumerable interests; in one word, what had never till then been attempted in Belgium, was at once carried into effect with an unlooked-for success.

At the present time the men of the 12th of August have fallen; we will no longer have them personally, but we incriminate their acts, and condemn, or rather look upon them, as fruitless attempts. We wish to overturn and annihilate the least vestiges of their administration; the Representative Chamber itself, would see with a degree of satisfaction the uprooting of that immortal edifice, constructed with so much care. But the present ministry, better instructed than the coalition, the spirit of which has seized upon a great part of the members of the Legislative Corps, and more solicitous for the public interests than for the strifes of the national proxies, has had recourse to a measure before which the most firmly-established arguments ought to remain silent: it has united all the men most eminent in this line, representing and faithfully devoted to, the interests

of agriculture, and submitted to them the following question:—

“Is it not desirable that the Government continue to interfere officially with the agricultural interests?”

This problem, big with the future for a people whose principal wealth is derived from the land, has naturally occasioned numerous discussions in the journals and other periodical publications. All impartial men, the true friends of their country, and desirous of placing it upon a par in progress with other nations of the globe, have solved it in the affirmative.

Placed in the order of the day amongst the discussions which the Superior Council of Agriculture had to decide upon, this question has met with no serious opposition, which is proved by the fact that after many sittings of sustained interest, in which the liberty of the tribune has allowed the discussion of the question under all its phases—after many lances indirectly broken against the opinion of the majority, twenty-three members present have unanimously given in their official adherence to Governmental interference, two only having dissented therefrom. One member alone has thought it his duty to give some explanation of his adverse opinion. Without completely annihilating the principle of such intervention, he has nevertheless severely criticised all the offices which constitute the allocation relative to rural industry. Thus, he declares himself opposed to the stud, to the professional instruction of the veterinary college, to the indemnity for cattle attacked and struck down by contagious diseases, &c. This honourable adversary has denounced the existence of the royal stud, because, according to him, it has not produced satisfactory results at all in proportion to the enormous expense for which it figures in the budget. The sums allowed for its support he denominates fantastical expenses; declares himself a very weak partizan of certain schools, because the Government cannot enable the generality of the inhabitants to participate in their benevolent operation; he pronounces the indemnity granted for cattle struck down and infected with epizootic disease, unpopular, because it opens the door to much injustice and abuse. Veterinary instruction still serves as a text to the adversary to fire red hot balls at official intervention, which he alleges costs too dear. According to him, it would be far better to send the young people intended for the practice of the veterinary art to study abroad; and so on.

None of these arguments have had any success, since the Council have unanimously voted the maintenance of the existing order of things. And how could it do otherwise? Who, better than the Government, can make itself acquainted with the general requirements? Have we not seen, in every country on the globe, power, in its own interest, exercise even a direct interference in the affairs of agriculture? We have before us a still recent example of such pressing interference, which in some years has been powerful enough to metamorphose a whole country. England, whilst insuring by its immense capital a continually increasing prosperity to rural industry, could not meet the consequences of Sir Robert Peel's bill without demanding of the Legislature the resources necessary to a direct intervention in the amelioration of the soil. The House of Commons voted unanimously several millions sterling, in the shape of a loan. The sum total has been absorbed; it has received its destination; and at this moment three-fourths of the wet lands of the United Kingdom are drained. Without this official co-operation of the Government, the drainage would have remained in embryo.

Belgium has felt that it was necessary to enter upon a wider scale, in order to ensure to science and practical agriculture a new career, and to emancipate it from its ancient routine. It has purchased of foreigners the best agricultural implements, and imported the best

breeds of domestic animals, in order to improve the native ones. None will deny the eloquence of figures, to which we shall have recourse in concluding this notice.

Fifteen years ago the Government and province of West Flanders expended 200,000 fr. in the purchase of Durham bulls and cows. Amongst the 165,000 head of cattle existing in that province, there are not more than one-tenth which have not exhibited the beneficial effects of the crossing, independent of the 74 bulls and 93 cows and heifers of pure blood, which still remain the property of the Government.

This expense, so eminently useful to the province, has increased the value of the animals thus crossed to the extent of at least 10 fr. per head, which amounts, for the 143,000 animals improved, to an increased value of 1,430,000 fr., gained at an expense of 200,000 fr., integrally represented by 167 animals.

These facts are patent, and prove how much, in this single branch of rural economy, so subject to a multiplicity of adverse influences—how much, we say, the intelligent protection and adhesion of Government can effect. If we were not fearful of departing from the rule of impartial chroniclers, as inaccessible to indifference as to infatuation, we should allow ourselves to engage in pleading this cause, had not the adhesive vote of the Superior Council of Agriculture given it an official sanction.

## AGRICULTURAL STATISTICS.

### OBSERVATIONS AND SUGGESTIONS.

**THEIR NECESSITY.**—That the first agricultural country in the world, both in practice and science, should be without a satisfactory statistical account of the state and progress of its agriculture, is very impolitic and detrimental to its present welfare and future prospects.

That the greatest commercial country in the world should be from year to year without any accurate knowledge relative to the amount of food raised to supply its people's wants, is highly injudicious, and leads to very hazardous speculations, which have frequently resulted in most ruinous commercial panics.

That the absence of all reliable information relative to the annual produce of the country is alike injurious to the producer and consumer, the one having no idea as to the right time to effect sales, or the other to make purchases.

That this uncertainty as to the prospects of the year often leads to severe loss and privation on the part of the needy producer, and no corresponding benefit to the consumer. The early, forced sales of the needy farmer being made in ignorance of facts, immediately subsequent to harvest, a low price is mostly received; whereas if the real facts were known, a corresponding price would be realized proportioned to the character and truthfulness of the information.

That it has the effect of misleading all other nations

looking to this country as the great market for their surplus produce, limiting their operations in culture, and causing delay and doubt in the transmission of supplies; besides, it gives those countries furnished with such statistics a manifest advantage, enabling them either to retain, transmit, or purchase their stores according to their requirements.

That it is the duty of the Government to obtain the most correct account of the annual produce of the country, with the view of providing for the wants of the community committed to their charge, upon the safest and most equitable terms.

That this knowledge so obtained should be diffused abroad as soon as possible, in order that all parties may have the benefit thereof, so that each individual may be enabled to shape his course of business according to his own position and circumstances.

**OBJECTIONS.**—Because of its inquisitorial character, prying into every man's private business, which in a free country is so soon resented, and exposing affairs amongst parishioners and neighbours, which is often injurious to a man's credit and position.

Because of its tendency to expose a tenant's affairs to a crafty and covetous landlord, who will take advantage of his prosperity to demand additional rent.

Because it will give reliable data upon which a needy Government might engraft a new system of taxation.

Because it interferes with a man's independence, and is arbitrary in its character, inasmuch as it compels him to expose his affairs, or submit to the forcible entry of another to pry into them.

Because of the invidious comparisons which will be drawn from the knowledge of the energy, skill, and capital displayed in individual instances, and in selected districts, against others which do not manifest the like progress.

Because more is required in the returns than is absolutely necessary, and of the complication in its details, and the inability and indifference of occupiers to make out such returns correctly.

Because of the great difficulty and expense in the collection, and the selection of the proper machinery for such a purpose.

**SUGGESTIONS.**—It is absolutely necessary to secure the ready co-operation of the farmers, that all returns shall be kept secret from all other than the officials, who shall be under strict surveillance in this respect, and that the aggregate return of the whole country, county, or district shall alone be made public. Officials divulging any particulars of any return shall be heavily fined and discharged.

It will be very injudicious to entrust the superintendence of the collection of these returns to the boards of guardians, or to their officers; they are far too localised, and their supervision would lead to great opposition, and prevent the full success of the measure.

It would be equally injudicious to entrust such superintendence to the magistrate in petty sessions. The prejudices of farmers would be still more excited. Magistrates and their friends being generally influential landowners, farmers would have an insuperable objection to their affairs passing through their hands.

It is far better to have a central board in connection

with the Board of Trade, in London, and to appoint district officers of good *agricultural standing*, after the plan of tax surveyors or assessors. The board of guardians should transmit to this officer the addresses, and particulars of occupation, of every occupier in their respective unions. It shall be his duty to send schedules addressed to each occupier, to the overseers of the different parishes, who shall see to the proper delivery of each schedule, and also to their proper collection, and to return them to the district officer, giving him, at the same time, notice of any omission or error he may have made. He shall collate the whole, and transmit the result with a proper report, and all such other requisite information as he may deem valuable, to the central board, &c., &c. Overseers have not any very onerous duties to perform in these days, and might fulfil this.

It is desirable that, in filling up all the details for carrying out this new experiment, everything likely to cause complaint unnecessarily should be avoided, and the schedule be simplified as much as possible.

It is desirable to confine the inquiry for the present to the main facts, such as the number of acres of grain sown, distinguishing them; and potatoes planted (made in June); the average produce likely to be realized (made immediately after harvest); and the quantity or number of cattle, sheep, and pigs fatted, and fleeces of wool shorn. This return would pretty nearly give the supplies for the food of the people, and the minor kinds of produce might remain for some future trial.

It is quite requisite that compulsory methods be resorted to, to obtain returns; the best is a moderate fine on the first refusal, to be increased as occasion may require.

It is of course the imperative duty of the Board of Trade to publish the aggregate returns as early as possible after each succeeding harvest.

## FUMIGATING WHEAT: SALAVILLE'S "GRAIN-AERATOR."

M. Salaville, whose fumigator and "grain-aerator" has for some weeks past been under the notice of the Council of the Royal Agricultural Society of England, has revived the old story of fumigating wheat and other corn for the purpose of bleaching and destroying fungi and insects. The process also involves the ventilation of corn in granary, stackyard, &c., without the labour of turning. To the readers of the *Mark Lane Express* these are topics of more than ordinary interest. Let us therefore dwell upon them for a little.

From time immemorial farmers and corn-merchants have been familiar with the practice of bleaching corn by means of the fumes of burning sulphur—more especially oats. Wool and straw for plaiting are also bleached to an almost perfect whiteness by the same process. These fumes consist of a combination of sulphur and oxygen, known to chemists by the name of sulphurous gas. The compound is destructive to both animal and vegetable life, and hence has been used for

killing insects and fungi; but, from its deleterious character, it cannot be applied to living plants without injury. Mildew, however, may be cured by dusting them with sulphur, or applying it in a sublimated state—both practices being common in horticulture.

The common plan of bleaching corn is on the kiln. Oats are put upon the kiln-floor as if to be dried for grinding. If fresh, or containing a sufficiency of moisture, the fumes of sulphur will act; but if old, dry, and musty, a little water may be necessary. After the oats are spread equally over the area of the kiln, burning sulphur is applied below, when the ascending fumes rising through the grain perform the operation of bleaching. If the kiln ventilates well, the process is simple, and soon over; but if otherwise, more difficulty is experienced in getting the grain equally operated upon.

Hitherto the work has principally been done for the sake of colour. In a commercial sense this is of consi-

derable value—samples frequently finding a ready sale in market, when badly coloured ones are passed by with indifference. Hence the amount of doctoring Irish and Russian oats grown in moist and late climates receive.

To those not acquainted with the change which a pennyworth of sulphur will effect upon a quantity of grain, the difference is scarcely credible—dark, musty, and dull-looking samples becoming silvery bright, as if the produce of another climate. The greatest effect is, perhaps, produced upon oats; but barley, wheat, and rye are also brightened in colour; and not only the corn, but the flour and meal also. To millers and keepers of livery-stables, and the like, these are differences of no ordinary importance.

The change of colour, however, is not all—quality, *it is said*, being also improved, both for keeping and immediate use, without any deterioration of quantity. Indeed, in cases of dry mouldy corn, when water has been added, quantity is increased.

With regard to keeping, experience has long ago shown that bleached oats keep better than unbleached, both in granary and for shipping, when the work is properly performed. This, no doubt, arises partly from the fungus or mould with which the grain is infested being killed, thus checking its growth; partly from the vitality of the corn being destroyed; and partly from its being less liable to heating or fermentation when fumigated, the sulphurous acid being an antiseptic.

M. Salaville, on the other hand, concludes that the fungus of wheat is poisonous, and when taken into the system, in however small a quantity, sows the seeds of disease and untimely death; but that fumigation renders it innocuous, and consequently the wheat more nourishing and healthy. This is certainly a most interesting view of the subject, one which we hope experience will realize to be true; for to a country like England—depending upon so much imported corn, generally less or more affected with fungus, and where so much bread is used by the labouring population—it must prove a source of harm, the magnitude of which may be more easily imagined than described, if the seeds of death are thus in reality so widely sown. But clinging with so much tenacity to past habits, as Englishmen generally do, it will take a very accurate and lengthened course of experiments to convince them that there is such a difference between the dead and living spores of the fungus of either wheat or bread, *i. e.*, that the living spores of wheat-fungus are absorbed into the system, taking root there as if the tissue of the human body was their natural matrix, or that bleaching neutralizes the *virus* of wheat-fungus, supposing it to be poisonous.

But although our convictions may not be so easily reached as they should be, in this, as on many other points in dietetics, we are nevertheless better prepared, from the progress lately made in sanitary reform, to adopt the familiar old maxim, "Prevention is better than cure," than we have been; and this is obviously

the sound view of the subject. In other words, ought we to fumigate our wheat in order to prevent fermentation and the growth of fungus? Or will doctoring of this kind only give rise to a more poisonous species of fungus than non-fumigated wheat produces?

Again, the fact that the vitality of wheat is destroyed and the quality of the flour enhanced, at least to appearance if not in reality, proves that a change has been effected worthy of more investigation in the laboratory of our agricultural chemists and sanitary commissioners than has yet been effected. This, we hope, is all that is necessary, to draw attention to the benefits which accurate chemical and microscopical examination would confer upon the public at large.

Farther, in treating the subject as an individual question, the baker is hardly less interested than the farmer, corn-merchant, and miller—the effects of fumigation on the panary fermentation and baking of bread requiring also to be experimentally investigated with more accuracy than has yet been done. Several bakers whom we have conversed with, on the subject, state that they believe they have used flour from bleached wheat. Our own baker, for instance, had twenty loads. Its colour was superior, indicating the finest quality; but it did not ferment properly in the setting of the sponge, kneading, and baking, the process having more resemblance to that of oat or barley meal than wheaten flour. It made, however, excellent ship and other biscuit. He had it analyzed by one of the first chemists in the capital, who affirmed that it contained no foreign substance; but that he suspected it had either been fumigated or kiln-dried.

The second question raised by M. Salaville—*viz.*, the aëration of grain—is also an old one in a new mechanical form. The same apparatus (a description of which was given in the Royal Agricultural Society's Report of the 18th ult.) serves both for fumigating and ventilating, and is intended to be used in late bad harvests, to arrest fermentation and the growth of fungus, drying the grain at the same time. In early, dry seasons, again, insects may be destroyed. For our Australian colonies, and other warm climates, where so much harm is sustained from insects, the project may become invaluable both for home and export use. The process will also arrest fermentation and mould in root crops.

In making these observations, we do so rather for the purpose of inviting inquiry and discussion than arriving at practical conclusions. If fermentation and the growth of fungus and insects can be arrested, and a superior quality of flour obtained for making biscuits, for confectionery and cooking purposes, a great result will be realized. There cannot be a doubt that the immense quantities of flour manufactured from damaged wheat is injurious to public health, and that the losses sustained by farmers, corn-merchants, and millers would do more than cover the expense of fumigating and aërating corn harvested in bad order.

## KENNINGTON AGRICULTURAL AND CHEMICAL COLLEGE.

## LECTURES ON THE GENERAL PHENOMENA OF THE EARTH, HAVING REFERENCE TO THE PRODUCTION AND MAINTENANCE OF ORGANIC LIFE.

BY CHARLES JOHNSON, ESQ., PROFESSOR OF BOTANY, GUY'S HOSPITAL

## LECTURE VII.

In addition to the varied and complicated phenomena already described, the productiveness of the earth is influenced by climate, as well as by local causes that act in opposition to the latter in particular regions. The differences of climate are, on a broad scale, due to the oblique position of the axis of our globe with respect to the sun, and the consequent unequal distribution of his light and heat throughout the year upon the countries that extend towards the poles; which are alternately exposed to those changes of temperature, alteration in the comparative length of day and night, and other vicissitudes, that have occasioned the familiar distinction of the seasons, more especially of summer and winter. From this inclination of its axis, amounting to about  $23\frac{1}{2}$  deg., to the plane of its orbit or annual path round the sun, originated the ancient division of the earth's surface into five zones, limited by the imaginary circles drawn at that distance from either pole, and called the Arctic and Antarctic Circles, and those drawn at a similar distance north and south of the equator, named the Tropics of Cancer and Capricorn. Between the two latter lies the torrid or heated zone, over some part of which the sun is always vertical or immediately over-head at noonday. Between the tropics and the polar circles extend the two temperate zones; and within the latter the two frigid zones; over all of which the sun shines more or less obliquely, according to the distance at which the several countries included by them lie north or south of the torrid zone.

Within the torrid zone, more frequently denominated the tropical or equatorial regions, vegetation and animal life are much more abundant and diversified than they are elsewhere. Thus vegetables, in addition to the ordinary forms met with in temperate and colder climates, mingle among the trees of a tropical forest, the palms; among herbs, the bananas and plantains, and the bamboo and other gigantic grasses. The size of the leaves, their bright and constantly renewed verdure; the splendour and sweet odours of the flowers; the lusciousness of the fruits, are never equalled elsewhere. As we travel northward or southward from this glowing climate, the scene changes; the tropical forms are left behind, or gradually vanish from the colder and darker landscape. In the South of Europe, many of the trees and shrubs—as the oaks, the olive, and the myrtle—are evergreen; but these disappear beyond the Alps and Pyrenees, and are succeeded in the central parts of the continent by others that are deciduous, or that lose their leaves on the approach of winter. Farther still, the broader-foliaged trees are no longer met with; but the forests consist of birches, fir, and pine, gradually diminishing in size and height towards the shores of the Frozen Ocean. Among animals, the elephant, the giraffe, the beasts of prey, the crocodile, and the boa have no parallels in size among their kinds out of the hot countries in which they are themselves exclusively distributed.

The distribution of organic being, under the different parallels of latitude, does not present more remarkable variations than are to be found at different degrees of elevation above the

level of the ocean. The decrease of temperature as we pass into the higher regions of the atmosphere has been already observed upon, in a preceding lecture, as connected with its increasing rarity or thinness; and in accordance with such decrease, we find the phenomena of vegetation exhibit similar diversities, whether we travel from the tropics towards either pole, or ascend from the sea-level to the summit of a mountain; differing only thus, that in the latter case the transitions are much more rapid, and consequently more striking than in the former. This progressive difference in the character of the landscape as the higher lands are reached is observable to a certain extent under all latitudes; but it is far greater in the equatorial regions than within the temperate zones, and becomes still less remarkable as we approach the polar circles. This circumstance is owing to the gradual approximation of the limits of perpetual frost towards the plains in the higher latitudes; these limits being found to descend in a tolerably regular gradation, according to the distance of the mountains from the torrid zone. Thus between the tropics their average height is estimated, in round numbers, at about sixteen thousand feet of perpendicular elevation from the level of the ocean; while in the latitude of the European Alps, or midway between the equator and the north pole, they commence at eight thousand feet, or at one-half only of the elevation before-mentioned; and in the latitude of fifty-seven deg. north, at four thousand four hundred feet only, being fifty feet higher than Ben Nevis, one of the loftiest summits of our island, situated nearly under that parallel.

Now, from these facts, it may be readily understood that the mountains of the temperate zones—for instance, the Alps and Pyrenees, which, as situated near the middle of the northern one, afford a fair standard for comparison—present only half the extent of elevation above the low lands at their feet to exhibit the variations occasioned by diversity of temperature which those of the torrid zone do; so that at the same height at which the last traces of vegetation disappear amid perpetual snows on the sides of Mont Blanc, trees of the largest size decorate those of Chimborazo, one of the loftiest in the great chain of the Andes of South America.

The effect of elevation in lowering the temperature is of great importance to the inhabitants of many tropical countries, who, dwelling on mountains and high plains or table lands, enjoy there a moderate and agreeable condition of climate, instead of experiencing the excessive heats by which those of lower districts are oppressed. Many of the towns and cities of the equatorial parts of the earth, occupying alpine situations, have a comparatively temperate and healthy atmosphere around them. Quito, almost immediately under the line—geographically considered, the hottest portion of our globe—at an elevation above the sea of between nine and ten thousand feet, has an equable temperature throughout the year corresponding to that of England during the months of May and June; while the towns below, on the shores of the Pacific and

the Caribbean Sea, are subjected to the scorching rays of the tropical sun, and all the inconveniences and mortalities of a torrid climate.

The warmth or the coldness of a country is not always, however, determinable by its position in a certain parallel of latitude, nor by its comparative elevation: many other causes contribute to produce differences of a most remarkable character between lands which, if climate were dependent only on the immediate influence of the sun, and the modifications resulting from the latter source, would resemble each other in these conditions. Western and Northern Europe, for instance, even to the east of the North Cape, are very differently circumstanced to Eastern Asia. In the Shetland and Faroe Islands, the longest frosts of winter are only, in the former of a few days', in the latter of two or three weeks', duration at a time, though recurring frequently, with intervals of thaw. The island straits and inlets or fiords of Norwegian Lapland are open throughout the year; and barley and oats ripen within the Arctic Circle. In Eastern Siberia and Kamschatka, even in the latitude of the North of England, the ground remains frozen a little below the surface, even in the summer time. This difference is perhaps chiefly dependent upon the constant mingling of the heated water of the Gulf Stream with the cold Arctic current of the Northern Atlantic, added to the prevalence of moist south-west winds in these latitudes, which latter only reach the countries in question after traversing the dry, cold lands of Central Asia. The remarkable current, or ocean-river, that has its name of Gulf Stream from its passage round the Gulf of Mexico, has been described, and its origin and principal course traced, in the second lecture; but, although the northward flow of the Stream is prevented from attaining a much higher latitude than Newfoundland, its warming influence, as there stated, is indefinitely extended even to the limits of the Arctic Ocean. In consequence of the narrowness of the outlet of Behring's Straits, in the opposite hemisphere, and other peculiarities in the physical character of the Pacific Ocean, as compared with the Atlantic, a corresponding current does not exist there, although the climate of North-western America is milder than that of the opposite coast.

Similar differences are observable in other parts of the world, more or less immediately resulting from local causes, though not, perhaps, to so great an extent as in the instance before us; and to express them, lines are sometimes drawn across our maps of the world, called *isothermal* lines—from the Greek *isos*, equal; and *thermos*, heat—such lines indicating the limits of equal or corresponding temperature in different parts of the globe; and, though drawn in the same direction with those of the latitudes, they are so far from being parallel with them as to present infinitely-varied curves. The isotherms are generally more uniform and parallel where they pass over the sea than over the land—partly on account of the water heated within the torrid zone becoming mingled with that occupying colder regions, in consequence of the agitation produced by the tides and tempests, and the constant interchange maintained by the flow of currents in all directions, and partly owing to its peculiar properties as a fluid. The same causes occasion islands and seacoasts generally to manifest more equable climates throughout the year, and, in the cooler latitudes especially, milder winters than inland countries—a fact so remarkable as to have given rise to the well-known and appreciated distinction between an "island" and a "continental climate." It is well exemplified in the difference between the open currents of our English rivers, so rarely interrupted in our coldest weather, and the frost-bound condition of those of central Europe, under far

lower latitudes; in the excessive severity of a Russian winter at Moscow, and the comparatively temperate character of that of London, Edinburgh, and Bergen.

Apart from other causes, the depth of the water and its saltness have much to do with such amelioration of the winter's cold in islands and maritime or coast-lands, lying within or around the main ocean; the first circumstance especially. The chilled surface-water is continually descending, while its place is being occupied from time to time by the ascent of the warmer, and therefore lighter, fluid from beneath; and where the depth is considerable, this interchange is maintained throughout the winter, to the verge of the frigid zones, and even within the polar circle, in the northern hemisphere: and though at a temperature below 40 degrees of Fahrenheit the water expands, and, tending to retain its place upon the surface, becomes eventually frozen, that effect is so long postponed that, at a distance from land and shallows, the deep waters of the North Polar Ocean are probably constantly open—as, indeed, the reports of many arctic navigators have all but confirmed.

Still, the latitude of a country necessarily determines, on a broad scale, the comparative duration of winter and summer, as well as the leading character of the respective seasons, where it is not affected by the disturbing influences of which we have been considering the operation.

The winter of Swedish Lapland, though not so excessively cold as that of Siberia under the same parallel, is quite as protracted, as a calendar of the year there, bequeathed to us by the celebrated Swedish naturalist, Linnæus, will testify:—

- June 23. The snow melts.
- July 1. Snow all gone.
- " 9. Fields quite green.
- " 17. Plants at their full growth.
- " 25. Plants in full flower.
- August 2. Fruits ripe.
- " 10. Plants shed their seeds.
- " 18. Snow falls.

From this time until June 23rd of the following year, snow and ice overspread the ground; and thus the winter may be regarded as occupying 309 days of every year; while spring, summer, and autumn include together only 56 days.

Certain local features, of vast importance in modifying the climate of lands far removed from those to which they belong, claim our notice here, in consequence of the influence of one such, at least, upon that quarter of the globe whose inhabitants may be said to have arrogated to themselves power and dominion over all the rest, but whose capabilities of so doing have been the result of a combination of natural phenomena which has conferred upon Europe a series of advantages as to climate and other conditions, from which it would, under a different arrangement, have been excluded by its geographical position. The tideless waters of the Mediterranean, with its numerously-indented shores and its scattered islands, fostered navigation in its infancy; and the mild atmosphere and fertile lands of the Levant, of Greece, and Italy, favoured the early development of that civilization which, with its varied inventions and adaptations, has since led to such magnificent indications of political and moral supremacy. But the central and western parts of this small continent, in which the superiority of mind and untiring industry destined to mature the influence of Europe over the rest of the world was to be exerted, would have been very differently circumstanced had the direction of the Gulf Stream been diverted from her shores, and had the bordering lands of Asia and Africa been otherwise allotted, or, even in their present position, had a different aspect been bestowed upon them to that under which they now exist.

The value, for commercial intercourse, of a channel through

the Mexican isthmus, connecting the Atlantic with the Pacific Ocean, has been long appreciated, and the capability of its execution made the subject of speculations that will probably be realized at no very distant period, by conducting a ship canal across Central America. During the time that this plan has been an occasional theme of discussion, the obstacles to be encountered in its fulfilment have doubtless led many to reflect upon the advantages that would have accrued to European navigation had the subsidence of the Isthmus of Panama left South America an island, and thus yielded a ready access to the Pacific by a strait like that of Gibraltar. Such a strait would have completely altered the economy of the human world, by admitting the direct flow of the equatorial current into the great western ocean, instead of being compelled, as it is under present circumstances, in its effort to pursue a course round the globe, to sweep the shores of the Gulf, and carry thence that genial warmth so beneficial to our northern lands, and without which the west of Europe would have rivalled the swamps and arid steppes of its eastern boundary.

On the other hand, south of the Mediterranean, over an expanse of more than two millions of square miles, extend the barren and inhospitable plains of the Sahara, the great desert of Northern Africa. Separated, it is true, by a distance, over sea and land, of nearly twenty degrees, or from eleven to twelve hundred geographical miles, it might well be questioned by the casual observer, In what respect can this desert, vast as it is, affect the climate and condition of countries beyond the Alps? And yet that it does so, and to an extent equal to and deserving its own grand dimensions, is certain. To the heated and dry state of the air that crosses these trackless plains is chiefly owing the rapid evaporation that maintains the Mediterranean Sea at a mean level of three or four feet below that of the Atlantic, causing the extreme saltness of its waters mentioned in our second lecture, and likewise the rapid current that pours into its basin through the Straits of Gibraltar. The southerly winds, loaded with moisture drawn from this reservoir, the largest of our inland seas, discharge their burthen upon the cold mountain-summits in the form of snow, a constant accumulation of which invests them in the perpetual winter that reigns in those elevated regions. Towards the lower part of the eternal cap of frost that clothes the loftiest peaks of Switzerland, the Tyrol, and other high mountainous districts, the snow, slowly melting beneath, where it is in contact with the rock and soil, gradually yields and slides downwards by its own weight: this is the commencement of the *avalanche*; or, arrested in its descent by arriving at more level ground, or lodging in the ravines and higher valleys, it terminates in the formation of the glacier or ice-field.

As these remarkable results of alternate frost and thaw are productive of considerable local changes, whose influence is often indefinitely extended—and as they constitute important features in lofty mountain groups and ranges throughout the world—although our space will not admit of any lengthened detail of the varied phenomena which render them objects of interest to the traveller and of speculation to the philosopher, a few extracts from the accounts of actual observers concerning their appearance, and the theory of their formation, will aid us in comprehending their utility in the scheme of nature.

“If,” as observed by Saussure, “a spectator could be placed at a sufficient height above the Alps to embrace at one view those of Switzerland, Savoy, and Dauphiné, he would see a mass of mountains intersected by numerous valleys, and composed of several parallel chains, the highest in the middle, and the others decreasing gradually as they recede. The central and highest chain would appear to him bristled with craggy rocks, covered, even in summer, with snow and ice in all those

places that are not absolutely vertical; but on both sides of the chain he would see deep and verdant valleys, well watered and covered with villages. Examining still more in detail, he would remark that the central range is composed of lofty peaks and smaller chains, covered with snow on their tops, but having all their slopes that are not very much inclined covered with ice, while the intervals between them form elevated valleys filled with immense masses of ice, extending down into the deep and inhabited valleys which border on the great chain. The chain nearest to the centre would present to the observer the same phenomena, but on a smaller scale, beyond which he would see no more ice, nor even snow, saving here and there on some of the more elevated summits.

“The formation of the glaciers, whatever are their position and appearance, is due to the great quantity of snow which falls in the high and cold regions of the mountains, and which the heat of summer can but partially thaw. When the slopes of the lofty peaks are very rapid, the snow, being unable to rest upon them, slips down into the valleys in the form of avalanches; and this being added to what falls directly into the valleys, there is accumulated an enormous quantity that becomes compressed by its own weight. This snow is subsequently converted into a kind of ice by the following process:—The rains which occasionally fall, and the water resulting from the partial melting of the snow in the warmer months, percolate the mass, steeping it throughout; and in this state, being seized by the cold of the succeeding winter, it is consolidated into a glacier. It will, however, be easily conceived that the ice formed is very different from that found in ponds or lakes; it has neither the hardness, the compactness, the solidity, nor the transparency of the latter, but is, on the contrary, porous and opaque. The water, in filtering through the mass, not being able to drive out all the air lodged in its interstices, this air—together with that which is liberated during the subsequent congelation—collects into bubbles of various forms and sizes, destroying the transparency and cohesiveness of the mass. With regard to the snow which rests on the slopes, it is evident that it will be subject to the same effects of rain and warmth as that in the valleys; but owing to the very position in which it lies, the greater portion of the water runs off, or is only retained towards the bottom of the slope, whence it results that the glaciers so situated are in general of much looser texture than the glaciers of the valleys. It is only towards the bottom, where the water accumulates, that the ice of the former acquires a consistence equal to that of the latter. This solidity decreases as you ascend, until towards the top there is nothing but snow.

“In winter, as well as in summer, there is continually a quantity of water flowing out from the lower part of the glaciers, though much less abundantly in the former than in the latter season. This water proceeds from the thawing of the under surface of the glacier, occasioned by the natural heat of the earth beneath. In the winter it oozes from under the ice in small streamlets; but in the spring and summer months, when it is greatly increased in quantity, it bursts away the ice from before it, and gushes out in plenteous streams from the caverns it has excavated.”

The combined extent of the glaciers of the Alps of Switzerland, the Tyrol, Piedmont, and Savoy, is calculated to amount to 1,484 square miles; they number from four to five hundred, varying in length from 3 to 15 miles, with an average breadth of 1 or 2 miles. Their melting constitutes an inexhaustible supply to the principal rivers by which the central parts of this favoured continent are permeated in various directions; and which, while they dispense fertility

over the land, furnish a medium of communication by which its produce is conveyed from place to place, and that interchange of the results of their mutual industry maintained through which its inhabitants have reached their present high position. Without these rivers much of Central Europe, if not altogether a desert, must at least have been but thinly populated; and the moral and physical supremacy have slumbered that has marked the career of its nations from the state of barbarism under which they became known to the Romans, to one as far beyond the highest civilization of that haughty people as they were above the rudest of the untaught tribes they subjugated and despised.

The relative situations of the Sahara and the Mediterranean may be thus regarded as involving more of the fate of Europe, and with it that of the whole family of mankind, than would at first be imagined possible to result from a source so distant. But the African desert is not the only region that, unproductive itself, is more or less indirectly concerned in favouring the

fertility and usefulness of others: a succession of barren tracts of somewhat similar character, though often of far greater elevation, may be traced through Arabia, Persia, and Central Asia, all influencing in a proportionate degree the neighbouring lands. Their effects on these latter are due to the absence of vegetation, and the consequent unlimited radiation of the sun's heat into the atmosphere above them. Were it possible by artificial irrigation to bring these districts into a state of cultivation; or were any great natural convulsion to upraise mountains, and, pouring rivers through their thirsty sands, convert them into field and forest; without any alteration in the condition of their own surfaces, the South of Europe and Asia Minor would lose their semi-tropical character, and a change take place throughout the entire of the former continent to an extent that it would perhaps be difficult justly to appreciate under its present circumstances, but greatly to the deterioration of those upon which its prosperity is dependent.

## THE BREAD QUESTION.

BY J. TOWERS, CROYDON.

This subject (and it is one of deep interest, involved as it must be with war and its inevitable consequences), has had its origin partly in the high prices that have long ruled in the corn and flour markets; and then, in the suggestion and letters that have appeared occasionally in *The Times*, and other periodicals, pointing to the means by which wheat and its flour might be so economised as not only to effect a reduction in prices, but, at the same time, to improve the quality of bread made by the public bakers, by rendering it more nutritive and salubrious. We are told of great waste of flour, amounting to many pounds, retained in the bran, from a sack of wheat, which ought to be applied to the sustenance of man, in lieu of being wasted as food for swine. There is great truth in the facts thus mentioned, and I therefore feel authorized to refer to observations made by myself during the experience of years, on the making of bread while residing in Berkshire. In the first place, however, it is a duty to direct the reader's attention to that most instructive book just published, "*The Chemistry of Common Life*," by Professor Johnston. That able writer has conclusively shown (vol. i., p. 99) that "the bran or husk of wheat, which is separated from the fine flour in the mill, and is often condemned to humbler uses, is somewhat more nutritious than either the grain as a whole, or the whiter part of the flour. The nutritive quality of any grain depends very much upon the proportion of *gluten* which it contains; and the proportions of this in the whole grain, the bran, and the fine flour respectively, of the same sample of wheat, are very nearly as follows:—

Whole grain . . . . .	12 per cent.
Whole bran (outer and inner skins)	14 to 18 "
Fine flour . . . . .	10 "

"The *whole meal* obtained by simply grinding the grain is equally nutritious with the grain itself. By sifting out the bran we render the meal less nutritious weight for weight; and when we consider that the bran is rarely less, and is sometimes more than one-fourth of the whole weight of the grain, we must see that the total separation of the covering of the grain causes much waste of wholesome human food." In a note at p. 125, we read—"It has been announced by a French

chemist that the bran of wheat, besides the nutritious quality it derives from the large per-centage of gluten it contains, possesses also the property of dissolving the flour or bread with which it is mixed, and of rendering it more digestible in the stomach. It contains a peculiar species of ferment, which, in the presence of water, and aided by the heat of the oven, and of the stomach during digestion, gradually converts the *starch* of the bread into *sugar*. To this property of bran, as well as to the nourishment it yields, is to be ascribed a portion of those wholesome qualities which many persons have recognised in whole-meal bread."

We may here advert to the domestic economy of home-made bread; for if the science of that excellent practice be clearly understood, intelligent readers will attain a position sufficiently commanding to overlook and control the general opinion. In domestic practice, we were economical experimentalists, accustomed to note and describe results. Thus it was soon ascertained that "private bakers cannot by any *direct process* produce bread similar to that made by the public baker. Home-made good bread is full of flavour; that of the baker being comparatively flavourless. The former is firm, of a strong compact substance, goes far, keeps well from three days to more than a fortnight, and indeed improves after the second day, before which it should not be cut." At the period when our Berkshire notes were formed, the public did not possess that great adjunct termed German yeast, though in fact it is made in Holland. While fresh, this ferment effectually obviates the use of the brewers' yeast—that *family opprobrium* which, if stale, ruins a batch of flour; and if quite fresh, is apt to communicate too much of the hop, or perhaps of a *worse bitter* principle. Potatoes were proved to be worse than useless, and by no means economical. The reader will now perhaps take interest in the following extracts—

"1. A bushel of good (*finest*) flour made from well-harvested wheat, freed from the bran and pollard, weighs 56 lbs.: such flour will make the *whitest* bread: but it is dear, and will not give, on an average, its own weight and one-third more of bread. Thus, 21 lbs. absorbs so much water as to yield not quite 28 lbs.

"2. *Grist flour* is always to be preferred for bread, and indeed

for every other purpose excepting that of pastry. It is ground from the best wheat, divested of the coarse bran only. None can have this fine and sweet flour but those who grow or purchase wheat, and send it to a mill (hence the term millers' grist): 1s. 6d. or 2s. per sack was paid for the grinding, the flour and the bran being delivered back to the purchaser. A sack of wheat weighs 240 lbs. If 190 lbs. of flour was sent home, and from 45 to 50 lbs. of bran (replete with flour) the quality of the wheat was esteemed good, as only 178 lbs. of flour were known to have been returned. Of this fine *grist* or *one way* flour 24 lbs. make a small batch of family bread, and about six quarts of tepid water and half a pint of thick, *sweet* barm, or so much German yeast diluted to the like consistency of the former. Neither dough nor beer will ferment properly unless raised to the heat of 60 Fab.; and as the former must be completed in a few hours, not less than 75° (and more in frosty weather) must be applied. I am dealing with general principle, not with the minutiae of domestic baking. Enough therefore may have been stated towards establishing the doc-

trine of the modern school in respect to the superior excellence of *whole* or *entire meal*.

Be this as it may, we must admit that the product will be a *brown* loaf, and capital bread it will be. Great saving of good flour will result, because all the flour now retained in the bran will be combined with the batch. But who will then remove the prejudice which prevails against brown bread? Nine persons of ten dislike it, and many servants refuse to eat it. Conquer or abate this prejudice, and a main point will be gained; but even then another peculiarity must be explained and obviated, and that is the extraordinary price of a brown loaf! Very nice brown loaves are made by bakers in this neighbourhood, but they charge a penny more than for the 4lb. loaf of the best household; or in other words, a price equal to that of the finest white bread!!

Should it be so? Ought that very process which effects the saving of every particle of the wheat be permitted to enhance the cost of the staff of life? *Credat Judæus, non ego!*"

Jan. 8.

J. T.

### MR. HORSFALL'S DAIRY MANAGEMENT.

Another year's experience has, to some extent, confirmed the importance of Mr. Horsfall's dairy practice, which was so imperfectly laid before the Royal Agricultural Society last year, that no practical conclusion could be drawn from it. An experiment in this branch of husbandry merits more than a passing notice, especially when we take into consideration the unsatisfactory effect it has hitherto produced, for the reasons just stated.

The peculiarities of this new system of dairying, as our readers will recollect, are these—(1), healthy, well-conditioned cows, kept at a uniform degree of temperature; (2), properly-cooked food, containing a large percentage of nitrogenous matter; (3), dairy-house artificially heated during winter; (4), rich cream and butter; and (5), winter-butter equal in quality to summer-butter. A very condensed review of these, severally, will suffice to exemplify the principal advantages of the practice.

1. From time immemorial dairymen have been familiar with the fact that a cow in good condition gives richer milk, generally speaking, than when in a state of poverty; while the reverse is the case as to quantity, the skin-and-bone milker filling the pail better than her plump and sleek rival.

Again, experience is equally familiar with the other fact, that milch cows require a mild temperature and uniform climate; the extremes of heat during summer, and cold during winter, being against both them and the quantity and quality of their milk.

The rationale of both these propositions may be thus briefly given:—In the process of secreting milk, the aqueous and butteraceous elements—or the raw materials of water and butter—are more easily disposed of than the nitrogenous elements, or the raw materials of casein; while nervous and muscular exertion, and consequent exhaustion, is greater than when laying on fat, as when cows are dry. In other words, the functions of digestion and assimilation of cows having attained to a

maturity of growth, and not giving milk, have less demand upon the albuminous elements of food for keeping up the system than when in the opposite, especially when the functions of secretion are stimulated by sour or saccharine food; consequently, when the latter are called into operation, and the work of depositing fat in the adipose tissue dropped, the labours of the former are somewhat changed; for in order to make a large quantity of rich milk, more cascous matter must be digested and taken up into the blood than the nitrogenous repair of the body previously required. Hence the second head of our subject—albuminous food, and its preparation.

Again, the nervous system of a cow giving milk is in a much more active and even irritable state than when dry, being equally fed in both cases, and therefore more liable to be affected by changes of temperature; consequently, when exposed to the full blaze of a summer's sun, surrounded with teasing flies, or the opposite extreme in winter—a freezing temperature and a wet skin—either the fatty matter of the food available for butter, or the fat of the adipose tissue, is consumed in lubricating the muscular and nervous systems, together with the keeping up the animal heat of the body; while the increase of waste upon muscles and nerves themselves must be considerable, owing to the exhausting influence of neurological irritation.

The truth of both propositions is also very forcibly illustrated by the manner in which the generality of cows lose flesh after calving, until they attain a level below which health will not permit them to go. The more they are exposed to changeable weather, the faster they lose flesh; and as they become poorer, their milk decreases in quality.

There is here a two-fold demand upon the blood—one by the organs of secretion for milk, and the other for the repair of the body—while there is but one upon those of digestion and absorption for supplying or keep-

ing up the fountain of life (blood); hence the consequences when the first and last are stimulated, and the second allowed to get into a state of inaction. In this case sour or saccharine food—containing a large quantity of water, acting as attenuants in thinning the blood—is not what is required, but the very reverse, because it does not contain what the repairing of the body and the secretion of rich milk require.

2. The cooking of food for cattle, especially milch cows, is a far more important branch of husbandry than has yet been acknowledged. The analysis of rich milk may show what a dairy cow's diet ought to contain; but to mix together anyhow the raw elements thus required is not sound practice; for those acquainted with a chemist's laboratory must be familiar with the fact that to produce a certain compound more elements are generally required than such a compound contains: so is it in the cooking of food for producing milk. If attenuants, for example, are required to produce a large quantity of thin milk, so may tonics, &c., to obtain thick; while even they must be exhibited according to some specific combination, to have the desired effect. In the case in question, the food should not only contain the requisite amount of albuminous matter, but that quantity must be in such a form as to promote its digestion, absorption by the lacteals, and secretion in the milk; a large per-centage of casein in it being absolutely necessary, as will soon be shown, to yield either rich cream or a fine quantity of butter.

The practical question which we arrive at, therefore, is briefly this, Is it the bitter element of rape-cake in the specific form exhibited which renders it superior to linseed-cake in Mr. Horsfall's practice, and upon which the success of that practice mainly depends? In his statement before the Council of the Society, he placed no ordinary importance upon the flavour or smell of the food, as being necessary to render it palatable and easy of digestion, analogous to what takes place when meadow hay is properly heated in the stacking.

3. The temperature of the dairy-house for throwing-up cream is doubtless an important question; but on this head the facts of the case have never been elicited, so that we cannot enter upon the discussion of this head

practically. The temperature of the atmosphere, for example (60° Fah.), was only given, whereas that of the milk and hot water in which the pans were placed ought also to have been given. These Mr. Horsfall has yet to supply.

4. It is a well-known fact that milk rich in casein throws up the finest quality of cream—that which yields the largest quantity of the best butter; but the quantity of butter thrown up is less than if there had been a deficiency of casein. Hence the well-known practice of putting in water, in order to obtain more butter, but at the expense of quality. Drs. Hunter and Anderson, half a century ago, mentioned this fact—one sufficient to account for Mr. Horsfall's use of albuminous food, and the quantity of butter obtained from a quart of cream.

5. Summer butter contains less olein or butter oil than winter butter, according to the ordinary practice, and less margarine. Braconnot gives the details thus:—

	Summer.	Winter.
Margarine . . . . .	40 . . . . .	65
Butter oil . . . . .	60 . . . . .	35
	100	100

Nothing, we believe, has been done to ascertain the quantity of olein in Mr. Horsfall's butter; but if it contains 60 per cent., while other samples, from the old practice, contain only 35, the difference is such as to merit no less the attention of every consumer who prizes rich butter, than of the dairyman who wishes to make it, for the high price and ready market it must obtain.

Such is a very cursory review of this practice. It is, we hope, however, sufficient to direct attention to the great facts at issue in the march of progress in dairy management. It will have been seen that the chief results are, taking them in their natural order, healthier and better fed cows; they being thus in a fitter state for developing the different functions of the animal system than when in the opposite; a finer quality of cream and butter for the rich, and a more muscle-producing quality of skimmed milk for the hard-working man and his family.

W. B.

## BOYDELL'S TRACTION ENGINES FOR THE PUBLIC SERVICE.

An interesting course of experiments has been performed during the current week, partly at the Camden Works, Camden-town, London, and partly at Willesden, Middlesex, to test the traction force of one of the traction engines ordered of the Messrs. Boydell and Glasier by the War Department of her Majesty's Government. For some time past, Boydell's endless railway, applied to the wheels of gun-carriages, has been in use in the Crimea, General Codrington reporting, in his despatches to Lord Panmure dated "Camp before Sebastopol, Feb. 19, 1856," that heavy siege guns could easily be transported through "Crimean mud" by them, when they could not be so by any other means at

command: and now it is proposed to draw such guns and carriages by means of traction engines.

The engine is greatly improved both in mechanism and workmanship, compared to the one exhibited at Carlisle last summer, as will be seen from the following description: It has two cylinders, each 6½ inches in diameter, working with a stroke of 10 inches. On the one end of the crank-shaft is a fly-wheel, and on the other a small ten-leaved pinion, which either gears in a 96-toothed wheel, 5 feet in diameter, fixed on the carriage-wheel, which is 6 feet in diameter, or else, on being shifted by a clutch, in an intermediate 20-toothed wheel on a separate shaft, on which is a 10-toothed

pinion, which then gears in the 96-toothed wheel already mentioned, thus giving a quick and slow motion to the engine at pleasure, and also enabling the driving pinion to be thrown out of gear in the carriage-wheel, when the engine is required for thrashing or other purposes, as working fixed or travelling windlasses, &c. These improvements are important in the highest degree, while they point to far greater ones which can yet be made.

The quick speed of travelling is from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  miles per hour, and the slow one from  $1\frac{1}{2}$  to  $2\frac{1}{4}$  miles per hour.

The weight of the engine, without water and coals, is about 7 tons. It has a water-tank and coal-boxes, capable of carrying from  $1\frac{1}{2}$  to 2 tons of coal and water, thus making a total of 9 tons.

With steam up to 60 lbs. there will be a pressure of 1,200 lbs. on each piston, or a total force of 2,400 lbs. exerted by both. In consequence of the extra velocity of the pistons, however, 360 lbs. of this are lost, so that the actual force of steam is 2,040 lbs., or nearly 14 horse-power—calculating 150 lbs. drawn 220 feet per minute over a pulley per horse-power.

Calling the force applied to the top of the wheel on the carriage-wheel the *motor-force*, and the force applied to draw carts or implements the *traction-force*, the former, or the motor-force, at the quick speed, will be as above 2,040 lbs., and for the slow speed 4,080 lbs. Of this force 850 lbs. are, according to experiments made, consumed in friction and propelling the carriage forward on level ground, no traction-force being exerted, so that the motor-force applied to produce *traction force* will be for the quick speed 1,190 lbs., acting with a leverage of 5 feet 6 inches, and for the slow speed 3,130 lbs., with a leverage of 5 feet 3 inches.

Although the experiments performed both days fully confirm the theoretical conclusions drawn by Mr. Boydell from such data, yet from the controversy which has taken place on this subject, and the fact that a diagram would be necessary to do it justice, we must postpone further consideration of it to a future opportunity, allowing the experiments which we now notice to speak for themselves at present. These we shall take in the following numerical order:—

1. The first experiment performed was propelling the engine up a short inclination of one foot in three. Trenches were dug in the ground about 18 inches deep, and in length sufficient to allow the endless railway to rest in the bottom. Into these the engine worked itself—was allowed to stand, and then made to propel itself up a short inclined plane of about four feet. This experiment was repeatedly performed to the satisfaction of a most respectable assemblage of spectators, specially invited. The weight of the engine, water, and coal was about 18,480 lbs.; so that this was propelled up an inclined plane of one foot in three by the above force of 4,080 lbs.

The object of this experiment is to show what inclination the engine will propel itself up empty, taking double the number of ploughs down-hill; or in hauling waggons or gun-carriages up-hill by means of a drum, on the principle of a stationary windlass, stopping at short distances.

2. The second experiment was made in hauling bricks over soft ground. About seven tons of bricks were put in a waggon which weighed 2 tons 5 cwt.; thus making a total of 9 tons. This load the engine hauled on the level, but soft ground.

This illustrates the carting out of manure—home the produce of harvest, and that produce to market, in agriculture; the carrying of building materials, in building; guns, materiel, &c., in military affairs; and goods of all kinds in commerce, where such engines can be profitably employed as “feeders” for railways.

3. The next experiment was drawing the empty waggon with the fore-wheels locked, and four ploughs ploughing up the ground to the depth of a good furrow.

This experiment elicited general approbation every time it was performed. The fore-wheels of the heavy waggon (2 tons 5 cwt.) sank in the ground to the depth of 8 inches; thus showing that it alone was a very heavy draught, while the four ploughs indicated more than a draught for 8 horses.

4. The fourth experiment was going out and in at a doorway little more than the width of the carriage-wheels, turning within narrow circles, and the like, showing the command the two men (one at the wheel or steering, and the other at the engine) had over it; and the result certainly speaks volumes to their praise in every case.

5. The fifth experiment was going to Willesden, on Friday morning, with the engine, waggon, coke, &c. This, as Mr. Mechi justly observed, was enough to recommend it to every practical man accustomed to yoke his teams to draw his engine from one part of the stack-yard to another.

6. The sixth experiment was hauling a “Samuelson's Digger” over a turnip field belonging to John Meacock, Esq., Little Ealing. The turnips were being removed for the London market, and Mr. Meacock kindly placed the portion cleared at the disposal of Mr. Hamilton (for Messrs. Boydell and Glasier), to be experimented on. The soil was a strong, tenacious, Middlesex clay, rendered unfit for being wrought with the digger by the rain which had fallen on the previous night. It was just in that state termed by the farmers of the district “extremely loving,” *alias* sticking to the implement like glue—a state which tested the action of the endless railway on such a soil, as well as the traction force of the engine. Nevertheless, it hauled the implement after it, snorting with all that proud dignity of steam when master of its task, in defiance of all opposition; the digger literally lifting the soil in a body to the depth it went, until forced off the tines by the bars above, when it fell in shapeless sods, with the green side generally uppermost. Various guesses were made as to the horse-power or traction force exerted by the engine; but as Mr. Hamilton stated he had never worked the land in such a state, we decline giving hypothetical conclusions, lest we should impose upon our readers. One fact, however, was patent to every practical man present—*viz.*, that the endless rails did infinitely less harm to the land than would the horses' feet in drawing the implement.

7. The last experiment was ploughing, or rather an attempt to plough, the engine breaking the

chains before we had well started. The ground was in such a state, that Ransome and Sims' double ploughs provided for the occasion would not work, the "loving" clay filling the spaces between the ploughs "choke-full." This was a grievous disappointment. However, four common ploughs were set to a four-horse furrow each, and yoked behind the engine with what chains could be had; and, "sure enough," away they went, the four ploughmen and ploughs rattling among each other in an amusing manner, the crowd following as close in on every side as ever did a flock of hungry sheep after a turnip-cart about to leave its contents on their pasture; brawny Middlesex rustics paying as much deference to lords and ladies and London reporters as to one another, good-humoured enthusiasm appearing to fill every breast with a sort of sympathetic feeling. But, alas! snap went some deceitful chain or other, at every short interval; and aghast all stood as the stentorian order, "Stop her!" fell upon the ear. We at length, however, made one round, the ploughs in several places making comparatively good work, especially the latter two, the engine proving that it was ready and willing to do its part, at a pace estimated by practical farmers at one-and-a-half that of the horses of the district. Having taken a dynamometer with us, capable of indicating 10 cwt., we yoked one plough behind the engine, with the strong chains fit for its traction, and applied the instrument, which indicated the draught of one plough at rather more than 8 cwt. The furrow-slice was well laid; and we have no doubt that, with ploughs in a proper frame, three such furrows could have been made without intermission. At least, after measuring the furrow, and comparing it with the other four, we came to the conclusion that the four made together required a traction force equal to three such furrows, or 24 cwt.; thus proving that the engine not only propelled itself over ground in such a state, adhering and lifting with the rails, but applied more than its motor-force of steam—2,040lbs.—in hauling the four ploughs.

We have stated above that 850lbs. are consumed in overcoming friction, and propelling the engine over level ground alone; but our readers must not conclude from this that such was all the force required to overcome friction, and propel the engine over the ground during either the experiment in hauling the digger, or four ploughs set to a four-horse furrow each, for nothing could be further from the truth than this; for such a force, under such circumstances, cannot be

estimated. Neither are they to conclude that the whole force of the engine was exerted in hauling the digger or ploughs, or that it is possible to apply its full force; for, like horses, it must always have a reserve of power to overcome extreme resistances, or it would soon come to a stand.

As a whole, the course of experiments have proved more than satisfactory to those who have witnessed them, capable of estimating mechanical results, and promising to the patentee and his partner, who have during the last twelve months undergone an amount of slavery in introducing this great project, enough to exhaust the strength of the most lion-hearted pioneers in the march of progress. No doubt those who expected to see a more successful experiment in ploughing, left the field rather disappointed; but we beg to remind such that the engine was made to order for a different purpose; that engines of a totally different construction can easily be made for agricultural purposes; and that all which was intended to be shown by the experiments was the adaptation of the endless railway to our portable engines, which all declared did less harm to the ground than horses' feet, while they afforded an important foundation for bringing improved high-pressure engines to bear upon the soil.

Before closing our report, we should be wanting in duty did we not express our best thanks to Mr. Hamilton, for his kindness throughout the day, and the princely hospitality received at Friars-place. It was certainly interesting to see Mr. Colinson Hall on his right, and Mr. Boydell on his left, the former telling to the company the sceptical opposition his high-pressure engines (320 lbs. to the square inch) had met with; and the latter, how his endless railway had been received; especially when we contemplate what the two (high-pressure engines and endless railways) are yet obviously destined to effect in the grand question before us—*steam culture and cartage*; and how much the agricultural world are indebted to these two gentlemen for their unwearied exertions in this national work. We hope the day is not far distant when their labours will be more closely united in the great cause at issue, enabling Mr. Hamilton, and the other leading farmers of Middlesex, his guests on the occasion, to dispense with that most expensive of all agricultural machines—*EQUUS CABALLUS*; and to carry to the capital double the quantity of produce, and fetch in return three times the quantity of manure they can now do, at half the expense.

## POTATO PLANTING.

The season having returned when it is customary in this country to plant the greatest breadth of land for the potato crop, a few words upon this point of the cultivation of the potato may not be inappropriate. It is not to be expected that anything new has to be stated; but if this short paper may suffice to prevent a single error on the one hand, or give a "wrinkle" on the other, it

will have served its purpose, and will abundantly satisfy the writer.

*Time of Planting.*—This may be extended from the commencement of the month of March to the latter end of the month of May—a very extensive range undoubtedly, but nevertheless many good crops have been obtained at either extreme in planting; indeed, for a crop

of early potatoes, the autumn, or even the open weather during the winter, is also chosen, taking care to protect the sets by a thick covering of warm dung on the surface. Extremes, however, ought to be avoided; and the better time, as proved by universal experience, will range somewhere between the 21st of March and the 21st of April—*i. e.*, the third week in March and the third week in April.

*Preparation of the Soil.*—This may be stated in a word or two. It must consist in a deep and thorough pulverization—a cleanly, open, and fine tilth; no planting ought to take place till this is attained, although it may drive the planter to the furthest extreme named above. He will be amply compensated for a fine deep tilth, even if he has to wait so long. The autumn may favour him, both in continued growth and in “taking up.”

*Mode of Planting.*—It has become the prevailing custom in the district where the writer of this paper resides to plant in ridges, after what is there called the Northumberland system. The ridges are at twenty-seven inch intervals, and are generally manured with fold-yard dung, as for mangolds or swedes. The potato-sets are planted along the bottom on the manure between the ridges, and the ridge is then ploughed over them. If caution be not used in placing the sets, many will be displaced by the horses' tread while ploughing. The old and more common method is to use a light one-horse plough, ploughing nine-inch furrows, and setting down every third one. In this case, it is very difficult to put in manure properly at the time of planting; for fork it as you will, get it in ever so well, and cover it almost perfectly, it will turn up in the subsequent horse-hoeing. If the weather is dry, rolling should take place under both systems. Setting by spade and line is also practised; it is both expensive and tedious, and the trampling in going over the ground and upon a fine mould does much injury. In mild, open, or showery weather, the land cannot be left too light, providing the mould closes well around the potato-set; but in a dry season it is necessary to the preservation of the set itself that the soil be pressed closely around it, by the pressure of the roller or other contrivance; it can easily be reopened by horse and hand-hoeing, and harrowing, when desirable.

*Depth to Plant Sets.*—This part of the process deserves more attention than it receives. In the early part of the season it is desirable to plant deeply, say from 4 to 5 inches in depth, in order to avoid danger to the sets from late frosts; but the general custom is not to exceed four inches, generally from three to four inches in depth, except in ridges; but as the soil of the ridge lies so loosely around the set, no difficulty is experienced, as the sets readily vegetate, and the sprouts show themselves in some part of the ridge near where the set lies; and if the ridge is rolled down, they are not then deeply buried by it, but easily find an outlet for their first sprouts on one side or other.

*Size of Sets.*—This is an important question with potato-growers. The great object, in the present day, is to produce the greatest crop of large marketable potatoes—not the heaviest crop of all sizes. How is this

to be done? Small sets do not grow with sufficient vigour; large ones are more costly, and it takes more of them, in proportion. The general practice has settled down to the “seed”—*i. e.*, the largest-sized *chats*. None that will pass through a common chat-riddle are large enough, and such should not be planted. They must not be less than 1½ inches in diameter, or fully equivalent to that size. As a rule, it may with truth be said, “The better the set, the better the crop.” The smaller sets have to be compensated for by the nearness of the intervals in planting, and other methods of management, either in manure or extra culture.

*Width of Sets.*—Much will depend upon the richness and fertility of the soil; and it should in some measure guide in this department of the business. A rich soil requires fewer sets. Small sets require to be more thickly planted than large ones. Large sets on ordinary soils may be planted twelve inches apart in the rows, smaller ones proportionably nearer, but none less than nine inches asunder; the rows being taken to be at 27-inch intervals.

*Preparation of Sets.*—This part of the business of potato-planting is very much overlooked, and is of far greater importance than most planters imagine it to be. It is not the greatest weight of potatoes per acre that is most valuable; but we repeat, the greatest bulk of large or marketable ones makes the true value of the crop. Now, small potatoes abound in eyes pretty nearly equal to the large ones. Every good eye will produce a sprout. The more sprouts, the more potatoes, such as they are; but as it is impossible that these can grow—can find room to grow—to a large size, and must of necessity be small, the aim should be to reduce the number of sprouts, so that the set shall only put up into full vigour two, or at most three, good stems. These stems will, of course, produce fewer fibres, and these fibres or roots fewer bulbs; and thus, in proportion as a vigorous plant flourishes, will the bulbs increase in size. The heaviest and most profitable crop produced in this district during the last season was owing to the grower's adoption of this theory, and putting it into practice. When the plants were sufficiently strong, he caused all the stems, with the exception of the two best on each plant, to be drawn up and thrown away; the two remaining ones producing an extraordinary crop of large, handsome bulbs. Potato-sets, then, ought not to be planted, having more than two or three good eyes. This may be regulated by attention to the cutting: the small as well as the large ones should all be carefully looked over, and their superfluous eyes destroyed. The large ones will cut into two or more sets; and thus their eyes become reduced to the desired number. Avoid setting small ones: it is false economy. Do not expose the sets to the sun or wind: keep them moist. Choose cool and showery weather for planting. Cover all in every night. Have experienced planters, so that all the sets may be equidistant. Use all expedition in a favourable season. Do not prepare the sets long before planting: use them fresh, and as nearly in a growing state as possible. In dry seasons, roll down every night. Harrow up again after the first satisfactory rain. Should no rain descend till the plants are above ground, they may, when suitable, be harrowed with a light harrow: no danger need be apprehended.

## DRAINAGE.—THE EVIDENCE TAKEN BY THE LORDS' COMMITTEE ON THE IMPROVEMENT OF LAND.

The subject of land drainage is fraught with so much importance, not only to the owners and occupiers of the soil, but to the public at large, that we may again draw attention to the evidence given before the Committee of the House of Lords on the improvement of land.

On a former occasion we gave an abstract of the evidence of Mr. Mules; we shall now request the attention of our readers to that of the two other Inclosure Commissioners, Mr. Blamire and Mr. Darby. The former gentleman was informed by the Committee, that having already gone into the details of the several Land Drainage and Improvement Acts, they needed no further information on that part of the subject, but requested him to explain his views with reference to what appeared to him defective in the Acts, and what remedies he would suggest. To this question, therefore, his evidence was directed; and he pointed out, as one of the most serious evils, the want of uniformity in the existing Acts, as to the works of improvement which they sanction. As a remedy, he suggested the extension of the provisions of the Private Money Drainage Act, so as to embrace every kind of improvement sanctioned under the Acts of any of the Companies. He considered that it would be most convenient to the owners of settled estates to execute works of improvement from their own resources, taking a charge upon the land so improved, for the term allowed. Assuming such an extension to be authorized, he would recommend that a public Act should be passed, authorizing any of the existing companies, or any which may hereafter be formed, whose sufficiency had been certified by the Board of Trade, to bring themselves under the provisions of such public Act, accompanied by a provision which should authorize the system of debentures, as in the case of the Lands Improvement Company's Act. He considered that principle to work very well. The extent to which that company had negotiated loans within the preceding eighteen months, had amounted to nearly £300,000. He considered that public companies had this advantage—that, negotiating with Insurance Companies for very large loans, they were able to borrow on much better terms than any private individual.

In reply to a question, whether he would allow the companies so formed to be in any way the executors of the work, he replied *decidedly not*. He deemed it inadvisable that the companies should

themselves execute the works, because it necessarily imposed greater expenses on the landowner, than if he were his own contractor, the company being merely the negotiator of the loan, and taking upon itself the responsibility of seeing that the security is formal and that the prescribed notices have been duly given.

In answer to a question, whether he would limit the period of charge on the estate to 22 years, as in the public Act, Mr. Blamire expressed an opinion that it might be extended to 30 years; but did not think it should be for a longer period. Being requested in conclusion to recapitulate shortly the improvements which he would suggest, he repeated the opinions we have already cited as expressed by him respecting the necessity of providing by a public Act for all kinds of improvement at present sanctioned by the private Acts, accompanied by a power for issuing debentures as in the case of the Lands Improvement Company.

Mr. Darby, the other Inclosure Commissioner, insisted on the necessity of passing a public Act for regulating these drainage companies, as in the case of railway bills, and providing that all which relates to the company should be settled by a private Act, while all that relates to the manner in which land should be charged should be regulated by a public Act. This witness explained why he refused to join his colleagues—the only difference which existed between them—in refusing to be a party to arrangements by which the West of England Company under their Act entered into arrangements with the owners of settled estates for charging the estate with a mortgage in fee.

In reply to a question, as to the number of years for which he considered it safe that the liquidation of the loan should be postponed, and whether he did not think the 25 years, at present authorized by the Private Moneys Drainage Act, might not be increased to 30 years, Mr. Darby replied—“As between 25 and 30 years there may be a great many opinions, and one can hardly say which is the right one; but I am always in favour of a term that shall drive the man that takes the money to see that the outlay will pay.”

Being asked whether in the case of a company, like the Lands Improvement Company, the company should not be in some sort responsible for the due execution of the work, Mr. Darby replied—“If the contract be made with the landowner

himself, he must do the amount of the works specified for the sum for which he has contracted to do it; and if not, he must find his own money to complete it, if he has made an improvident contract. Until he has done the work he does not get his order. What I mean is this: Supposing he is going to drain 500 acres, and he has calculated that he can drain it for £5 an acre, and when he comes to work it out it costs £6, he must do that number of acres for that sum of money. Either he will not get the charge at all, or he must out of his own money pay the extra £1 per acre before he gets the charge. Then the reason why I think it would not be advisable to impose that duty upon the Company is this: that, except in the remote contingency of the Company's character being affected by its not being properly done, they have no interest in the matter, except to get the charge; and, therefore, if they have a person to look after it, all he would do would be as against the inspector appointed by the Inclosure Commission, to get him to pass things which the assistant commissioner might find difficulty in passing: so that it would be no additional security. Then who is to do it? Because I showed your lordships just now an instance of a surveyor's account where, upon an expenditure of £332, there was a charge of £44 11s. 10d., independent of the law expenses, where

our charge for what was quite as efficient an inspection would have been 3 per cent.; and our charges under the Public Drainage Act have not amounted to 3 per cent. But you cannot get them done in the other way under 10 or 15 per cent. Therefore you would get an additional charge of 10 per cent. upon the property, and the person who did it, as a matter of business, would have an interest in getting the charge whether it was well done or not. In fact, you would get the intervention of a useless man at a great expense."

The witness put in a table showing the number of pipes, from 12 to 16 inches long, required to drain an acre, at intervals of from 12 to 66 feet.

Mr. Darby and the other commissioners were also examined as to the propriety of allowing land to be drained on other than the methods at present sanctioned by the Inclosure Commissioners, acting the reports of their inspectors, some of whom it appears are engaged in the execution of drainage works. The inconvenience of a system under which gentlemen occasionally act in different capacities as inspectors and executors of works, did not appear, however, to have attracted much of the attention of the committee. These witnesses were also examined as to the propriety of allowing land to be charged for buildings and planting, for shelter and periodical cutting.

#### "THE MODERN PROFESSOR."

However much we may now be inclined to depreciate the "old comedies" which once delighted our grandfathers, they were nevertheless a tolerably true reflex of the age they appeared in. The clap-traps on our national valour and Britannia's supremacy were only an echo of what the people themselves sung or said in the streets and taverns. The swaggering fine gentleman was a close copy from the life. The gawky hoyden—the free-and-easy valet—the pert chambermaid, were drawn as assuredly from veritable originals. Prominent in this group, too, was a very favourite character with the dramatist of those days—the learned man or "Professor." A great humbug he was; with his fine speeches and scraps of Latin, intended only to confuse those with whom he came in contact. His favourite victim was, of course, the countryman. On his devoted head were poured forth whole floods of pedantic jargon; all of which John Trotter duly received with open mouth and eyes, totally unable to comprehend a syllable of it. "Daug it!" he was made to utter at the close of such a peroration, "how he do knock the words about, sure-ly! I wonder what it all means?"

But times and customs have changed since then. We have certainly still a pretty full supply of Professors of all sorts; many of them as verbose and as tedious as ever. Our business, however, is more especially with the learned man who yet continues to address himself to our visitor from the rural districts. And here the change is marked indeed. The country gentleman is no longer a butt or a victim. There is scarcely a sentence the lecturer delivers, but the other as fully comprehends. The improvement has been mutual. The Professor no longer "knocks the words about;" he disdains to talk fine or merely technical; while his auditor has gradually grounded himself in the principles of that science with which it is his aim to become yet better acquainted.

Our first thanks, nevertheless, must be to the Professor. He has met us more than half way—descending, to do so, from all the pet studies and fancies, of theory to the less attractive realities of practice. In direct antagonism to his flourishing predecessor, he feels that to be appreciated he must be understood. From him the days of mystery and concealment have passed away. The wand he

now holds, in place of making the wonders of science but more wonderful still, serves rather to lead the eye to some diagram or illustration, which shall but the more clearly elucidate all he so plainly tells us. The least attempt at trickery is carefully avoided. Even in this age of beards and other hirsute appointments, the Professor is content to pass for a clean-shaven English gentleman. He can do even without spectacles; and appear in fact before us in the morning jacket or simple frock, as little like a learned Professor as any of those he is going to talk to.

There is a good moral in all this, especially for that country gentleman the Colemans and Moretons were so pleased to place in an awkward position. He occupies it no longer. Encouraged by the manner in which he is met, he loses his awe and diffidence—freely asks questions on points he does not quite see, and tests at once himself by experiment what he hears recommended. It is by means like these that the union of science with practice can alone be cemented; and it is by such, we are happy to say, that they are day by day becoming more closely united. Within only the last few weeks we have been present at two meetings where Professors have addressed themselves to agriculturists—Mr. Nesbit at the Central Farmers' Club, and Professor Simonds at the Royal Agricultural Society. Reports of both these lectures will be found in our pages. They stand alike in proof of what we have said. Excellent in matter, unpretending in style, and laudably free from hard words and "shop" phrases, we believe there was not a point advanced but that will be of service, nor a sentence uttered but that was understood. In any case our readers will find nothing but that is susceptible of the freest discussion, or of which they cannot themselves ascertain the real use and value. As Mr. Wood, the Club Chairman, truly said, "to non-scientific men these lectures were very valuable. They were remarkably free from 'words which darkened knowledge'—popular in the best sense, and 'he who ran might read' them." Colonel Challoner, again, who occupied the President's chair at the Society, paid Professor Simonds a similar compliment—"he had heard many scientific lectures, but never one before in which science was rendered so perfectly intelligible to farmers."

We confess that we have, and in the same room. No doubt the gallant Colonel spoke on the spur of the moment, and as undoubtedly Professor Simonds has as full a claim to such high praise as any one can have. We confess we never heard the common practice of farm life, its conventional errors and careless habits more practically or thoroughly corrected than they were by the aid of scientific research and observation on this occasion. The

Professor, however, has a worthy associate in all science does for practice under the auspices of the English Society. If, in fact, we were to name any one as the first to strip "the Professor" of all the pedantry and technicality of his art, it would be Professor Way. While none have gone deeper in their researches, none have been so simple in their statements. Few who have heard him as a man of science address a company of agriculturists, but must have felt it was indeed the right man in his right place.

Mr. Nesbit holds a somewhat similar position with the Central and local clubs to that Professor Way does with the Royal Agricultural Society. So well, too, do his friends here think of all he has done for them, that it has been determined to present him with some testimonial of their esteem for his services. There is the greater warrant for this, as it must be remembered that all lectures at the London Club are entirely gratuitous. Farmers, to be sure, may be expected to enlighten each other; but still the professional man receives nothing beyond his well earned vote of thanks. We have reason to know that such services have been invariably given with the greatest readiness; only, perhaps, a better reason for the acknowledgment which is now about to be made for them. Though emanating from the club, the originators of this movement will be only too glad to find it responded to by all who have profited by Mr. Nesbit's labours on their behalf—And is there a district in England in which he is not known?

One word, yet, on what has been, so far, a very grateful theme. We could wish to have a little more general demonstration of the esteem in which these lectures are really held by the agriculturist. The discussion at the Farmers' Club was certainly well attended, the room being quite full. The lecture, on the contrary, at the Society, hardly assembled as many members as usually make up a Weekly Council meeting. This ought not to be, although it but too often is so. It has struck us the hour may be an inconvenient one—just in the middle of the day, when most men "either from town or country" have some other business to engage them. If we recollect rightly, the most fully-attended lecture of the Society we ever were present at was one delivered some years since by Professor Way, in *the evening*. It is well known that in the first week of every month the summons of two or three societies calls a number of agriculturists to London; and the evening of the Monthly Council Meeting might draw, we think, much better than the Wednesday morning of next week. At any rate, it is very certain that the agricultural evenings of both the Farmers' Club and the Society of Arts have brought far more agriculturists together than

the mid-day announcements of the Agricultural Society. Were this suggestion carried out, there could, of course, be no necessity for confining the lecture to the one hour now so strictly, and often so awkwardly insisted on.

Let it be remembered that we have the best men at our service ; and that it is a duty not merely to ourselves, but to those who place us in authority, to make the best use of them.

## THE LONDON, OR CENTRAL FARMERS' CLUB.

### THE RELATIVE VALUES OF ARTIFICIAL MANURES, AND THEIR COMPARATIVE ADAPTATION TO DIFFERENT CROPS.

The April Monthly Meeting took place on Monday, April 7, at the Club Rooms, Blackfriars ; Mr. J. Wood, of Ockley, in the chair, supported by a very full attendance of members. The subject for discussion, to be introduced by Mr. J. C. Nesbit, of the Chemical and Agricultural College, Kennington, London, was stated in the following terms : "The relative values of Artificial Manures, and their comparative adaptation to different Crops." Tabular diagrams were suspended on the walls, and a great variety of specimens of manuring substances placed on the table for the purpose of illustration and reference.

After a few introductory remarks from the Chairman, Mr. NESBIT said : Mr. Chairman and Gentlemen, the subject which I have the honour to bring before you this evening, namely, "The relative values of Artificial Manures, and their comparative adaptation to different Crops," is, in my opinion, one of very considerable importance. We all know that within recent times the use of artificial manures has assumed proportions which no one at the commencement of the year 1840 thought it could assume ; and few can doubt that in years to come it will assume proportions still more vast. I propose, in the first place, to spend a few minutes in tracing the history of this system, and afterwards to follow out strictly the heading of my subject. The first thing which it is of importance to know is what are manures. If we examine authors of the earliest periods in history, we shall find them constantly speaking about artificial manure. I might quote Theophrastus, Cato, Columella, and many other ancients in support of this statement. But, although a great variety of manures are spoken of by these and other authors, if we enter into their chemical history we shall find it very easy to show that manures in general must contain all the substances which are found in plants. Now there are two kinds of manures. First there are those which can be made on the farm by the farmer himself. These are made up of the debris of vegetable and animal matters, mixed with earth and other substances, on the farm. Of these I may remark that they cannot supply the continued waste of materials on the land, or, in other words, the loss occasioned by the production of crops and of beef and mutton con-

tinually exported. The second class of manures are artificial manures, which may be defined to be whatever the farmer imports on the land from extraneous sources, consisting of materials which have been found in practice or indicated by theory to be beneficial to the land. It is to this portion of the subject of manuring that I shall direct your attention this evening. Now, if you refer to the introduction of extraneous substances upon the land, you will find that the history of artificial manures extends a considerable way into antiquity. I might here recal to your notice a passage in the 14th chapter of St. Luke. We are there told that if the salt has lost its savour, it is not good either for the land or for the dunghill. This language clearly shows that even at that period salt was used for the land and also for the dunghill ; for it is stated in effect that when the saline materials are washed away, salt is of no value in agriculture ; it is not "good" either for the land or for the dunghill. I might cite a great abundance of other testimony to the early use of extraneous manures. I will, however, content myself with referring to a work published by an Englishman (H. Platt, Esq.) in 1601, 255 years ago. With your permission, gentlemen, I will quote a few passages from this singular book. It is styled, "The Nevv and Admirable Arte of setting of Corue." The author of this little book—published, as I have stated, 255 years ago—brought forward facts of the utmost importance, and the aid of science was alone wanting to cause artificial manuring to become general at that period. He speaks, Mr. Mechi, of the use of all kinds of liquid manuring (laughter). He also mentions butts on wheels, with spigots in them, and a great many other things which have recently been put forth as new.

A Member enquired by whom this book was published.

Mr. NESBIT : It is published by "Peter Short, dwelling at the signe of the Starre on Bredstreet Hill." Among other remarks the author says—

"Sea Kilps and Sea Tangle, and other Sea weeds are founde by experience to enrich both Arable and Pasture grounds exceedinglie. Shreds of Woollen cloth strewed vpon Pasture grounde will bring fourth grasse abundantie.

"The dregs of Beere and Ale applied to the rootes of

Trees, and other smaller Plantes, will make them flourish and prosper mightily, Seeds steeped in brine, proportioned according to Sea water, which consisteth of one part salt, and eigheteene or twenty parts water, wil in diuers grounds procure a good increase.

"The Soote of Chimnies, both ingendred by Sea-coale, as also by Wood and Charcoale in a very small quantity, worketh great effects this way.

"There is a salte which the Petermen vpon the refining of their Peter, doe separate from the Peter, this salte (if I be not deceiued) is the Salte purchased from the Ashes, vpon which the Petermen powre their foggy liquors to cleere them; one worke (vnlesse it be a great one) doth not yeeld much aboute a bushel thereof weekly: this salt I take to be a true vegetable salt, and therefore exceeding profitable, either to be strewed vpon grounds to be mixed amongst the seed Corne, or for imbibition.

"Shauings of horne, vpon mine owne experience, I must of necessity commende, by the meanes whereof, I obtayned a most flourishing garden at Bishops hal, in a most barren and vnfruitfull plot of grounde, which none of my Predecessors could euer grace or beautifie either with knots or flowers.

"I haue had the like experience with singular good succeesse by strewing the waste sope ashes vpon a border of Sommer Barley."

Now, gentlemen, this man had certainly got into the region of artificial manures. He tried experiments on everything that came in his way; and if he had only had a philosophic idea on which to string his facts—if he had only known what were the ingredients of the manures of which he speaks, there might have been a perfect system of artificial manuring 250 years ago. He speaks of—

"The watering of Grounde presently after it is sowne, with an artificial Brine, consisting of an eyghteenth or twentieth part of salt: this is performed by a hogshedd or some other such like vessel drawn vpon a sled, hauing one of the heads boarded full of small hoales like a watering pot."

He then says—

"Malte dust may heere also challenge his place: for foure or fve quarters thereof, are sufficient for an acre of ground."

And after speaking of the burning of ironstone ore as enriching the land, he says—

"Sal Armoniake being a volatile salt, first incorporated and rotted in Common earth, is thought to bee a rich mould to plant or set in."

So that we have got here our ammonia. In another place he says—

"Dogges and Cattes, and other beasts, and generally all Carrion buried vnder the rootes of Trees, in a due time will make them flourish and bring forth fruit in great abundance."

That one of our own nation should, 255 years ago, have collected a series of facts like these, and put them together in the manner that he did, shows that even at that time, if there had only been some little connecting link between philosophy and art as regards cultivation, there would have been the most tremendous revolution in agriculture that up to that period had ever taken place. I thought you would like to hear that the utility of ammonia and bones, and dogs and cats, was discovered even then. Now, with respect to the modern application of science to agriculture, I think that, notwithstanding all the labours of Sir Humphrey Davy, and of those who succeeded him up to 1839, real philosophy must be attributed chiefly in the first instance to the

British Association for the Advancement of Science. It was, if I recollect right, in the year 1839, that Liebig was deputed by that Association to draw up an account of the then condition of agriculture; and this resulted in his making a report, which in the same year appeared in the form of a book. This report of Liebig, though it may not have been an exact philosophic exposition of the art of agriculture, was that which first placed agriculture on the basis of a science. When Dr. Dalton published his celebrated atomic theory, chemistry was an art, being merely a simple collection of facts, without any leading idea upon which they could be strung together. After he had put forth that theory, all the combining proportions of each of the elements, of which every one was previously ignorant, begun to be perceived; and chemistry, becoming a science, soon made the most rapid strides. In like manner, in 1840, Liebig applied the same philosophic idea to agriculture; and whether his hypotheses were right or wrong, he succeeded in producing a theory, by means of which all the facts of the art were collected together, and the consequence was that a thousand things were shown to be connected which before appeared to be completely isolated. Agriculture thus became a science. Philosophy consists in seizing and collecting, as it were, into one idea all the leading facts which various men have pointed out; and this, I affirm, Liebig succeeded in doing in the present case. Now I shall not be doing wrong, I think, in placing before you Liebig's great idea, and pointing out to you where he was wrong and where he was right. For this purpose I must refer to the difference between the mineral and the organic theories. Liebig, looking at the vast field of nature, and perceiving that everywhere nature clothed the various species of rock, earth, and so on, whatever might be their nature, with plants adapted to their natural position, laid it down that if the soil contains a sufficient amount of mineral matter, the plants which grow there are able to derive the whole of their sustenance from the air. Now, so far as nature goes, he was correct in this view. If you take the case of a common rock, where there exists no organic matter, you will find Nature clothing it with lichens, which obtain all their carbon and nitrogen from the air. When the vegetable fungi have begun to be formed, and there is a sufficient amount of organic matter accumulated upon the rock, Nature provides another plant which is adapted to take a certain amount of materials from the air, and a certain amount from the soil. So that, taking into account only broad first principles, you will find Liebig right in his theory, so far as the general operations of Nature are concerned. His error consisted in this: he endeavoured to apply that which takes place in the wide field of nature to an artificial operation termed farming. In the great works of Nature, we have nothing to do with rent and taxes and prices; and the consequence is, that Nature clothes her fields with plants precisely adapted to grow therein to the greatest natural advantage. Liebig unfortunately forgot that, in the artificial process of farming, there are other elements which it is

necessary to consider. Under natural conditions, only a certain number of quarters of wheat per acre, and a certain quantity of turnips per acre, could be obtained from the soil. The farmer had to come in with his art, and to supply certain materials, to enable him to produce more than the normal condition of the soil would allow him to do; and thus originated the art of farming. Liebig overlooked this. With this exception, a more beautiful theory than his was never propounded. You will observe, then, that it is essential that farmers should introduce into the soil the materials which plants have the power of obtaining, to a certain extent, from the air, though not to an extent which will permit the payment of rent, or ensure profits. There is a necessity for constantly adding organic matter to the soil; and this Liebig omitted to take sufficiently into account. Now, if we refer to all that has been written in the course of the dispute about the mineral theory and the organic theory, we must at last come to this conclusion—that plants require, in their growth, every material which is found in them; that some of the ingredients are found naturally in abundance in the soil, and do not require to be placed there; that others, though found naturally in the soil, are more easily exhausted, and do require to be placed there; but that there is no condition in which plants can be found, in which, at one period or another, manuring with one element or another may not become most important. Take the case of the effect of gypsum, when it was first introduced. It is not a hundred years ago since gypsum was first imported into this country from America; and its importation led to the production of enormous crops of a certain kind. If you read the accounts of what took place in former days in consequence of the application of this substance, you cannot fail to be struck with the enormous change which it made as regards the cultivation of clover, sainfoin, and grasses. Gypsum does not produce the same effect in these days, simply because for a long period we have been supplying the soil with it indirectly, in the shape of superphosphates and other manures, our grasses being, in consequence, much more abundant than they were formerly. Being thus constantly supplied in another form, its separate and distinct application is not required; and if it were applied, it would not produce the same effect that it did formerly. Any single constituent of a plant or soil may, in certain cases, become the element of the greatest manuring value. I recollect, for example, that in a field on Exmoor, pared and burnt, and manured with guano and superphosphate of lime, lime having been applied by my advice, there was about an acre and a half to which the lime did not extend. To an inch where the lime had been placed there was a splendid crop of turnips; in the remaining part of the field not a single turnip grew. Here was an instance in which lime was the manure which was really wanted, and guano and superphosphates would not have been of any value without it. So that the true theory of manuring is, that you must have in the soil for the purposes of the

crop, either naturally or artificially, the very things that the plants require to take out of the soil, as well as those which are required for the amelioration of the soil. But when you come to apply this in practice, it is not in the laboratory that you can tell what is the best thing for the crop: I defy any one to arrive at this merely by taking a plant, and analyzing it for the purpose of ascertaining what proportions of carbon and nitrogen are contained in it. It is necessary to ascertain the habits of the plant, and its mode of growth; whether its roots strike deep or spread laterally, how the leaves grow up, and in what way the plant acts by its roots upon the earth, and by its leaves upon the air. It is impossible for any man, however great may be his scientific attainments, to form correct conclusions, without taking into account all these circumstances. The fact is, the mere application of the chemistry of the laboratory, without a knowledge of the physiology of plants, is of no use in such cases. Now from the results of the experiments which have been tried, up to this period, it turns out that the great manuring principles are nitrogen in any of its forms, and phosphates; but that alkaline salts of soda, potash, &c., have not yet proved to be of much agricultural importance. Taking the vast extent of the surface of England, and having regard to the experiments which have been made on thousands of farms by thousands of persons, and culling the facts which have been collected by those who have recorded the results of all these experiments, you will find that nitrogen and phosphates are the substances upon which agriculture at present depends. Whether this will continue to be the case for a lengthened series of years is another question, and one with which farmers who are engaged in providing for present wants have nothing whatever to do. What is required now, I apprehend, is that the farmer should be supplied at the cheapest rate with the manure which will secure the largest crop. If the conditions under which this applies at the present moment be changed, the system of manuring will also be changed; but at present, having regard to money considerations, it is well to keep to those facts which are patent to all who have been engaged in experiments connected with this subject. This being the case, we will confine our attention, if you please, chiefly to the various forms in which phosphates and nitrogen can be applied to the soil. In the first place we will take bones. Now bones are the first artificial manure that was applied in England after the use of gypsum. Being at first applied in large quantities in an unground state, the bones produced little or no effect. Three or four years elapsed, and they were again applied, but in a powdered state, and then they produced marvellous effects, particularly in the cheese counties of Cheshire and Shropshire, whence the elements of bones had been constantly exported for centuries in the shape of cheese. Now, one of the most important things for which we are indebted to Liebig is this. Assuming it as an undoubted fact that bones produced a good effect, he suggested the use

of a well-known chemical substance called superphosphate of lime, in order that bones might be rendered more soluble when they were put in the land. This may be considered as the leading idea which has led to the modern system of artificial manuring. Before that time we had nothing else but simple mixtures of animal and vegetable matter, ashes, and other things of that kind, which were mixed promiscuously together, and were supposed to be manure because they had been found to do better than *nothing*. There was, in fact, no definite mode of proceeding, and very little was known on the subject. However, this suggestion of Liebig was adopted first in Scotland, and afterwards in England. The thing was very soon found to answer exceedingly well, especially for turnips; and from that time there commenced a race to supply the farmer with this valuable material. Well, then, just about the same time, curiously enough, commenced the importation of Peruvian guano into this country. It was first imported at £24 a ton; and though there were of course very few customers for it at that price, the effects which it produced, so far as it was applied, were very striking. Then came the discovery of the island of Ichaboe, which led to a considerable reduction of price, so that the use of guano soon spread all over the country. This discovery gave the greatest impulse to the home manure trade which it had ever received.

Superphosphate of lime, which is now so extensively used, appeared to me to demand a special reference. About the same time, or within a few years afterwards, there came the discovery by Professor Henslow of little nodules which are found to exist in various counties. He discovered on the coast of Suffolk nodules which on analysis were found to contain phosphate of lime to the extent of from 50 to 55 per cent., and these were subsequently traced over a large district. Now, observe that without the leading idea which Liebig had previously given out—that sulphuric acid would render phosphate of lime soluble so as to cause it to act powerfully on the soil—the discovery of these fossil remains would have been of little value; but, coming immediately after Liebig's idea that soluble phosphates were exceedingly good for various crops this discovery became of the very greatest importance. Remains of this kind have since been discovered in other places. The first discovery of the presence of phosphoric acid in the Farnham marls was made by me in the year 1847; but no notice was taken of this fact in the paper which subsequently appeared on this subject in the 9th volume of the "Journal of the Royal Agricultural Society," although the writers received the original information directly from myself. Subsequently, in Hampshire, Dorsetshire, Cambridgeshire, and other counties, there were discovered, through the researches of myself and other geologists, nodules containing from 40 to 64 per cent. of phosphate of lime. There has also been discovered in America a substance called "apatite," containing as much as 80 per cent. of the same ingredient, and found in various primary rocks, in

veins two or three feet thick. A similar discovery has been made since in Norway, where large quantities of this substance have been exported to this country. Moreover, we have calcined bones brought to us from South America. These are the bones of the bullocks which furnish the hides and tallow which are sent here. We also derive from the same source a manure called "flesh manure," containing both bone and dried flesh, which is prepared under a patent, and imported into this country by Messrs. Dixon & Cardus, of Southampton. The result of all this is a great extension of the trade supplying manures; and the farmer can now buy superphosphates cheaper and better than he can make them himself, simply because the parties who deal in such substances commercially obtain what they require on a larger scale than he can, and from a greater variety of sources. Let me now remark that superphosphate of lime is essentially a mixture of phosphate of lime with sulphuric acid. The sulphuric acid seizes a portion of the phosphate of lime, and liberates the other in a soluble state. The sulphuric acid and the lime, together with a portion of the water used in the operation, combine together to form gypsum, which is always found with superphosphate of lime. It is this mixture of gypsum and soluble and insoluble phosphate, which is known commercially as phosphate of lime. Now, I want to point out to you that a considerable difference must exist between superphosphates of lime made in different modes. Perhaps of all the forms of phosphates of lime, apatite is the most insoluble. From all the experiments which I have made in connexion with this subject, it appears that in the making of superphosphate of lime it is necessary to take care not to dissolve all the phosphates. I will tell you what first drew my attention to this point. About 1845 or '46, being on a visit in Hampshire, I rode over a farm in the neighbourhood of Alton. In passing through a large 20-acre field of turnips, I came suddenly to a place where the horse's feet immediately smashed the turnips. All the turnips in that portion of the field were perfectly rotten; the others were firm and solid. The difference could be seen to a drill. I at once set about ascertaining the cause of this difference. It turned out that one part of the field had been manured with superphosphate of lime, and the other with common farm-yard dung and bones. On hearing this, it at once struck me that the cause of this must be, that the superphosphate of lime had been made wholly with an insoluble phosphate, like coprolite or apatite, and that when the soluble part had been taken up for the purposes of the plants, the vascular structure of the turnip becoming greatly enlarged, did not subsequently find any material for its further growth, in consequence of the other phosphates being insoluble; and thus the whole system of the turnip being weakened, it fell a prey to the frost which prevailed at that period. Since that time a great many persons have been engaged in making superphosphate of lime, and the use of this article has become widely extended. I may here observe that there has of late been a great

loss of turnips, and though I cannot attribute it at all to the use of artificial manures, yet I must say that it is in a great degree attributable to the practice of giving a certain amount of phosphates only soluble, and the remainder insoluble. I dwell upon this the more because an idea is being diffused by some chemists in favour of making phosphates wholly soluble. Many chemists of the present day have, in fact, recommended that the whole of the phosphates in manure should be made soluble; and I believe that the more this recommendation is adopted, the more will turnips be found to rot. I therefore feel it to be a public duty to caution you gentlemen against what I believe to be a mistaken view. I know from my own experience that too much soluble phosphate is very injurious. There should be a certain proportion to get the plant past the fly, but an excessive amount of soluble phosphate cannot fail to do mischief. My statement on this subject will perhaps be contradicted, but I am perfectly prepared to prove by facts the position which I have assumed. To give you an idea of a superphosphate, let me take any one of these substances (referring to specimens of apatite, coprolite, &c., on the table). If you were to dissolve these substances by means of acid, and let the insoluble matter consist of calcined bones, or animal charcoal, or better still, of fine bone, in short of such substances as are most easily acted upon in the soil, you would in that way produce superphosphate which would answer best under any given conditions. All superphosphates ought, also in my opinion, to contain a certain amount of ammonia. It is not found practically that a very large proportion of ammonia is essential to a superphosphate, but I have found by experiments in the field that 2 or 3 per cent. of ammonia, or some form of nitrogen, is decidedly beneficial to the turnip: it causes the turnip to grow quicker, and, other conditions being equal, always ensures a larger crop. But the use of nitrogen is perhaps still more valuable in other kinds of crops. Manures may be divided into the phosphatic kind and the nitrogenous kind, and between the two there are various substances combining the properties of both—among them is the flesh manure imported from South America. The phosphatic kind includes bones and all kinds of phosphates. The true nitrogenous manures are guano (which also contains phosphates) and nitrates of potash and soda, together with flesh, blood, wool, hair, and other similar animal substances. When guano is exposed to the action of a large quantity of water, the nitrogenous matter is washed away, and the phosphatic left; and the result of this washing is the production of guano similar to that of Saldanha Bay, which is rich in phosphates and poor in nitrogen. All these guanos may be considered as acting in the same manner as bones, and as being adapted to the crops for which bones are especially adapted. The nitrogenous manures, however, are adapted to all crops—in fact, to the grass tribe generally, whether cereals or ordinary grasses. But there is a very considerable difference to be observed in the application of them. In the case of grasses you may apply them very abundantly; in the

case of cereals you must apply them with caution, for the simple reason that if applied too freely they stimulate the straw to an abnormal extent, and thus prevent the ear from ripening. Now, of the nitrogeous manures guano stands at the head, because it not only contains a large amount of ammonia, but also phosphates to the extent of 25 or 30 per cent. Kuhlmann, a learned French professor of chemistry, at Lisle, tried some experiments on grass land, which showed that the produce was almost in exact proportion to the quantity of nitrogen employed, whether in the form of ammonia, nitrate of soda, or any other substance. This is a fact which ought not, I think, to be forgotten, because the use of these kinds of manure on grass is attended with no difficulty, all that is requisite being to spread them broadcast over the land, and the very first shower will wash them in. The case is rather different with corn crops. As regards wheat and other cereals, if you put too much you throw the crop down, and therefore in this case more caution is required in the application. As regards the use of nitrogenous matters for various crops, let me point out an important adjunct, namely, salt. By using salt with either nitrate of soda or guano, you arrest the abnormal growth of the straw, and the nitrogen is reserved for the growth of the ear. It has long been a problem, What is the real use of salt? Some time ago we had over here Mons. Dumas, the great French chemist, and a deputation from France, for the purpose of travelling all over England to ascertain what is the real use of salt; and these gentlemen found such a variety of practice, and so many discordant ideas prevailing in reference to that subject, that they went back at last no wiser than they came. The simple truth is, that salt acts as a corrective of excessive fertility, and that is all that can be said on the subject. Superphosphate of lime acts in a similar manner; but its dearness prevents it from being used. Salt produces the same effect on cereals as superphosphate of lime, at one-seventh of the cost. With 2 cwt. of guano and 4 cwt. of salt there is very little chance of the crop ever being thrown down. As to the effect of nitrogenous manures on the wheat-crop, allow me to quote two passages from a letter of Mr. Caird to the *Times*. The first passage is as follows:—

“The use of guano has been with me, as with many others, for the last ten years, a matter of system, and I have frequently satisfied myself by experiment of the profit attending its application. To apply it to the wheat-crop is the rule: not to apply it, the exception. Last autumn, in sowing a large field, exactly 100 acres, I directed the person who was laying on the guano to pass over an acre in the centre of the field, all the rest of which received two cwt. per acre, at the time the wheat was sown. The produce of this and the adjoining acres were cut, and kept separate from each other, and from the rest of the field, and were thrashed last week, yielding as follows:—

	Bush.		Cwt.
One acre, with two cwt. of guano	44	and straw	40
One acre, without guano	35	„	30
		Increase of wheat	9
		and straw	10

“The cost of the guano (Peruvian) on the field was 10s.

per cwt., or £1 an acre; so that I have nine bushels of wheat for £1. The acre selected for the experiment was an average of the field; and I have no reason to doubt that, for an expenditure of £100 on guano on that field last autumn, I have now reaped an increased produce of 900 bushels of wheat. This tallies very closely with the experience of Mr. Lawes, in Hertfordshire, where two cwt. of guano gives an increase of eight bushels of wheat."

Again Mr. Caird says—

"In the centre of a fifty-acre field, one acre was left without manure, all the rest of the field receiving two cwt. of Peruvian guano per acre in autumn, at the time the seed was sown. The produce of the acre undressed has been tested against that of the adjoining acre, which received Peruvian guano; and this is the result:

	£	s.	d.
One acre, with guano, 32 bushels, 63 lb. weight per bushel, at 6s. 6d. per 60 lb....	10	18	4
One acre, without manure, 25½ bushels, 60 lb. weight per bushel, at 6s. 6d. per 60 lb....	8	5	9
	<hr/>		
	£2	12	7
Cost of two cwt. of guano in 1853.....	1	0	0
	<hr/>		
Profit per acre, besides one-fourth more straw	£1	12	7

"The inferiority in the quality of the unmanured wheat, as shown by the weight per bushel, is worthy of notice, as well as the fact that the unmanured wheat was a week later in ripening than the other."

Now, gentlemen, with facts of that kind staring us in the face, with the knowledge that nitrogenous matters, whether guano or nitrate of soda, flesh manure, or anything else of the same kind, will give a profit of £1 12s. per acre, it seems to me, I must say, very singular that, with these results before us, corroborated as Mr. Caird is by Mr. Lawes and by hundreds of other experimenters, and by my own experience, these things should ever be neglected, and that farmers who are cultivating their two or three hundred acres of wheat should be at all backward in pocketing the £1 12s. Well, now, as regards the manures which are best adapted to different kinds of crops, experience, so far as it extends, seems to prove very clearly that phosphates generally are most applicable to the root crops, and nitrogenous manures to the grasses, whether cereal or otherwise. But there are some which lie between these. Superphosphates seem to be, in most parts of the country, better adapted for turnips than most other manures; but, as I mentioned before, there ought always to be a certain amount of ammonia present. I have found that one of the best modes of securing a good crop of turnips is to broadcast 2 cwt. of guano per acre, and drill 2 cwt. of superphosphate, mixed with ashes, with the seed. I will tell you why I recommend that that plan should be adopted. Several times in going through a field of turnips I have pulled up a turnip by the neck, and where the drill alone had been used I have found the root stronger in the direction of the drill than in any other. As it is well known that the turnip sends its lateral roots in every direction, the only reason which can be assigned why they are stronger in the direction of the drills than between the drills must be, the presence of the manure there. Now that we have such a command of manure, the drill system is not so necessary as it was formerly; and it is evidently

desirable that every rootlet of a plant, whatever may be its direction, should have its proper share of improvement. I therefore always advocate the broadcasting of—say two-thirds of the manure, and the use of the drill only to facilitate the early germination of the seed. About five or six years ago, I happened to mention this matter in the course of a lecture which I delivered at Blandford. One gentleman who was present, a practical farmer, at once saw the reasonableness of what I said. As it is customary in Dorsetshire to give prizes for the best crops of swedes, he determined at once to act upon my suggestion; and the result was, that he obtained the prize for the best 40 acres of swedes in the county. Under the plan which I recommended, not a single rootlet in a crop of turnips will fail to obtain its proper modicum of manure. Now I think that this plant, whose rootlets run like network through the whole surface of the soil, ought to be more attended to than it has been. Most of us recollect that the original drill system arose from nothing but a wish to concentrate manure, when manure was scarcely to be had, and to bring it into immediate contact with the seed, in order that the seed might derive the utmost amount of benefit which could be obtained from the use of it. But considering that, under the present state of things, you are compelled to seek the largest amount of produce from the land which it is capable of yielding, I think you will be obliged to adopt the plan of having a general supply of manure throughout the whole extent of the soil, and that the drill will in future be used simply to put in that amount which is necessary for the early and primary growth of the plant.

Let me now speak of mangel wurzel. In this case you want, in addition to the phosphates, an increase of nitrogenous materials. If Mr. Hutley were here, he could tell you a good deal about this matter. I recollect being down at his farm on one occasion, and perceiving that my friend Hutley without science completely thrashed my friend Mechi with science. (Laughter.) Mr. Hutley, if I recollect right, first applied 15 or 20 loads per acre of farm-yard dung in the autumn, and ploughed the land five or six times. In the spring, before sowing the mangel, he applied something like 3 cwt. of guano, 4 cwt. of salt, and some rape-cake, and I believe he drilled the mangel with a little superphosphate. The result was, that I saw what I computed to be 40 tons per acre produced on Mr. Hutley's farm that year, whereas Mr. Mechi averaged, I think, only about 13 tons (laughter). There has however, I believe, been a considerable improvement on Mr. Mechi's farm since that period (renewed laughter). I never in my life saw finer mangel wurzel than Mr. Hutley's. Of course there was no manure required for the next wheat crop. The manuring was not, therefore, you will observe, at all excessive. With 40 tons of mangel wurzel per acre, and with the thorough preparation of the land for wheat, I consider that Mr. Hutley adopted a very economical mode of arriving at the desired result. Having tried experiments myself with mangel wurzel, I have found that the

addition of a little nitrate of soda, or guano and salt, to the superphosphate, is a great benefit to this root crop. With respect to the wheat crop, I think I mentioned very specifically what I considered the best for that, and the same rule is applicable in the case of oats and barley. Many gentlemen who occupy "down land" appear to have no idea of the increased number of sheep which they might keep if they were to use nitrogenous manure upon it. I have preached on that subject for a considerable time, and am not yet tired of my preaching, though I could wish that some Hampshire and Dorsetshire farmers had been more benefited by it. I am convinced that a great many persons occupying down lands, might, by attending to this simple suggestion, double the number of sheep which they could keep on those lands. Of course I am aware that in consequence of the cheap carriage of artificial manures a great deal of down land is now being broken up. This change will probably go on; but wherever the land is not broken up, I recommend the use of nitrogen in some form or other.

A Gentleman inquired whether Mr. Nesbit meant that the manure should be sown broadcast; and, if so, at what period it should be used.

MR. NESBIT: Simply broadcast; the best period being from February to April, according to circumstances. Now, gentlemen, this is a very extensive subject; but, as I do not wish to take up any more of your time than I can help (cheers), I wish now to proceed to the other part of the subject, namely, that which has respect to the valuation of these manures. I have nothing further to say with respect to the general use of artificial manures. I have indicated what is most important, and I will now simply observe, by way of recapitulation, and before I advance to the question of value, that carrots and mangel wurzel generally require more nitrogenous manure than the turnip; that the turnip generally does very well with phosphate, but that there ought to be a certain amount of nitrogen and carbonaceous matter; that grasses and cereals need a large quantity of nitrogen; that, in the case of cereals, salt ought to be used, in order to prevent the crop from falling down, but that it is not so necessary in the case of grasses; and that there are very few grass lands which, even in the case of chalky downs, will not bear to be well chalked. On this last point I may add that in some of the upper parts of chalky downs scarcely a trace of lime can be detected, in consequence of the continual washing of the lime downwards.

Well, then, as to the best mode of calculating the relative values of manures: in consequence of the variation in the composition of manure, and the constant adulterations practised by unprincipled dealers, it is a matter of considerable importance to the farmer to be able in an easy manner to obtain an approximative value of any manure he may have had subjected to analysis; and I subjoin a mode of valuation, the use of which

will at least save him from the gross imposition to which he is at present subjected. The substances which analysis and practice have proved to be most efficient as manuring principles are phosphates, and nitrogen in any of its forms. A few isolated experiments prove potash to be of some value in one or two crops; but, as this substance can readily be bought in a state of tolerable purity as sulphate or muriate of potash, and as it is not generally found in compounded manures, I shall not give this any agricultural value, further than as comprised under the term of alkaline salts. Silica, under any of its forms, has not yet been proved to have any agricultural value; and carbonate of lime (chalk) is in most instances a serious detriment to a manure, though useful on the large scale, when used per acre by tons at a time. From a careful comparison of numerous analyses of manure with the value of the substances therein contained, I have been led to adopt the following prices as giving the nearest approximative value of the several manuring matters:—

Multipliers of Value.

Nitrogen .....	£74 per ton.
Ammonia.....	60 "
Phosphate of lime .....	8 "
Phosphate of lime made soluble ..	24 "
Organic matter .....	1 "
Alkaline salts .....	1 "
Sulphate of lime (gypsum).....	1 "
Silica.....	No value.
Carbonate of lime .....	No value.

The following mode of calculation has been adopted by me for many years, and is exceedingly simple, as we only require the analysis of the sample to enable us to arrive at its worth in a very few figures:—

RULE FOR CALCULATING THE VALUE OF MANURES.

Consider the analysis to represent the components of one hundred tons. Multiply the respective amounts of each ingredient by its price per ton in the preceding table, add up the several products, and the sum will represent the value of one hundred tons. Divide this amount by one hundred, and the quotient will be the price per ton. The decimals in the analysis below 0.5 may be disregarded, and those above that amount reckoned as an additional unit. Thus, in the second example, the organic matter, instead of 21.68, may be read 22; and the phosphate of lime, instead of 44.35, may be called 44.

EXAMPLES.

I. VALUATION OF AN AVERAGE SAMPLE OF PERUVIAN GUANO. Value per ton. Total.

Moisture.....	15.10		
Organic matter .....	51.27	× £1 =	£51
Silica .....	2.20		
Phosphate of lime .....	22.13	× 8 =	176
Phosphoric acid .....	3.23		
= Phosphate of lime (made soluble) .....	7.00	× 24 =	168
Alkaline salts, &c. ....	6.07	× 1 =	6
	<u>100.00</u>		
Nitrogen (equal to) .....	13.54	per cent.	
Ammonia .....	16.42	× 60 =	960
			<u>1,00</u>
			20
Value £13 12s. per ton.			<u>12 20</u>

II. VALUATION OF SAMPLE OF BOLIVIAN GUANO.

	Value per ton.	Total.
Moisture.....	13.85	
Organic matter .....	21.68	× £1 = £22
Silica .....	2.70	
Phosphate of lime.....	44.35	× 8 = 352
Phosphoric acid .....	3.30	
=Neutral phosphate (made soluble) .....	7.15	× 24 = 168
Alkaline Salts.....	14.12	× 1 = 14
	<u>100.00</u>	
Ammonia .....	4.02	× 60 = 240
		1,00 ) £7,96
		20
Value £7 19s. per ton.		19.20

III. VALUATION OF A GOOD SAMPLE OF SUPERPHOSPHATE OF LIME.

	Value per ton.	Total.
Moisture.....	19.82	
Organic matter .....	20.72	× £1 = £21
Silica .....	2.80	
Soluble phosphate.....	10.25	
=Neutral phosphate (made soluble).....	16.00	× 24 = 384
Insoluble phosphate .....	16.60	× 8 = 136
Hydrated sulphate of lime ....	29.81	× 1 = 30
	<u>100.00</u>	
Ammonia .....	2.00	× 60 = 120
		1,00 ) £6,91
		20
Value £6 18s. per ton.		18.20

IV. VALUATION OF A BAD SAMPLE OF SUPERPHOSPHATE OF LIME.

	Value per ton.	Total.
Moisture.....	17.90	
Organic matter .....	14.00	× £1 = £14
Silica .....	29.10	
Oxide of iron, &c .....	8.62	
Soluble phosphate.....	3.24	
=Neutral phosphate (made soluble) .....	5.05	× 24 = 120
Insoluble phosphate .....	3.85	× 8 = 32
Hydrated sulphate of lime ....	23.29	× 1 = 23
	<u>100.00</u>	
Ammonia .....	0.50	× 60 = 30
		1,00 ) £2,19
		20
Value £1 4s. per ton.		3.80

V. VALUATION OF ADULTERATED GUANO.\*

	Value per Ton.	Total.
Moisture.....	5.40	
Organic matter, &c. ....	20.55	× £1 = £21
Sand .....	49.30	
Oxide of iron and alumina.....	5.46	
Phosphate of lime .....	16.25	× 8 = 128
Carbonate of lime, &c. ....	3.04	
	<u>100.00</u>	
Nitrogen (equal to) .....	4.65	
Ammonia .....	5.64	× 60 = 360
Value £5 per ton.		£5.09

VI. VALUATION OF A SUBSTANCE LATELY INTRODUCED INTO COMMERCE, CALLED "MEXICAN GUANO."

	Value per Ton.	Total.
Moisture.....	3.24	
Organic matter, &c. ....	13.56	× £1 = £14
Silica .....	0.60	
Phosphate of lime .....	25.60	× 8 = 208
Carbonate of lime .....	46.14	
Sulphate of lime, &c.....	10.86	× 1 = 11
	<u>100.00</u>	
Nitrogen (equal to) .....	0.21	
Ammonia .....	0.26	× 60 = 15
		1,00 ) £2,48
		20
Value £2 9s. per ton.*		9.60

The foregoing examples show how very closely the rule brings out all the actual value of the various samples. It is necessary, however, to remember that circumstances might possibly arise in the course of time, which would render some alteration requisite in the amounts of our multipliers of value. At the present period, however, they are sufficiently true for every practical purpose. In conclusion, I am very much obliged to you, gentlemen, for the kind manner in which you have received my imperfect remarks, and I shall be happy to answer any questions which you may put to me, or to give you any further information which it is in my power to afford (cheers).

Mr. R. BAKER (of Writtle) said, every gentleman present must feel highly gratified at the very lucid manner in which Mr. Nesbit had treated this subject—a subject with which he was well acquainted, and on which he conveyed his opinions with far more felicity of expression than ordinarily characterised the addresses of chemists (Hear, hear). He would not enter into the constituent properties of manures, which had been clearly explained by Mr. Nesbit; but, having used artificial manures extensively himself, he asserted that whatever might be the quality of manure, it would be of no use unless it were properly applied. During the late drying winds more than half the guano applied to the land had, he believed, been actually lost. If there were not sufficient moisture in the soil to create an affinity with the manure, and cause it to be taken up at once, a large portion of what was applied went into the atmosphere. His own experience shewed that in the case of mangel wurzel especially, the ploughing should immediately precede the application of artificial manure. Immediately after the land had been turned up for the ridges, the manure should be sown broadcast; another ploughing should directly follow, and the manure should then be covered in and rolled down as soon as possible. By such an application the gaseous qualities of the manure, which would otherwise fly off, would be secured. It was often easy for persons who were travelling to discover from a distance of half a mile that a field had been manured that day with guano.

\* Often sold as Peruvian Guano, a pound or so under the market price, to farmers who are in want of—A BARGAIN.

\* This value is, however, practically lessened by the large quantity of carbonate of lime contained in the sample. Yet this substance has actually been bought by farmers as guano, at from £8 to £9 per ton.

In such cases the moisture in the soil had not been sufficient to fix the manure; and thus what was sown in one field rose into the atmosphere, and perhaps falls combined with rain into some field a hundred miles off (laughter). In applying guano for turnips or mangel wurzel, he never waited till the time of sowing, but availed himself of the first convenient opportunity before that time arrived. A short time ago, in going over a farm the occupier of which grew much heavier crops of mangel wurzel than any other person in the neighbourhood, he was led to the conclusion that he did not himself use sufficient means to ensure large crops. The occupier of the farm having asked him how much mangel wurzel he produced, he replied: "From twenty-five to thirty tons per acre." "Oh," said the farmer, naïvely, "you might just as well have thirty-five or forty tons; I used to have only 30; now I get 40, and the increase is caused by my using 2 cwt. of guano per acre more than I used to do." He (Mr. Baker) at once determined to follow the example which was thus set. He would now state how he now prepared his land for mangel wurzel. During the frost he first applied about 15 tons of well-decomposed farm-yard manure, which he ploughed in. He then applied the following dressing:—3 cwt. of guano, 4 cwt. of fishery salt. He afterwards drilled in 1 cwt. of super-phosphate of lime with the seed, which he found to stimulate the growth of the plants more than anything else; and the result was, an increase of from 10 to 15 tons per acre. In another part of his farm he applied the following dressing:—4 cwt. of fishery salt, 3 cwt. of blood-manure, and 3 cwt. of guano. Comparing his own experience with the remarks of Mr. Nesbit, it appeared to him that the course which he was now pursuing, with respect to mangel wurzel, was that which was most likely to lead to satisfactory results. He thought he might say, without exposing himself to the charge of egotism, that he now produced as good mangel wurzel as was grown in his district. There was, in fact, no room in this case for egotism: mangel wurzel was now simply an article of commerce, and you might produce almost any quantity per acre you pleased, provided you applied properly the most suitable kinds of manure in sufficient quantity to effect the object.

Mr. J. J. MECHI (of Tiptree) defended Baron Liebig's mineral theory, referring to his lately published reply upon Mr. Lawes's experiments, which (he said) was crushingly conclusive as to the necessity of soluble inorganics for the vegetable and animal structures. With respect to mangel-wurzel, he concurred with Mr. Nesbit that it required to be deeply and most abundantly manured. His largest crop, 43½ tons per acre, had been grown by manuring the surface, then double trenching, and again manuring the deep furrows before the ridges were levelled down. Such treatment not only paid in the growing crop, but greatly increased the after-crops. Twenty to thirty loads of farm-yard manure, five cwt. of rape-cake, and three cwt. of guano, with a cwt. or two of salt, was a proper dressing for the mangel crop. Experience had taught him that a very large portion of our manures were washed away through the soil and the drains by

heavy rains; but that rendered heavy manuring still more necessary. It frequently occurred, that whilst irrigating his fields with solid and liquid excrements mixed with water, every drain in the field discharged abundantly coloured water, or rather manure; for you might both see it and smell it, and it tainted the water for nearly a mile. This was in very stiff tile earth, drained five feet deep, at intervals of from thirty to fifty feet, with one-inch pipes. He found that heavy soils passed water more abundantly than light soils, the latter retaining more by their superior capillarity. As regarded super-phosphate of lime, it produced no beneficial effect on the stiff clays, although he knew it was very advantageous on light or mixed soils.

Mr. CUTHBERT JOHNSON (of Croydon) was fully sensible of the excellent manner in which Mr. Nesbit had introduced this important subject, though there were one or two minor points on which he differed from him. For instance, he did not agree with him that in the application of superphosphate of lime for turnips there might be too much soluble phosphate. Superphosphate was too valuable an article in commerce to be sold in the condition which Mr. Nesbit supposed, and he feared there was little danger of farmers meeting with a sample of that description. The question which Mr. Nesbit had introduced was, in fact, much too large to be exhausted that evening, or for all the points embraced in it to be touched upon. The simple question, What is a manure? was one which would puzzle ninety-nine men out of a hundred. It had been remarked that a weed was a plant growing out of its place, and manure might be defined as something in its right place, and of which the soil was naturally deficient. But, then, in this were involved a great many minor considerations. A farmer in Essex, for example, would tell them that chalk was a most valuable manure, and one which he carted at a considerable expense; whereas a farmer whose land was situated on a cretaceous formation would tell them that chalk was the last thing he would ever think of applying; the truth being, that there was, in his case, an abundance of chalk already. They had been told, that evening, that by the application of nitrogenous manures, to the extent of two, three, or four cwt. per acre, farmers might secure large crops of turnips. The question, however, had been raised, whether ammonia might not sometimes be applied in excess, and whether a large portion of it might not, as Mr. Baker had intimated, evaporate. There had been some researches of late, with the view of ascertaining whether, even if the manure were applied at the right time, and properly spread on the land, errors might not be committed, and loss sustained. The labours of the chemist had shown that drainage-water—the rain, he meant, which descended into the soil, and thence into the drains—carried off a considerable proportion of those ammoniacal salts which were of such great value in guano. Some years since the present Professor of Chemistry in the University of Edinburgh, Professor Wilson, made some most valuable researches on that question. In the case of a

field which had been manured with guano, he analyzed some water taken from the drains before the guano was applied, and then analyzed some taken from them after the application of guano. The result was that if a certain quantity of the drainage-water contained 3.4 grains of organic matter *before* the soil was dressed with guano, the same quantity of the water held 7.8 grains *after* it was thus manured. Then came certain experiments of Professor Way, on the combination supposed to take place between the ammonia spread on the soil and the alumina which the soil contained. He showed that there was such a combination, and that the alumina stored up the ammonia; but some later researches, with which they would soon be favoured, had also led him to examine the important question, whether a portion of the ammonia thus added to the soil did not escape in the drainage water. He (Mr. Johnson) would have added a little more upon the subject, but that they would themselves be shortly furnished with the details, through the ordinary channels. With his love of practical application, what he now wished to direct their attention to was this: As there was no doubt that a considerable portion of the guano applied to the land (after being dissolved by the rain, and thus converted into liquid manure) did share the fate of the fluid manure, to which Mr. Mechi had alluded, and which escaped with the drainage water, to the loss of the cultivator, and the soil itself, a serious practical question arose, whether they should not try the experiment of applying these ammoniacal manures in distinct and separate portions, taking advantage, if they could, of moist weather for the purpose, rather than spread them all at once, and in such quantities that the plant could not immediately assimilate them to itself (Hear, hear).

Dr. ELLIS (of Sudbrook Park, Richmond) said: The lucid and interesting statements of the lecturer, on the subject of the relative value of artificial manures, have been listened to with great interest and pleasure by me. There is one bearing of the subject, on which it appears to me it would be very interesting and important for further information to be elicited: it is the adaptation of the different manures to the various soils which are under cultivation. I am an occupier of different soils, such as light sand, sharp gravel, loam, and mixed. Plants have an affinity for peculiar soils. Dressings with suitable manures should, if possible, be adapted to meet the different wants of the various plants which are embraced in general agriculture. All plants cannot require the self-same nutriment, nor are the different kinds of soil destitute of all the kinds of nutrition plants require. Farmers want to grow roots, herbage cereals, or corn, on all sorts of land, and all wish to obtain as large a crop as possible. There is an approval manifestly rendered to farm-yard manure, and artificial manures are demonstrated to be productive of remunerative crops. As to the query, "What is manure?" I fancy the question to be easy of solution. This solution may be erroneous; but it appears to me that manure is that proper food for the plant which its habits require. The physiology of plants resembles in some degree that of animals: both are sustained, developed, and perfected by nutrition. Doubtless all nutrition must be rendered soluble before it can be taken up by the vessels, and formed into tissues, and fill the cells so as to constitute perfect development. Soils which are deficient of the essential principles of nutriment will require all those elements to be introduced into them. Those which are desti-

tute of a portion of such elements only, will have to be supplied with the deficient elements. Chalk cannot require the same elements as pure sandy soils. Nor will vegetable earth require the same addition as loam and clay. The quantity of manures must be adapted also to the quality of the soil, and the nature of the crops to be raised; and it may be said truly that he who sows sparingly will reap sparingly and vice versa. With respect to the condition in which manure should be administered to the plants, that of the fluid form carries much reason in its favour. It has been stated that fluid manure runs through the land, and is to some considerable extent wasted on hard clay soils. This sounds odd. Farmers are, as a body, reckoned very credulous, and an opinion prevails that they are easily taken in; indeed, they are considered fair prey. But surely they cannot believe that liquid manure will run through clay soil so fast as to furnish large quantities at the outlet of the under-drains five feet deep. Some of the fluid manure, if pumped on to such land in dry seasons very fast, may run off the soil and get along into the openings of the ends of the drains which lie low. In recent drainage, where the openings through the solid clay have been recently cut and filled up with pulverized material, the fluid may rush down and find a readier way to escape than if it passed through the unbroken bed. But we ought to believe that the fluid leaves most of its virtue behind, and is less and less a useful material as it descends in the earth. The astounding affinity of all soils for the properties contained in decomposed materials is scarcely appreciated. The effect of the most offensive animal and vegetable matter may, when it becomes a nuisance, be cheaply and instantly superceded, if it be but remembered that the soil will so greedily absorb its gaseous and other properties. I may assert, that it is only needful to throw a slight covering of any kind of earth over all sorts of decayed matter, and its offensive nature is at once neutralised. I feel persuaded that the statements made at this meeting on the subject under discussion may be fully expected to lead the agricultural question of dressings for crops forward another stage, and that the desirable result will be accelerated of raising larger crops of better quality for the sustenance of our fellow-creatures.

Mr. MECHE, in explanation, showed that there was no mistake whatever as to the running through of the liquid. He was in the habit of irrigating a hundred days in the course of the year, and there was not a man or boy on the farm but knew that the drains always ran with coloured water when irrigating with manure. Heavy land would not retain the water like light land, but acted as a filter.

Dr. ELLIS said, the extent of affinity which common earth had for ammonia was not fully appreciated. If they happened to have a nuisance in their neighbourhood, arising from dead animal or other matter, the quickest possible method of getting rid of it was to throw over it a slight covering of earth. (Hear, near.)

Mr. BRADSHAW (of Knole, Guildford), for the purpose of allaying any apprehensions that might have been created by the observations made with regard to the disposal of manures on being applied to the land, thought he could not do better than relate some of the results of his own practice in the use of artificial manures. (Hear, hear.) And, first, he would state the results of an application which he made in 1854, on 18 acres of oats. In that instance he used 3 cwt. of damaged guano, at 9s. 6d. a cwt., which gave £1 8s. 6d. The land was undrained, very

wet, and altogether in a wretched condition. The results were twofold. Upon the guano-manured land he grew 40 bushels of oats an acre, whilst upon the unmanured land he grew but 20 bushels an acre. Having superintended the carting off and thrashing himself, he was satisfied there was no mistake in the matter. The fact was, he got 20 bushels of oats extra, and three of Crosskill's harvest carts, in addition, of straw. That extra quantity of straw he valued at £1, and the 20 bushels of oats at £3 15s., or 30s. a bushel, making together £4 15s., and deducting the £1 8s. 6d. for guano, a clear profit was left him of £3 4s. 6d. (Hear, hear.)

A MEMBER: You have no drains to carry away the manure? (A laugh.)

Mr. BRADSHAW had no drains; further, he had followed Mr. Nesbit's plan of manuring for mangel. In November, 1854, he ploughed once ten inches deep. In the spring, three weeks before sowing the mangel, he applied 3 cwt. of guano broadcast, and next scarified the land and drilled in 2 cwt. of superphosphate. Then, previous to horse-hoeing, he sowed broadcast, at twice, 1 cwt. of nitrate of soda and 3 cwt. of salt; and the result was that he grew 30 tons of clean root, not including tops, of long red mangel, without the application of a single load of farm-yard manure. By the same method he also grew 25 tons of orange globe, and 30 tons of long red.

A MEMBER: What was the succeeding crop?

Mr. BRADSHAW: Wheat.

A MEMBER: And what was the soil?

Mr. BRADSHAW: Loamy; there was no clay upon it. With regard to Swede turnips, he had applied 3 cwt. of superphosphate, with about 8 or 10 loads of farm-yard manure, and grew 20 tons to the acre last year. In 1854 he tried several experiments with swedes, and they were not upon a small scale, for he tried them on patches of land three and four acres in extent. On two occasions he made use of bones on a field of 14 acres. On one portion of the field he used 3 quarters of half-inch bones, and 4 bushels of bones dissolved in sulphuric acid. On another portion of the field, about 4 acres, he sowed 2 quarters of half-inch bones, 4 bushels of bones dissolved in acid, and 2 cwt. of guano per acre broadcast. The results were, that whilst there was little difference in the size of the swedes, those grown with guano were more porous—that was to say, spongy—and not of so good quality as those which were grown without. (Hear, hear.)

Mr. J. A. WILLIAMS (of Boydon, Wilts): When Mr. Nesbit proposed to sow the guano broadcast, of course he intended that it should be done on a moist day. He (Mr. W.) had once applied guano broadcast, and had made up his mind that it should be the last time he would ever do so, for he believed he lost three-fourths of the effects of it. The application was made on a dry day, and the greater portion was carried off by the winds to his neighbours' farms, for aught he knew, miles off. And that he feared would be too generally the case, if guano were applied on the broadcast system. The question had been asked to-night, "What was manure?" He (Mr. W.) agreed with Dr. Ellis that it was, in fact, the food of the plant; and if they applied manure to the soil which was not suitable for it, they would in effect as much throw it away as if they gave hay to a pig, or the animal food upon which mankind subsisted to a horse. With regard to what Mr. Mechi had stated respecting his drainage, he gave that gentleman credit for a vast amount of experience, derived from experimental farming; but thought that, after observing the effects of his drainage, and the practical means by which he irrigated his land, he would do still

further service to agriculture if he analyzed the coloured water which ran off through the drains, and ascertained whether that water had not, in truth, left its valuable properties behind. There was one thing with respect to which, if Mr. Nesbit could enlighten them, he would be making his admirable lecture complete; that was, that he should tell them what manures were best adapted to certain descriptions of soils. Upon very strong lands he (Mr. W.) found that the bones themselves were of far greater importance than superphosphate of lime. Wherever he had tried the latter on a light soil, he invariably found there was nothing equal to it; but on strong clays he grew better turnips where he used ground half-inch bones alone, than where he had put superphosphate.

Mr. W. BENNETT (of Cambridge), whilst admitting that he had rarely listened to a more useful or interesting lecture in that room, said there was one point which had not been touched upon, and with respect to which he should have been glad to be enlightened: he meant as to which artificial manures were the most likely to produce premature decay in the root crops. It was one of the drawbacks to the extensive use of these manures that roots—turnips for instance—were more liable to decay, where artificial manures were used, than where they were not: that, he hesitated not to state, was the result of his own experience. It had been his practice for many years to manure partly with farmyard dung, and partly with such artificials as he thought best adapted to the particular crop. But this year, finding the farmyard manure holding out better than he expected, he applied it to eight acres of Swedish turnips without artificial manures; and the result was that his turnips stood a vast deal better there, and with less rot among them, than where the artificial manure had been used.

Mr. MECCHI: The frost affected them, I suppose?

Mr. BENNETT: Not exactly the frost; because turnips, this year, began to decay at the root.

Mr. MECCHI: Not until after the frost, I apprehend?

Mr. BENNETT: Oh, yes: in many instances before there was any frost at all; but the frost undoubtedly facilitates the progress of disease. The fact was, that turnips had begun to decay, especially in Bedfordshire, even before the month of November had expired; and he was not quite sure whether artificial manures did not encourage the progress of decay.

A MEMBER: Your remarks apply to swedes?

Mr. BENNETT: Yes. He recollected that, some few years ago, prizes were offered for the best crops of turnips in Bedfordshire, by the County Society, both at Leighton Buzzard and Luton, and being put upon his "mettle," he dressed heavily for turnips, and used rapecake in addition to farmyard manure. One of the most splendid crops of swedes he ever saw was the result; but several of the roots had begun to exhibit signs of decay as early as the first week in November, and he was disqualified by the judges on the ground that the turnips were not all sound. He should be glad, therefore, if Mr. Nesbit would give them some idea as to which artificial manure was likely to cause decay at an earlier period than another. With regard to what Mr. Mechi had stated respecting his liquid manure being carried through the drains 300 yards off as black as treacle, the statement was very staggering. Of course, he did not deny that it was true; but he was inclined to think that by this time the land would have extracted pretty nearly all that was valuable in the manure, provided there was anything valuable in it in the first place (Hear, hear, and a laugh). Colour was a most mistaken test of value.

Mr. MECCHI: It was the solid and liquid droppings from the bullocks, sheep, and pigs; nothing else.

Mr. BENNETT: Well, that ought to be good; but he should suppose that by the time the liquid had percolated

through the soil it would have left behind it all the properties that were valuable in it (Hear). As to irrigations of this description, he would rather his friend Mr. Mechi should have recourse to them than himself, for he had derived so little benefit from irrigation by liquid manures in the long run, that he believed he might put in his eye and see none the worse for it all the good it had ever effected (Hear, and laughter). He would infinitely prefer using his liquid manure, mixed in compost heaps, to carrying it in its liquid state on the land (Hear, hear).

Mr. OWEN WALLIS (of Overstone) said that Mr. Bennett's remedy would lead him to suppose that decay in the turnip arose in some degree from the use of artificial manures, and as on his (Mr. Wallis's) farm he had used bones in considerable quantities for several years past, and his turnips had suffered much from rot this year, he had himself entertained a similar notion. Having made inquiries amongst his neighbours, however, he discovered many instances in which rot had been equally prevalent on land where no artificial manures had been applied within any man's recollection. It occurred to him that it was highly probable that decay in turnips might be something like decay in the clover plant; that it might be occasioned by the exhaustion of some quality in the soil that was necessary to its proper growth; and if practical agricultural chemists would turn their attention to that point, he believed they would render greater service than ever to the cause of improvement in agriculture. He (Mr. Wallis) would readily contribute his £5 or £10 towards a good prize for the discovery of a remedy for this evil (Hear, hear). As Mr. Nesbit had invited inquiries with regard to matters in respect of which the club might be desirous of receiving information, he should be glad if he would inform the meeting, first, what was the best mode of dissolving bones. He (Mr. Wallis) was prompted to ask this question by the circumstance that he had dissolved bones in acid on his own farm, and that the manure had more the appearance of brown rappee snuff than anything else; whilst the superphosphates he had purchased from the most respectable makers were exactly like white chalk? The other question he would ask was this: He had been in the habit of using a great quantity of artificial manures and consuming a large amount of cake, and as he had suffered much from his barley and oats falling, he was anxious to know if salt would not be as useful for them as for wheat?

The CHAIRMAN (having been called upon) entirely concurred in the observations of Mr. Nesbit, whom he would take that opportunity of thanking for the lecture with which he had favoured them, and also for the information contained in a series of lectures which he had been good enough to present to several members of the club (Hear). To the non-scientific men these lectures were very valuable. They were remarkably free from "words which darkened knowledge." They were popular in the best sense, and "he who ran might read them" (Hear, hear).

Mr. NESBIT, in reply, alluded to the question of soluble phosphates, and said that there had been a tendency amongst professional chemists, Professors Anderson, Way, and others, to recommend the manure-makers to make all phosphates soluble. He (Mr. Nesbit) could not say, however, that he would advise anything of the sort at present. He believed if they had not a sufficient amount of insoluble phosphates for the latter growth of the turnip, there was a chance of its growing too rapidly at the beginning, and being checked and stunted afterwards, and so rendered liable to disease; and he had observed that where there was too large an amount of soluble phosphates, the turnips had shown a tendency to early decay. As to the running away of manure through the drains,

of which Mr. Mechi had spoken, they must be aware that a loss of manure was always going on upon every description of soil: only where the land was undrained it went off the surface, and the loss was much greater than where the land was drained. Experiments on the water which was carried off by the drains were in his opinion superfluous. No doubt there was some loss. There was loss from evaporation upwards, and from percolation downwards; but the best mode he could suggest for balancing that loss, was to put more manure on the land (Hear, hear). With respect to guanos being valuable only for the nitrogen they contained, that was altogether a wrong conclusion. The fact was, they contained both soluble and insoluble phosphate, and their value must be measured, not only by the amount of the ammonia, but also by the phosphate they contained; that in Peruvian guano being nearly 30 per cent. (Hear). As to the mode of applying guano, he preferred mixing it a fortnight or three weeks before using with eight or ten times its own weight of earth or ashes, so that on dry windy days it should not be blown away.

Mr. MECCHI sowed his with salt.

Mr. NESBIT: Salt was a very good thing; but he preferred the plan he had mentioned.

A MEMBER: Would you recommend burnt clay?

Mr. NESBIT: Anything of that kind, burnt or unburnt, would do well. In the use of guano or superphosphate for turnips, he had witnessed exceedingly good results from sending before the horse-hoe a lad to strew a few handfuls between the drills. That was after the general manuring. The consequence was that the handfuls thus distributed got worked in by means of the horse-hoe, and the little fibres being cut off by the action of the hoe, on their shooting out again they found a good deal of nutritious matter, which enabled the roots to grow healthy and sound. With reference to the various kinds of soils, a more scientific nomenclature of soils was wanted; but as a general rule he should say that superphosphates seemed to suit light land better than heavy, and guano to suit heavy land better than light. In answer to Mr. Wallis's question, Mr. Nesbit said there were something like twenty different substances which the manure makers had to select from, in making their superphosphate. They might, therefore, have a superphosphate almost of any colour. For instance, if it were made of calcined bone, which was white, it must be white; if of charcoal, black; and if of the two, grey. Salt was certainly useful for strengthening the straw in all cereal crops, and would be found advantageous in almost every district, applied with any dressing that was given to these crops. It would enable them to stand a much larger dressing of ammoniacal and nitrogenous substances than if it were not used; though it was not so beneficial where land was well drained.

It was then moved by Mr. Owen, seconded by Mr. Mechi, and carried unanimously, "That the thanks of the Club be given to Mr. Nesbit for his valuable lecture, so ably and fully explaining his subject; while the meeting recommend to the best attention of agriculturists the extended use of artificial manures."

A vote of thanks to Mr. Wood, the chairman, terminated the proceedings.

#### PROPOSED TESTIMONIAL TO MR. J. C. NESBIT.—

On the conclusion of the above discussion many of the members expressed their desire of offering some suitable testimonial to Mr. Nesbit for the valuable services he had rendered the agricultural community by his numerous lectures on chemistry; the use, application and adulteration of manures; and on other subjects of interest to the farmer. A list was accordingly opened, which was immediately signed by all then present; Mr. James Wood, of Ockley, the Chairman for the year, consenting to act as treasurer, and Mr. H. Corbet as honorary secretary. It is not, however, intended to confine this to members of the Club, but to extend to every other agriculturist in the kingdom the opportunity of expressing his approval of Mr. Nesbit's labours. Subscriptions can be forwarded accordingly to Mr. H. Corbet, Farmers' Club House, New Bridge-street, Blackfriars.

## SEA-SAND AS A MANURE.

It will be seen by the report of the recent meeting of the Royal Agricultural Society, that attention has been drawn to the immense quantities of sea-sand which are carried into the interior of the counties of Devon and Cornwall for manure, and that investigations are to be undertaken by Professor Way respecting the chemical composition of this sand.

The subject is important; and we are glad to see it taken up by the Society, but it is by no means new. It was brought into notice some years back, by Sir Henry De la Bêche, in his report on the Geology of Devon and Cornwall, published in the Journal of the Geological Survey of Great Britain, and reprinted in the Journal of the Royal Agricultural Society. Sir H. De la Bêche referred to the writings of Dr. Borlase, if we remember rightly, for a statement of the extent of the traffic in this sand in his time. The writer of the paper in the Journal of the Royal Agricultural Society, on the agricultural relations of the Hampshire Tertiary District, used this traffic as an argument, in favour of the hitherto neglected resources which our railways afford for the improvement of land, by the transfer of mineral manure from one district to another—of clay, for instance, to silicious soils; and of chalk, in the unburnt state, to districts of clay.

“The vast quantities of sea-sand,” said the writer, “transported into the interior of the county of Cornwall from the sea-coast, furnish an example of the magnitude to which the traffic in mineral manures may extend, when once the use of them becomes an established practice. The subject is well worthy the serious consideration of railway companies, particularly those—of which there are so many—not overburthened with traffic of other kinds; as well as of landowners having poor lands lying contiguous to lines of railway which pass through counties containing mineral manures. In 1811, it was estimated that Cornwall paid £30,000 a year for the carriage of this sea-sand. It forms the chief article of commerce on the Bude and Launceston Canal. It is also carried abundantly by carts to supply the adjoining pastures of Devonshire and Cornwall. Roads and tramroads have been constructed expressly for its conveyance into the interior. 100,000 tons per annum were estimated in 1836 as the produce of Padstow Harbour alone, a great portion of which was transported into the interior from Wade Bridge by the Bodmin Railway; and the total quantity of sea-sand, which consists chiefly of finely-comminuted shells and corals, spread over the surface of the two counties, for the improvement of the soil, was estimated

by Sir Henry De la Bêche, at from four to five times the yield of Padstow Harbour.”

These facts were adduced, as an example of the use which might be made of our network of railways for the transfer of mineral manures from one district to another. He showed the great distance to which raw chalk is carried for the improvement of the land in parts of Norfolk. In many districts of that county, it is carted two or three miles to the land from the pit at which it is raised. In others, it is carted that distance, after being burthened with the cost of an expensive inland navigation. It was further shown that heavy manures of this kind may be carried on a railway 30 miles for the same expense that they can be carted 5 miles in the ordinary way. We have heard it objected to these views, as to the advantages of the transferring from one district to another of bulky manures containing a large percentage of clay, that the calcareous matter in the Cornish sea-sand is the valuable ingredient, and by the application of quick-lime, it is said, in which form the weight to be carried is reduced about one-half, a great expense may be saved, since sufficient argillaceous matter exists in most soils. There is no doubt that in agricultural questions much ambiguity arises from the vagueness of the terms sand and clay, as applied both to soils and mineral manures, and one of the fertilizing ingredients in the Cornish sand is without doubt the small proportion of salt and of organic matter which it derives from the sea. This is evident, from the fact mentioned, if we forget not, by Sir H. De la Bêche, that the farmers have found sand fresh from the seashore to be much more beneficial than that from the heaps of sand which have been carried into the interior by the wind, and from which the saline and organic matters have been washed by the rain. The argument, however, adduced from these facts against the transport to a distance of mineral manures containing a considerable portion of clay, is no argument against their transport by railway 30 miles, to districts of blowing sand, where a slight admixture of clay and lime would change the character of the soil, particularly if accompanied by the growth of such forage crops as were best adapted to the soil, and would furnish a supply of organic manure.

And then with regard to the transfer of mineral manures from a distance, when a little geologic research properly conducted would point them out in much more accessible situations, we may again refer to Norfolk. There are few estates on which a systematic investigation of its geological resources would not bring to light some undeveloped mineral

substances for agricultural or other economic purposes, which would soon repay many times over the trifling cost of the most minute geological examinations conducted by competent persons. Suppose, for instance, some such mineral manure to be discovered, and to be worth a royalty of 3d. the cubic yard for transfer to estates which are deficient in that substance, this would yield £60 the acre for every yard of depth, and would dress 242 acres at the rate of 20 cubic yards to the acre.

We have been informed that a prospectus was published a few years back, for a geological survey of estates, with special reference to their agricultural capabilities. Such survey was to include two maps. One was to show the mineral variation of the substrata which constitute the assumed surface of ordinary geological maps, but showing their mineral variations in greater detail than is possible on the scale of the best public geological maps we have, namely those of the Government Geological Survey. The other map was to exhibit the variations of soil and subsoil dependent on the superficial deposits, which are supposed in our present geological maps to be removed, in order to exhibit as the actual surface the rock nearest to the surface. These maps were to be accompanied by a report describing the undeveloped economical resources of the estate of all kinds, and the means of improvement. Some few maps, we believe, were made on this plan, and have

been pronounced by competent judges to contain a vast amount of valuable information, and to form the proper basis for the valuation of land, either its local value, according to the mode of cultivation pursued upon it, or its true value, according to better modes of cultivation practised in other districts on the same kinds of soil and under the same climate. We have even heard it asserted that ten years hence every valuer of land will be required to give in such a map, when valuing an estate, showing the data upon which his calculations of value are founded. If, at present, this advanced move in the application of geology to agriculture has met with but little encouragement, its author may console himself with the reflection that a similar fate has often attended other movements in advance of the times.

Smith himself, the land-surveyor of Oxfordshire who ranks as the "Father of English Geology," was long known in derision by the nickname of "Strata Smith," which has now become his title of honour. The cultivators of a more advanced agricultural geology than that which Smith originated may console themselves with the reflection that if their labours were not appreciated in their lifetime, some will a few years hence make fortunes by that at which they toiled in vain; that the same fate has befallen others before them; and that

"Nations slowly wise, and meanly just,  
To buried merit raise the tardy bust."

## DISCUSSION ON DRAINAGE AND LIQUID-MANURING.

The discussion which took place Wednesday, April 16, at 12, Hanover-square, on draining and liquid-manuring, reported in another page, proves how much may yet be said on either subject without exhausting it. In reviewing both, our observations must necessarily be very brief, owing to the limited space at our disposal, and their controversial, and on that account somewhat latitudinarian, character. This is to be regretted, as our remarks will have to assume the form of criticism rather than such an exposition as the two important topics themselves would otherwise require at our hands. We must, therefore, crave from our readers in this place that indulgence which our position under these circumstances demands, promising at no distant date to investigate separately each of them in detail, should the Council of the Royal Agricultural Society not do so.

First, as to draining. This question, it will be seen from the report already referred to, was introduced by Mr. Brown, who, in expressing his disapprobation at the manner it had lately been discussed before the Society of Arts, wished that it might be otherwise treated before this Society.

In both these cases Mr. Brown is perfectly correct, the subject having been very superficially handled before the former Society, while the experimental investigation

of it by the latter is very much wanted in order to reconcile with fact the many discordant opinions to be met with in every province of the kingdom, because such opinions are checking the progress and proper execution of a work justly acknowledged to be the foundation of all agricultural improvement.

On the present occasion little was done in the way of progress, the question having at once assumed the old hackneyed form of "Deep *versus* Shallow Draining," and being there left amidst the jarring elements of opinion, ycleped "experience," in as unsettled a state as ever, not a single expression of novelty having even been advanced, beyond an unsuccessful attempt to lay down a general rule for draining to the depth of four feet.

Nothing can be more hopeless than anything of this kind, or more certain to experience disappointment, especially in a country so diversified in soil, climate, and management as Britain.

The proof of a proposition so comprehensive as this would require an amount of detail, to do it justice, far beyond our limits, as already stated; so that we are left only one alternative—of referring to a series of articles, written by us, in the "Quarterly Journal of Agriculture," on this subject, for details, pointing out in the meantime the single fact that the Society's Report furnishes an

example in proof, Mr. Scott having fallen into error, *firstly*, by admitting that he himself is draining to a greater depth, in order to tap some springs(?). Of course, the principle here involved embraces the Keythorpe system of drainage, as well as the removal of all stagnant or bottom spring-water. Now, what is the area of land requiring to be drained on the principle of tapping a spring? Is it not greater than that requiring to be drained to the uniform depth of four feet? These are two plain statistical questions, which none of our draining engineers dare yet attempt to answer; and therefore, before they are justified in laying down any general rule for draining, they ought to be able to do so, as every one acquainted with the experimental philosophy of modern times must be aware. *Secondly*, by admitting that drains at 2½ to 3 feet depth do not last so long as those at 4 feet. Those of our readers who subscribe to the latter depth, will admit the principal reason of this, we presume, to be a more perfect state of filtration. Now admitting such, different qualities of soils will require drains at different depths, and also different depths of culture on individual soils. Again: clay lands, with a southern inclination, will require drains at a greater depth than lands with a northern, owing to the difference of solar influence; and lands of a southern latitude than those of a northern. In a word, the more we investigate this dogmatic rule of uniform depth, the more absurd it becomes.

The liquid-manure proposition was introduced by Mr. Chadwick, who gave a very graphic account of the Rugby experiment, as will be seen from the report.

Hitherto we have never been able to subscribe to much of Mr. C.'s hydro-farming; but the proposition of daily applying to the land the sewage of towns in a fresh or undecomposed state is obviously sound practice, as results will be found to corroborate, wherever it can be thus used, while the application only involves a little more engineering. For example:—

Let the metropolis be mapped out into small districts, each capable of keeping a small engine and force-pump working, in sending its whole sewage twenty miles into the country daily. Let street sewers be so constructed that during storms of rain the sewage could be turned past at pleasure; and let the whole house sewage of each district be conveyed to a small tank at its engine, in glazed pipes, and let these be well flooded twice every day, or as often as necessary, to keep them clean and free from decomposing matter; and let there be a telegraphic wire communication between the engine and the country. Further into details we need not go, what we have just said being sufficient to show the outline of a workable scheme.

Now, with such machinery, our readers will readily perceive both sanitary progress and fertilizing progress. At present, and so long as the sewage of our large towns flows in open sewers for miles, it is and will be comparatively worthless as a manure, the decomposing matter in the sewers inducing the rapid fermentation of all fresh supply forced into them; so that, before it proceeds far, the more volatile and valuable constituents escape into the atmosphere, polluting it. But keep the glazed pipes clean between the houses and the engines, and then force the sewage through glazed metal pipes, at the rate of a mile per minute, before rapid decomposition commences, and the result will be very different in both cases; for in the one the atmosphere of towns would be pure, and in

the other almost the whole fertilizing elements of the sewage would be applied to the soil, as in the case of Rugby; the liquid manure-drill and guano-water applied with hose and jet, as in Ayrshire.

No doubt some very grave objections were brought against the whole system, but these are easily refuted. *First*, for example, it was said that it could not be profitably applied to cereals, or even green crops, after they had attained a certain stage; but without having recourse to Mr. Chadwick's plan, not yet sufficiently tested at the bar of Practice to meet with general approbation, two or three applications may in ordinary seasons be applied to young wheat, &c., before it attains that stage likely to suffer harm; putting on during those occasions a sufficiency to meet the future wants of the crop, so that if the watery portion of it is evaporated, and the cereals begin to demand a supply of moisture, the sound practice is to give clean water, which can be applied at any time without doing harm. Moreover, with an extra quantity applied to grass and green crops, it will be found that cereals will not stand much liquid manure on the best description of soils.

*Secondly*. It cannot be applied in frosty weather, was the next objection raised to the daily system of Rugby. But this may be obviated by any of the following plans:—(1). A spare, close tank for storing up on such occasions. (2). Prepare one field for liquid-manuring on the bottom system, first filtering the liquid through some partial deodoriser, to avoid sediment. (3). Work up the whole in making composts. And (4). Manufacture into a solid form.

*Thirdly*. The last objection, that "it could not compete with concentrated manures," was, we fear, somewhat hastily advanced, and to us appeared levelled not against the Rugby experiment, but the other failures we ourselves have often condemned—examples where the sewage had become nearly worthless from decomposition in open sewers or tanks; for at Rugby there cannot be a doubt that it is found cheaper than guano, or it would not continue to be used.

We may notice here a common error into which both liquid-manure and concentrated-manure advocates fall, viz., the exclusive advocacy of either practice, when the country obviously requires both. Mr. Chadwick, for example, admits that the sewage of the capital would only manure but a very small area of the metropolitan counties; while Mr. Sidney appeared to overlook the fact, that the most profitable plan of applying concentrated manures was, in principle, that practised at Rugby, in Ayrshire by Mr. Telfer, and in all cases with the liquid-manure drill; and while both appeared to forget that during the scorching months of summer, and not unfrequently spring, all the portable and fixed engines in the kingdom ought to be employed in applying pure water from our rivers, streams, and ponds, in the shape of artificial rain, to our parched fields and crops.

Such is our review. Imperfect as have been our remarks, yet we presume they have been sufficient to show the importance of the two propositions of inquiry made by Mr. Brown and Mr. Slaney, M.P., the one relative to our draining practice, and the other liquid manuring; so that it is hoped neither will be allowed to drop until it is experimentally investigated and discussed, in a manner becoming the Weekly Council of the Royal Agricultural Society. The questions at issue are—(1). How many different kinds of soil are there, in a draining sense? What are their different areas? And at what depth can each be most profitably drained? They are doubtless great ones—the greatest perhaps in statistical science—each of them far beyond the ability of the most talented to solve—yet certainly not beyond the reach of the Society, if the

work is properly subdivided among its members, and distributed over that duration of time which the circumstances of the case demand. They are, it will be seen, questions which cannot be solved in a day, nor likely in the lifetime of the youngest member; but that is no reason why the work should not be begun and persevered in as become all national works of the kind. (2). Ought not the sewage of towns to be applied to land in an undecomposed or fresh state? Can it be so with profit? Seeing that "the clouds drop fatness,"

ought not farmers, in times of drought, to apply pure water in the shape of artificial rain? Would not our pasture, meadow, and grass lands on such occasions, and our stubble lands, immediately after harvesting crops, profitably consume the whole or greater part of our town sewage? And will not steam culture enhance the importance of the liquid manure system, as the carting of manure would thereby be obviated? The principal questions into which the two topics thus divide themselves are therefore plain.

## ON DAIRY MANAGEMENT.

SIR,—The *Mark Lane Express* of April 31st reached me on the day previous to my leaving Yorkshire. Having noticed "W. B."’s communication on Dairy Management, I made the paper my travelling companion, with the view of giving this subject more attention.

As your correspondent discovers acquaintance with the subject, I am disposed to court an interchange of ideas with him, and propose to notice his statements seriatim.

No. 1. That a cow when fat gives the richest milk admits of qualification. I should expect from her in moderate condition, when gaining flesh, richer milk than when fat and losing flesh. If we take into account the disposition of the cow to apply her food to the enrichment of her milk rather than to her own maintenance, we may, I think, safely infer that the milk of a cow gaining flesh and fat is replete with casein and butter to the extent she is enabled by her organism to supply these from the food she consumes. I am disposed, in a great measure, to attribute the regularity in the quality of my dairy produce during the winter season to my success in preventing or arresting the loss of condition in cows giving a large yield of milk. I differ with "W. B." in thinking that a lean cow, skin and bone, fills the milk pail better than a well-fed one. I hold it to be undoubted that with impoverishment of condition you weaken the cow's ability to yield a like quantity and quality of milk. I am moreover inclined to think that a well-conditioned cow gives a larger yield, independent of quality. It is a common observation that condition in a milch cow is of as great (I hold it of greater) value than for the butcher. If I purchase a near-calver in low condition, and keep her till she calves again, I improve her condition, and consequently her value, very sensibly. With this improvement, I find, after her next calving, an increase in her yield of milk of four to six quarts per day. If you could see the same cow in each state, high and low condition, you would observe in the former state a greater development of milking properties, more distended veins and udder; to use a common expression, she would look more like milk. Practice also bears out my views. The purchasers for London and other great towns have their agents and correspondents in each of our agricultural districts, who are instructed to buy cows denoting properties of being great milkers. These agents attach great importance to good condition, and do not purchase for these large towns, where quantity rather than quality is a desideratum, low-conditioned animals.

No. 2. I agree with "W. B." in regarding the cooking of food for cattle as of great importance. I use as flavouring substances, bean straw, bran, and malt-combs, together with oat straw, rape-cake, &c. The effect of steaming is to volatilise the essential oils, in which the flavour resides, and to diffuse it over the whole mess. On entering my cooking place, you perceive an agreeable odour, not unlike that from the process of malting, which imparts a relish to the mess, and induces the

cattle to eat it with avidity; but in addition to this, I am disposed to think that it renders the food more easy of digestion or assimilation. One objection to cooking I saw stated in the discussion on feeding at the Central Farmers' Club—that it drives off some portion of the fattening oils. I hold it to be futile, as it requires far greater heat—speaking from memory, three-fold—to affect the fattening, in comparison with what is required to affect the essential oils.

No. 3. The temperature of my dairy ranges at 52° to 60°. During the time the cows are being milked the dairymaid is engaged in washing the bowls with hot water, the effect of which is to take off the chill, but not to warm them, as on being touched by the hand they still impart a cold sensation. The milk fresh from the cows is passed through a sieve into the bowls, its temperature being about 90°. When these are all placed on the shallow cistern, the hot-water tap being turned, a thermometer with the bulb immersed in the hot water denotes a temperature of about 100°. I have, however, on no occasion found this application to heighten the temperature of the milk; the bowls are of thick earthenware, a slow conductor of heat. With vessels of tin or other metal, the application of water of like temperature would, I am satisfied, sensibly affect that of the milk. The hot water is applied at each meal-time to the milk, when new. A second application, after the milk has cooled, is carefully avoided. Though the temperature of the milk is not increased when the hot water is applied, still the cooling is thereby retarded. I find the thermometer, with the bulb immersed in the milk, after four hours, still denotes a temperature of 60°. When the dairy, without application of artificial heat, ranges at 52° to 60°, the same result is observed.

No. 4. To the advocacy of food rich in albumen as of especial value for milch cows, I may claim particular attention. By an addition of bean meal in proportion to the extra yield of milk, I may say that hitherto, without exception, I have been enabled to avoid the loss of flesh in cows giving 16 to 18 quarts per day; which, estimating the proportion of casein from Haidlen's analysis, will contain, of dry casein, 14 to 15 lbs. per week, equal to 65 or 70 lbs. of flesh of beef, which has 77 per cent. of moisture; whilst the utmost you can induce a cow to lay on in feeding will be 10 to 12 lbs. of flesh, exclusive of fat. I may here remark on the great waste of albuminous food evidenced in the practice of those who submitted their treatment, when the feeding of cattle was under discussion at the Central Farmers' Club, many of whom use this food in larger quantities for beef-making than I find necessary to enable my cows, without loss of condition, to give off five times the amount in casein they can induce their animals to lay on in fibrine or flesh.

No. 5. I have as yet no means of estimating the comparative per-centage of my butter in olein and margerine fats. One simple test I have occasionally tried—that of placing a

small quantity of my butter near a fire, in juxtaposition with that of my next neighbour, who uses common treatment; the effect of which was that my butter melted with far greater rapidity: as the olein oil is more easily affected by heat than the margerine, it would seem to denote a greater proportion of the former in my butter. Other considerations affecting the chemistry of food on dairy produce have arisen, from observation of the results of my dairy treatment, to which I may seek occasion to call attention.

Having noticed seriatim the statements of "W. B.," I may answer inquiries which have reached me from different quarters, as to the improved value of the animals consequent on my treatment. The price of milch cows depends, in some degree,

on their nearness to calving; this, in proportion to a live weight, being higher close at calving time than at any other, not excepting when fatted. During the process of milking, my cows increase in condition; so that in about a year, when their yield is reduced to about five or six quarts a day, they are ready for the butcher, and usually fetch £3 to £4 more than when purchased as near calvers; whilst I am buying, from others, calvers of equal capability at a much reduced price. I have been recently selling my fatted milch cows at £18 to £21 each, and purchasing others in a dry state, of equal capability (and to make which fat will require a time of six months) at £11 to £14 each.

THOMAS HORSTALL.

Raheny, near Dublin, April 5, 1856.

## ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A WEEKLY COUNCIL was held on Wednesday, the 26th of March: present, Mr. RAYMOND BARKER, V.P., in the chair; Count Sparre, Mr. Burness, Dr. Calvert, Mr. Delves, Mr. Gadesden, Rev. L. Vernon Harcourt, Mr. Fisher Hobbs, Rev. James Linton, Mr. Thomas Scott, and Professor Way. The names of 19 additional candidates for election at the next Monthly Council were read.

**SARDINIAN AGRICULTURE.**—His Majesty the King of Sardinia having resolved to develop the agricultural resources of his dominions by the application of the best agricultural machinery of England, Sign. Ambron, of Florence, and Sign. Pinto, of Rome, presented themselves before the Council on this occasion, for the purpose of announcing such intention on the part of the King of Sardinia, and of submitting to the members the royal charter, bearing his Majesty's sign manual, granting those commissioners full power and authority to effect the important object of their mission to this country.

**COTTON-SEED CAKE.**—Professor Way laid before the Council the following letter from Mr. Barber, of Poulton Hall, Cheshire:—

March 4, 1856.

"I observe in the report of the proceedings of the Royal Agricultural Society's meeting of the 25th ult., that you expressed some doubt whether the husks and short fibres of Cotton which adhered to the seeds from which the Cotton-seed oil-cake was produced might not prove indigestible and cause obstructions in the animals which might be fed upon it. This statement has already been commented upon by consumers; and as it may in some degree deter agriculturists from using the cake, I think you will excuse me in bringing to your notice a fact of which I believe you cannot have been aware, and which has material reference to the question of the fibrous portions of Cotton adhering to the seed, viz., that cattle are extremely fond of Cotton itself, and eat it in preference almost to any fodder, and that no evil consequences arise from it, but quite the reverse. In fact, Cotton planters, when their Cotton fields no longer yield a sufficiency to remunerate them for picking, invariably turn in their cattle to eat up what is left. With regard to the huska, I am not yet prepared to give a very positive opinion; but I have many years ago observed the avidity with which cows eat the seed, and in which they were never restricted, so that I inferred no evil consequences arose from it. I have now some seed here, and am trying two beasts upon it exclusively. I have also had about 2 tons of it crushed, and have made cake of it without any effort at decorticating. The cattle eat it quite as well as that I have imported, the seed for which has been decorticated as well as the simple machinery will admit, and is the same you analyzed for Sir Thomas Parkyns. The analysis of this is

quite satisfactory, and is as follows: 100 grs. at 212 deg. lost 12.1 grs. water; thus dried and powdered, 100 grs. gave, on combustion, 83.33 organic matter, 6.67 ash; 100 grs. yielded 6.60 nitrogen, equivalent to 7.99 ammonia; 100 grs. exhausted by ether gave 12.5 of oily matter. The ash, on analysis, gave—carbonic acid, 3.5; sulphuric ditto, 3.6; phosphoric ditto, 4.8 per cent. You are quite welcome to a sample of it, if it will be of any service to you; and I hope on the next opportunity you will correct any misapprehension you may have been under as to the effect of Cotton-seed oil-cake as a food for cattle. In reference to the statement of another speaker at your meeting, respecting the disagreeable flavour imparted to the meat of animals fed upon it, I have only to say that I have now in the house as sweet a piece of cold beef as ever was eaten, entirely fed upon the Cotton cake, and have eaten others before of equally sweet flavour. The butter is also equally sweet.

"(Signed) WM. BARBER."

The flavour of the meat referred to by Mr. Holland, M.P., at a former meeting of the Council, resulted not from the animals having been fed upon Cotton-seed cake from which the greater part of the oil had been expressed, but from the Cotton-seeds themselves containing their full proportion of oil.—Mr. Gadesden remarked, that in his experiments on feeding sheep with Cotton-seed cake, he had found the mutton after cooking to be particularly hard, a result not to have been expected under ordinary circumstances, as the animals were at their full maturity.—Mr. Fisher Hobbs stated that he had remarked the same effect produced by feeding on Lentils.

**ARACHIDE-NUT CAKE.**—Mr. Spooner, of Eling, near Southampton, transmitted a sample of Arachide-nut cake, along with the following communication:—

"Observing that the attention of the Society at its weekly meetings has been directed to the subject of Feeding Stuffs, and particularly to Cotton-cake, I beg leave to forward a sample of Arachide Nut-cake, with an analysis of the same by Professor Way. The cake appears to be palatable to both sheep and cattle, and as its albuminous constituents are considerable, the subject may possibly be interesting to some of the members of the Society, to whom I shall be happy to communicate any additional particulars that may be required.

Analysis.—Moisture.....	9.81
Oil .....	12.34
Albuminous matter .....	35.30
Woody fibre, starch, gum, &c. ....	38.26
Mineral matter .....	4.29
	100.00

Containing nitrogen..... 5.56

(Signed) J. THOMAS WAY.

(Signed) W. C. SPOONER."

The Secretary was directed to apply to Mr. Spooner for the favour of a communication of the particulars to which he referred. In the meantime, the following information respecting the Arachide, translated from the French of MM. Girardin and Breuil, may perhaps be acceptable :

"The Arachide, or Pistachio Earth-nut, is the *arachis hypogæa* of Linnæus, and belongs to the leguminous family of plants. Imported into Europe by the Spaniards from South America, it has been especially cultivated in Spain. It is also to be met with in some localities in the south of France, particularly in the department of Landes. The seeds yield about 34 per cent. of a mild salad-oil, which is, however, much inferior in flavour to Olive-oil. It is particularly employed for the purposes of soap making and the supply of lamps. The oil-cake is very rich in fertilising properties. These seeds, besides producing oil, are used for feeding purposes. In Spain they are eaten either in their raw state, or slightly roasted, or mixed with cocoa into a sort of chocolate. MM. Payen and Henri have analyzed Arachide-nuts grown in the south of France. 1,950 parts by weight gave 1,495 of kernel and 455 of woody integument. In the kernel was found oil and casein (constituting the greater proportion), gum, crystallisable sugar, colouring matter, starch, essential oil, woody matter, malate of lime and free nitric acid, and mineral substances (such as phosphate of lime, muriate of potash, and sulphur). They obtained 47 per cent. of oil. M. Bridli, of Novaro, states that in Italy 50 per cent. is obtained; while in Spain it is asserted that the percentage amounts to 60. Nuts from the coast of Africa were found by M. Moride, of Nantes, to give 31½ per cent. of woody integument and 68½ per cent. of kernel. In the kernel he found 2¾ per cent. of water, 35½ per cent. of oil, 59¾ per cent. of organic matter, and 2 per cent. of mineral substances. From the Arachide-nut-cake supplied to the market from the oil-works at Rœnen, MM. Soubeiran and Girardin obtained the following results :

Water	..	..	..	..	..	..	..	12
Oil	..	..	..	..	..	..	..	12
Organic matter	..	..	..	..	..	..	..	71
Mineral substances	..	..	..	..	..	..	..	5

100

In the organic matter there were about 6 per cent. of nitrogen, and in the mineral substances about ¼ per cent. of soluble salts, and 1¼ per cent. of phosphates. If, therefore, the Arachide is tolerably rich in nitrogen, it is, on the contrary, one of the poorest substances in the phosphates; accordingly, its cake, when employed as a manure, ought always to be associated with substances rich in phosphates, such as bones and ivory black. The Arachide plant can only be cultivated with success in the south of France, Algeria, or other similarly situated countries."

Dr. Doebereiner, in his "Camerai-Chemie," gives the following notice of the oil :

"Earth-nut oil, from the root-tubercles of the *arachis hypogæa*, which yield about 50 per cent. of an oil almost free from colour or odour. This oil becomes solid at a temperature between 37° and 39° F., and is used for the purposes of cooking, as well as for the manufacture of a white dry soap."

**CULTIVATION OF GRASSES.**—Dr. Calvert, of 3, Park Place, Regent's Park, read to the council a report on his 20 years' experience in the cultivation of Grasses on his estate in Yorkshire. The length of this statement, which occupied nearly three hours in its delivery, will allow us on the present occasion to give only the series of heads under which Dr. Calvert treated the subject.

I.—An examination into the difficulties experienced by agriculturists of being able to lay down their tillage land to the greatest advantage into permanent pastures and meadows, arising from the want of a sufficient botanical knowledge.

II.—The difficulties to be overcome in consequence of the foulness of the ground from slovenly habits, in allowing weeds to grow up and shed their seed from year to year, apparently

sanctioned by all classes of British agriculturists, whereby the greater half of the land is occupied by them, the produce of the desired crops reduced below one-half, and the quality greatly deteriorated.

III.—The further impediment arising from the ravages made upon the seed crop by a species of grub or caterpillar, called by Curtis the *Noctua cubicularis*.

IV.—The difficulties arising from apathy and indifference in those who have the means, and ought by example and precept, to encourage the superior culture of our meadows and pasture lands, so as to produce at least double the amount of nutriment for their stock, which the land is capable of doing if kept free from weeds and laid down with properly selected clean grass seed only.

V.—The difficulties attendant on ascertaining which are the kinds of grasses best adapted for permanent pastures and meadows in ordinary situations and soils, and which ought to be rejected as unprofitable or detrimental, either from their tendency to impoverish and exhaust the land, inducing foulness by their creeping roots, or by occupying the spaces where better Grasses might have grown.

VI.—The difficulty of obtaining seed of the last species and varieties of Grasses for permanent pastures and meadows, without admixture of weed, and inferior Grass seeds.

VII.—A summary of the preceding articles, with comments and suggestions, particularly in regard to the state of land laid down and the treatment of the growing seeds, so as to secure complete success.

Dr. Calvert stated that he had adopted the plan of sowing his selected Grass seeds (of which he had still by him more than he required for his own use, a sufficient quantity to sow from 10 to 20 acres), at the rate of 24lbs. to the acre, on well-prepared ground; and that he preferred thin sowing, independently of economical considerations in reference to the seed. He exhibited to the members a great variety of specimens of the best, as well as of inferior Grasses, for the purposes of comparison.—Mr. Scott stated that he had himself been engaged for four years in researches of this kind. He called attention to the experiments of Lawson and Drummond on the effect of depth on the growth of Grasses; to the "Botany of Grasses" by Dr. Parnell; and to the confidence which, from his own experience, cultivators might repose in all seedsmen of established reputation. They were responsible men, whose characters would be involved by the supply of inferior seeds.

**PORTUGUESE AGRICULTURE.**—M. Felix Nogueira transmitted from Lisbon, through the Portuguese Embassy, a copy of his "Almanak do Cultivador" for 1856, with a letter stating that he offered it "as a token of his high consideration of the Royal Agricultural Society of England, and as furnishing in its pages obvious proofs of the estimation in which he held the agricultural literature of England." The council ordered their thanks for the favour of this present and communication.

**FIELD DYNAMOMETER.**—Mr. Amos, one of the Consulting Engineers of the Society, announced to the Council the success of his efforts to produce a Dynamometer adapted for the purpose of testing the draught of implements in the field. This communication was referred to the Implement Committee.

Communications from the Rev. S. N. Kingdon and Mr. Gubbin, on Sea-sand as Manure, were referred to Professor Way; and further papers on Agricultural Meteorology, from Mr. Fulbrook, to the Journal Committee.

The Council adjourned to their monthly meeting on the 2nd April.

A MONTHLY COUNCIL was held on Wednesday, the 2nd of April. The following Members of Council and Governors of the Society were present:—Colonel Challoner, Trustee, in the chair; Lord Berners, Lord Feversham, Sir John V. B. Johnstone, Bart., M.P.; Mr. Dyke Acland, Mr. Raymond Barker, Mr. Barnett, Mr. Barthropp, Mr. Bramston, M.P., Mr. Bullock, Mr. Cavendish, Mr. Evelyn Denison, M.P., Mr. Druce, Mr. Gadesden, Mr. Garrett, Mr. Brandreth Gibbs, Mr. Fisher Hobbs, Mr. Wren Hoskyns, Mr. Milward, Mr. Paine, Mr. Sillifant, Prof. Simonds, Mr. Simpson, Col. Towneley, Mr. Jonas Webb, and Mr. Western.

The following new members were elected:—

Bates, Thomas, jun., Barton, Silsoe, Bedfordshire.  
 Bonsor, J., Barnoldby-le-Beck, Lincolnshire.  
 Brickwell, Charles John, Overthorpe Lodge, Banbury, Oxon.  
 Brooke, William, jun., Norgate House, Huddersfield.  
 Brown, William, Devizes, Wiltshire.  
 Chalk, Thomas, Linton, Cambridgeshire.  
 Chapman, John, Stowmarket, Suffolk.  
 Doncaster, Charles Richard Thompson, Middlethorpe, Newark.  
 Freeman, Rev. Frederick William, Stowmarket, Suffolk.  
 Fisher, George, Cardiff, Glamorganshire.  
 Gibbs, Moses, Highfield Farm, Wickabson, Gloucestershire.  
 Grimwade, William S., Stonham-Aspal, Suffolk.  
 Guisford, Thomas, Baystone, Wickwar, Gloucestershire.  
 Hutt, J., Water Eaton, Oxfordshire.  
 Kenrick, George, Thurgarton Hall, Southwell, Notts.  
 Lockwood, Joshua, Hawley House, Blackwater, Hants.  
 Loyd, Edward, jun., Prestwich Lodge, Manchester.  
 Manchester, Duke of, Kimbolton Castle, Huntingdonshire.  
 Matthews, William, The Leasomes, Birmingham.  
 May, Charles Neale, Devizes, Wiltshire.  
 Mumford, William Henry, Bramford, Ipswich, Suffolk.  
 Mumford, Maurice, Creting, Stowmarket, Suffolk.  
 Nicholson, John, Pyrton Manor House, Lydney, Gloucestersh.  
 Pickin, W. C., Fledborough, Newark, Notts.  
 Postlethwaite, Thomas, Otley Holes, Hitchin, Herts.  
 Reynolds, Edward, Norwich.  
 Robinson, Thomas, Hutt Hill, Hedon, Yorkshire.  
 Scarbrough, John L., Stafford House, Colyford, Devon.  
 Shaw, Rev. Morton, Rougham Rectory, Bury St. Edmunds.  
 Slater, George, Little-Walden, Essex.  
 Smart, Mortimer Knight, 48, Bernard-street, Russell-square.  
 Sturgeon, Charles, South Ockendon Hall, Romford, Essex.  
 Thomas, Rees, Dol-lan, Llandyssil, Cardiganshire.  
 Upward, A., 36, Duncan-terrace, Islington.

FINANCES.—Mr. Raymond Barker, chairman of the Finance Committee, presented the report on the accounts of the Society; from which it appears that the current cash-balance in the hands of the bankers was 3,399*l.* (including 1,200*l.* as the Chelmsford subscription).

PRIZE ESSAYS AND LIBRARY.—Mr. Dyke Acland, Vice-Chairman of the Journal Committee, reported the arrangements made for adjudicating on the essays sent in by the 1st of March last, to compete for the prizes offered by the Society; and the further recommendation of the Journal Committee in reference to the preparation of a complete catalogue of the Society's library.

CHEMICAL ANALYSIS.—Mr. Wren Hoskyns, Chairman of the Chemical Committee, reported that a revision of the charges to be made by Prof. Way, Consulting Chemist to the Society, for analyses placed in his hands by members, was at that time under the consideration of the Committee, who intended to report their recommendation of a new schedule of such charges to the Council at their next monthly meeting.—Mr. Fisher Hobbs expressed his intention of representing to the

Council on that occasion the great additional advantages the farmers of the country would derive from Prof. Way's scientific acquirements, if, consistently with other arrangements, a condition could be introduced into the Society's re-engagement with him, that he should in the course of each year make certain tours through the farming districts, and acquire personally from the different members throughout the country a more practical knowledge of the means by which he might be able, not only to improve his own acquaintance with the application of science to agriculture, but to advance their own interests, and that of practical agriculture generally, by such more extended survey of the ordinary operations of farming.

CHELMSFORD MEETING.—Mr. Barnett, Vice-Chairman of the Country Meeting Committee, reported their recommendations that a show-yard should at once be constructed of the same size as the one at Carlisle last year; and that Mr. Manning, the Society's contractor of works, should prepare and submit to the Committee the plan and estimate of a pavilion capable of accommodating 1,000 guests at dinner on the Thursday of the Chelmsford Meeting show-week in the middle of July next.

CERTIFICATE ENTRIES.—Members were reminded that all entries of implements for the Chelmsford Meeting (as far as regarded the *space* required and the *number* of implements to be sent) were to be made to the secretary by the 1st May; and all entries of live stock by the 1st June.

MERITORIOUS LABOURERS.—Mr. Fisher Hobbs hoped that some opportunity would be afforded at the Chelmsford Meeting to recognise in accordance with one of the chartered objects of the Society, such services of meritorious agricultural labourers as might be brought under its notice by the several local associations of the county of Essex.

FIELD-DYNAMOMETER.—Colonel Challoner having reported, as Chairman of the Implement Committee, the communication made by Mr. Amos, one of the Consulting Engineers of the Society, of his successful efforts in devising a Dynamometer for ascertaining the tractive force required to work field implements, the Council authorised the Committee to direct the construction of such an instrument for employment at the Chelmsford Meeting; also to give final instructions for the completion of the conditions of the Implement Prize-sheet for that occasion.

COUNTRY MEETING OF 1857.—Notice was given that at the next Monthly Council on the 7th May at noon, memorials and deputations would be received in reference to the Society's Country Meeting to be held in 1857 at some city or town in the district comprised of the counties of Dorset, Hants, Somerset, or Wilts.

PARIS SHOW.—Mr. Brandreth Gibbs, as a member of the Committee appointed by the French Government for carrying out the arrangements in London for the Paris Show next month, expressed his willingness to receive and forward any entries the members of the Society might wish to make for that occasion.

ENGLISH JURORS.—On the motion of Mr. Brandreth

Gibbs, a special committee was appointed to carry out any application the French Government might make to the Council for the recommendation of English Jurors for the ensuing Paris Show.

Mr. Nesbit, Principal of the Agricultural and Chemical College at Kennington, presented a copy of the new edition of his work on Agricultural Chemistry, and the Nature and Properties of Guano.—Signor F. Lotterie, of Bergamo, presented a copy of his work on the Cultivation of the Mulberry Tree, and the Manufacture of Silk and Paper from its Bark.—The Central Society of Agriculture at Brussels, the Royal Agricultural Society of Bavaria, the Horticultural Society of Berlin, and the editor of the *Moniteur des Comices et des Cultivateurs*, at Paris, presented copies of their respective transactions.—Mr. Eddison, of Leeds, presented a copy of the Leeds and Yorkshire Flax Society, with suggestions for prizes to be offered by the Royal Agricultural Society of England in that department.—These several communications were received with the thanks of the Council.

The Council adjourned to Wednesday next, at twelve o'clock, when Professor Simonds would deliver before the members of the Society his lecture on the Skin-Diseases of Domesticated Animals.

A WEEKLY COUNCIL was held on Wednesday, the 9th of April: present, Colonel CHALLONER, Trustee, in the Chair; Sir John V. B. Johnstone, Bart., M.P., Mr. Asplin, jun., Mr. Astbury, Mr. Fuller Baines, Mr. Bosanquet, Mr. Burness, Mr. Corbet, Mr. Edward David, Mr. Devas, Mr. Brandreth Gibbs, Mr. Jonathan Gray, Rev. L. Vernon Harcourt, Mr. Fisher Hobbs, Mr. Lawrence, Mr. Paine, Mr. Pocock, Mr. Thomas Scott, and Mr. Vyner.

SKIN DISEASES OF DOMESTICATED ANIMALS.—Professor Simonds, the Veterinary Inspector of the Society, delivered before the members the first part of his lecture on the injuries arising to domesticated animals from parasitic insects infesting their skin. The Professor commenced his lecture by remarking, that however little apparent interest this subject presented to the scientific physiologist, it was a most important one to the practical farmer and flock-master. All domesticated animals were, to a greater or less extent, affected by peculiar parasitical insects. These might be divided into three great classes:—1. Insects attacking the external parts of the body, on which they pass through the whole period of their existence, as in the cases of acari producing scab, mange, &c. 2. Insects which pass their larval condition only on the skin, as a temporary nidus, from which they escape as flies on assuming their winged condition. 3. Insects most destructive to animal life, lodged in the internal organs and cavities of the body, as grubs, worms, &c. Professor Simonds added, that veterinary science was still very inferior to medical science in its nomenclature, having in many instances very imperfect terms to express the peculiar forms of disease; and it was still the habit to retain different names, in the case of lower animals, to diseases identical in their character; the

mange and scab in the horse and sheep being analogous to the itch or scabies in the human subject. It would lead to greater simplicity and precision if the mange, scab, and similar diseases were classed under the general term of "scabies." The scab among sheep led to great losses among flock-masters, in consequence of the deterioration of the wool and general condition of the animal. Its cause for many years was not known; and the merit of our present satisfactory information on the subject was due to a German physiologist, who clearly proved the wide distribution of acari or mites, in dirt or filth, sugar, cheese, flour, and almost every other form of vegetable matter; there being scarcely a substance not affected with them. He found that the male and female acarus of the horse and of the sheep possessed well-defined characters in the case of each of those animals, the former being the cause of the mange, and the latter of the scab. The study of their natural history would, in Prof. Simonds's opinion, be the best clue to the means of their destruction. These mites were endowed with the capability of travelling from one animal to another; and the scab-disease of sheep was known to extend to a whole flock, leading to fatal chronic disease. Since 1848 Prof. Simonds had instituted numerous experiments for the purpose of ascertaining whether the mites belonging to one class of animals had the power of engendering the same disease on animals of another class; in other words, whether the mite which produced scab on sheep was capable of producing mange on the horse or the dog, and the contrary. He tried these experiments again and again, with every variation of circumstance, but entirely failed to produce such results. It had, however, been alleged that in Germany success had attended similar efforts. The acari, or mites, varied much in shape. Pediculi, or lice, existed in the greatest variety. They could only live, however, in that particular part of the animal's body to which they were adapted. He then referred to the period which elapsed between the deposition of the acari on the skin of sheep and the development of the scab disease, as a question affecting the purchasing of sheep and the liability attached to that transaction. First a slight redness came on the skin, albuminous fluid was exuded, which matted together the adjoining wool. In a few days definite pain was felt by the animal, which violently attempted to scratch itself by rubbing the part against any resisting object. The irritation extended to 10 or 12 inches. The disease advanced with rapid progress. Acari had travelled over other parts of the body. In 16 days, 50 or 60 eggs of the acarus were found at the base of the wool. Large thickened crusts of a white appearance were formed. The health of the animal and its skin became generally affected. Large scales or scabs ensued, which, on being raised, a great number of acari could be detected. Inflammation had ensued on the skin. The itch in the human subject arose from the same cause; the acarus burrowed beneath the scale of the epidermis, or outer skin. This affection was known to be more communicable when the person was warm in bed than under other circumstances, the acari then coming out and ex-

tending their operations. The itch-mite insinuated itself within the skin, while the mites of the horse and the sheep made their attacks upon the skin. He described in detail the peculiarities in the adaptations of these creatures for the accomplishment of their particular purposes; their suctorial discs for extracting the juices of the skin, their hooklets for holding themselves by the wool or hair so as not to be shaken off while continuing their operations, and the trumpet-shaped appendages which enabled them to hold themselves securely by valves to flat surfaces; the relative size of the male and female mites, the female being the larger insect, and adapted for propagation, while the male was smaller, and adapted for sucking the skin; the disease, however, not being extended by males only: their changing their place in quest of new sources of nourishment, and the consequent extension of inflammation in the skin of the animals they infested. He referred to the question of these scab-mites being capable of living a certain period when removed from their natural sphere on the skin of the sheep. He had instituted experiments to ascertain this point; and the result was that he had found the mites alive and vigorous 14 days after they had been removed from the backs of sheep. He exhibited specimens placed for microscopical investigation in castor-oil between a pair of glasses. He remarked that oil of every kind was exceedingly destructive to insect life. This effect was owing to the spiracles on the general surface of the body of insects becoming blocked up by such glutinous fluid. The acari, or mites, formed no exception to this peculiarity of structure; they lived, however, as he had found, no less than ten days in castor-oil, between glasses hermetically sealed up by varnish, and during that period they were seen freely moving their limbs in the oil. He therefore thought it only fair to infer that they would have lived longer under other less fatal circumstances in the wool of the sheep; and that for at least a fortnight there would be great risk to any fresh healthy flock occupying the ground from which infected sheep had been removed. The disease of scab occasioned great loss in the condition of the sheep, and in the quality and amount of the wool. The hairy parts of the animal, however, appeared to suffer less than the decidedly woolly portions—as about the head, and below the knee, and on the hock. The remark of the late Mr. Youatt may be here added: “The old and unhealthy sheep are first attacked, and the long-woolled sheep in preference to the short: a healthy short-woolled sheep will long bid defiance to the contagion, or possibly escape it altogether. The scab may be called into existence by the derangements which our neglect, or unavoidable accident, or disease, may have made in the skin of the sheep.”—Prof. Simonds then proceeded to the consideration of the cure of scab. This, he remarked, was to be effected by the removal of the cause, namely, by the destruction not only of the acari or living mites, but also by the destruction of their eggs, which were ready a few days after being deposited to turn out a fresh swarm of insects to extend the disease. Many of the remedies proposed would destroy

the insects themselves, but not their eggs. In the process of sheep-dipping agents most destructive to insect life were often used, but these frequently failed to eradicate the source of disease, in consequence of the eggs being left uninjured, and ready to hatch. The rubbing-in of unguents had often succeeded; the deleterious matter was absorbed and diffused, and was present to destroy the young mites as soon as they came out of their eggs. The ordinary mercurial ointment had often been recommended. By itself, however, it was too strong for the purpose. The late Mr. Youatt had recommended it to be mixed with three or four times its weight of lard. The following are his directions:—

“A safer and more effectual method than washes—destroying the insect and benefiting the wool—is the application of a mercurial ointment. It had long been in frequent use among the sheep-masters, as a cure for the scab, but had got into some disrepute from its having been made too strong, and applied in too large quantities, thus salivating some of the lambs and the pregnant ewes. The ointment should be made of two strengths. That for bad cases should consist of common mercurial, or trooper's ointment, rubbed down with three times its weight of lard. The other, for ordinary purposes, should contain five parts of lard to one of the mercurial ointment. The operator should begin with the head of the sheep, and rub a little of the ointment well into it. A shred or furrow should then be made from the head to the tail, and in such a manner that the skin is exposed. A little of the ointment should then be applied with the finger to the skin along the whole of the exposed surface. Another furrow should then be drawn on either side; and in this way over the whole sheep, the furrows not being more than four inches apart. When any of the scabs are easily moved they should be taken away; and, last of all, the whole of the ointment that has been thus applied to the furrows must be well and thoroughly rubbed in. The quantity of ointment applied to each sheep may vary from a few drachms to two ounces, one-third of the quantity being used for a lamb. The sheep that has been thus dressed may be considered at least as incapable of infecting any of the others; the itching will soon subside; the acari will either be destroyed by the mercury as soon as they appear on the skin, or it will penetrate to their deepest recesses, and poison them there; or if, at the expiration of 10 days, there should continue to be much uneasiness or itching, another but a lighter dressing may take place. This ointment will have a kindly effect on the roots of the wool, encouraging their growth and that of the natural yolk, and forming a comfortable and most useful defence against the cold of the ensuing winter.”

Professor Simonds remarked that arsenical applications were more potent, but they required great care. The best mode was that of sprinkling a solution of arsenic, again and again, over the diseased parts. The preferable form of such solution was that of arseniate of potash, blended with vegetable infusions, such as those of Foxglove, Stavesacre, Henbane, Dock-roots, &c. He recommended two ounces of common arsenic and two ounces of carbonate of potash to be boiled together in a quart of water until they were dissolved, when a further quantity of water was to be added to make up a gallon of solution. To this gallon of solution, a gallon of vegetable infusion was to be added, made by pouring a gallon of boiling water over four ounces of Foxglove leaves, and allowing the infusion to remain till cold, when it was poured off. These two gallons of liquid constituted a safe agent, and one of the most potent remedies for scab. Half a pint of it, at intervals of a few days, was to be sprinkled (from a bottle, through a quill in the cork) on the skin at the back and sides of

the sheep. Two or three dressings would be found sufficient to cure the most inveterate cases of scab in sheep. Many of the advertised remedies consisted of preparations of mercury or arsenic, with similar vegetable infusions.—Professor Simonds then proceeded to state that parasitical insects travelled to other animals; and although they did not produce the identical disease on them they peculiarly produced on the particular animal to which they naturally belonged, they had nevertheless the power of creating a great amount of local irritation of an annoying character on the skin. He cited as an instance of this kind the effects of insects infesting common domestic poultry on the horse. Poultry, it was known, swarmed with insects of various kinds, especially with lice and mites, and those creatures had a great tendency to travel from the poultry to other animals. Horses often appeared to have the mange, while their disease was no mange at all, but simply the inflammation occasioned by poultry-ticks reaching them from the contiguity of the hen-roost to the stable; often from the roost being over the stable, in which case the dirt and insects from the birds fell through the flooring upon the horses. Inflammations of this kind were easily cured by means of oil impregnated with sulphur.—Prof. Simonds concluded his lecture by referring to the class of parasitical insects which passed only one period of their existence in the skin of animals, namely, the period of their larva or grub state, before they assumed their winged form as flies. He alluded to the “warbles” as a familiar instance of a result in such cases. These were small tumours, about the size of a hazel-nut, on the skin of the farmer’s best-doing stock, and contained each a large maggot, grub, or bot, the larva state of the gad or breeze-fly. Particular species of this fly for each animal deposited their eggs not only on the backs of cattle, but in the nostrils of sheep, and on the hair and skin of horses, where they were hatched; being licked up by the horse and passing into the stomach, and afterwards through the intestine as bots. The cattle gad-fly deposited on the skin of the animal its exceedingly minute egg, which being hatched by the heat passed beneath the scarf-skin, and lay secure, feeding on the unctuous secretions of that integument. It afterwards burrowed into the skin, and insinuated itself below it. A small puncture, like that made by the prick of a pin, might be detected; the fly itself having no power to puncture the skin. In this situation the grub passed through the winter. In March diffused swellings were formed on the backs of the cattle, which gave pain on pressure, the burrowing of the insect having induced inflammation. The grub lay in its nidus, or nest, within the true skin till the approach of summer, when its white colour became dark, and it made its way out of its retreat. On the ground it soon assumed the chrysalis state, escaped from its shell as a gad-fly, laid its eggs, and died: the eggs again produced grubs, and the same transformations succeeded. It was the same with the bots of the horse. When they lost at maturity their power of attaching themselves to the stomach, they slipped their holdings, and passed out of the stomach through the intestines to the ground, where they assumed

their chrysalis state and became flies.—The egg of the sheep gad-fly was deposited about the middle or latter part of summer. The sheep were seen herded together with their heads down, and violently stamping with their feet. The fly at length deposited its egg in their nostrils, and the hatched grub penetrated through the immediate cavities to the frontal sinuses, where a plate of bone prevented its getting to the brain. In the case of horned sheep it would get to the extremity of the horny cavity. In these situations the grubs found a natural secretion from the lining membranes, on which they subsisted. He remarked that various affections of the brain in sheep, such as vertigo, gig, giddy, turnsick, goggles, &c., commonly ascribed to the presence of these gad-fly grubs reaching that organ, had a totally different origin, namely, arising from the formation of little sacs or bladders containing hydatids. He exhibited to the members a skull of the sheep, and explained the mechanical impossibility of such penetration of gad-fly maggots through the nostrils into the cranium.—Prof. Simonds alluded to the dog-flea as being the particular cause of the mange in dogs. This insect, he remarked, was the fruitful source of diseased action and mange on the skin of the dog, where it generated and passed through all its gradations of existence. The Professor, in conclusion of this first portion of his lecture, explained by coloured drawings highly magnified the peculiar structure of the parasitical insects whose annoyances to the domestic stock of farmers he had described; and submitted to the inspection of the members, by means of his powerful microscope, the actual specimens from which those magnified drawings had been executed.

Sir John Johnstone, Bart, M.P., moved a vote of thanks to Prof. Simonds. The facts and reasonings he had brought before the meeting were novel to the generality of farmers and highly interesting. They could not fail to be productive of much utility; and he hoped that some opportunity would be given during the present season for the concluding part of the lecture.—Mr. Mainwaring Paine, in seconding the motion, remarked that the information they had received was very useful.—Colonel Challoner, as chairman, put the motion to the meeting, which was carried unanimously. He had heard many scientific lectures, but never one before in which science was rendered so perfectly intelligible to farmers. He felt how much more he now knew of the cause of the parasitical complaints among animals. As a lover himself of dogs, and having taken great pains with a particular variety of breed of pointers, he had experienced the great advantages to be derived from careful cleanliness of their skin, and the application of a valuable old remedy he had constantly and successfully employed to keep up its healthy action. They were dressed with it regularly every spring, and having occasionally left a single dog out by way of testing the value of the remedy, he had found in that dog the greatest possible difference from the others. He had fully proved the effect: he now knew the reason. These fleas it appears never leave the dog, and can only be kept away in the first instance by a constantly recurring detergent. Such information as the Professor had given

would be highly useful to masters of hounds. He himself offered Prof. Simonds his own personal thanks for his lecture.—On the motion of Mr. Fisher Hobbs the thanks of the meeting were voted to Colonel Challoner for his kindness in presiding on that occasion.

On the motion of Mr. Lawrence it was decided that it be recommended to the next Monthly Council that the concluding part of Prof. Simonds's lecture, "On Parasites Affecting Domesticated Animals," should be delivered before the members at 12 o'clock on Wednesday, the 25th of June next.

The Council then adjourned to their Weekly Meeting on Wednesday the 16th of April.

A WEEKLY COUNCIL was held on Wednesday, the 16th of April: present, Mr. RAYMOND BARKER, V.P., in the Chair, Earl Grey, Baron George de Cotta, Mr. Beale Browne, Mr. Burness, Mr. Cavendish, Mr. Chadwick, Mr. Evelyn Denison, M.P., Mr. Devas, Mr. Foley, M.P., Mr. Gadesden, Mr. Garrett, Rev. L. Vernon Harcourt, Mr. Fisher Hobbs, Mr. Holland, M.P., Mr. Mechi, Mr. Pocock, Mr. Thomas Scott, Mr. Sidney, Professor Simonds, Mr. Slaney, Mr. Spencer Stanhope, Mr. Thompson, and Mr. Wrench.

LIQUID MANURE IRRIGATION.—Mr. Chadwick made the following communication to the Council:

Mr. CHADWICK said: May I ask the favour to be permitted to submit some suggestions to persons who have adopted the principles of liquefied manure cultivation, now, I am glad to state, so far extending as to preclude individual communications, even to those with whom I am personally acquainted, and who have acted upon my recommendations? The suggestions relate to the frequency of the applications of the manures. In recent times the "lasting" manures have enjoyed extensive popularity. A dressing which serves two years, and much better if it serves three, is deemed sound agricultural economy. Thus manuring with solid bones was once preferred; but this practice has been broken in upon by breaking the bones, and still more by pulverizing them; and by the experience of immediate and more heavy crops as against the lighter though more lasting production. With the farm bailiffs of the older habits, who are accustomed to deem only that as manure which is to be moved by the spade or the fork, it is a great upturning of the ideas and of practice to treat, as I have presumed to do, that only as economical and proper manure which is only to be moved by the spoon or by the scoop. But eminent agriculturists have agreed with me, and have now moved many of their farm bailiffs, who had been educated to give one dressing for two years, or one dressing for a season, to give four, eight, and even ten dressings of liquefied and diluted manures. The grumblings at this "everlasting work of dressing" "which would be sure never to answer," have been generally silenced by successive augmentations of crops. But even with yields of 45 bushels of wheat, where 22 and at the utmost 30 had been got before, even with 10 dressings instead of one, with double, treble, and even quadruple crops, I have still to present myself with an aspect of dissatisfaction, and make remonstrances against remaining sins of waste, and talk even of the best of this practice as backward. I have visited the farms of forward and successful agricultural improvers during the last year and the year before, who have put their farms under tolerably complete distributory apparatus, who were still using guano or other artificial manures, whilst they had near the cattle sheds heaps of decomposing dung which ought not to have been there, but in dilution, and incorporated in the soil, and whose liquid manure tanks were stinking with the escape of the products of decomposition—denoting the extent of waste which is preventible by putting the manure in its right place. One eminently successful improver is a guano merchant, and is to be excused for displaying to the farmers a liquefied application

on his farm, of the powerful effect of his commodity. Another farm manager has also excusable prepossessions in favour of special manures, which he has been moved to try. But the "opinion—evidence," and the particular examples to which I advert, justify the objection which I make to the addition of any imported stimuli by the managers, whilst the farm-yard itself presents in the unused dung, and in the products of decomposition evolved from the stagnant contents of the tank, the demonstration of the presence of unused or misused manure. The empirical demonstrations of the absorbent and retentive power of soils which I obtained from trial works on the Manchester canal in 1846 47—such as the marks of a leaky hose visible on the grass in the second year after a single dressing—corroborated and extended by the scientific researches of Professor Way and others, have received subsequent additional and varied practical corroborations on a number of the liquefied manure farms. Sometimes the corroboration has been accidental. Thus on one farm very capacious tanks were filled by the solid deposit, and they were seen to be overflowing, and the unused liquid manure running down a lane. The farm manager was for the removal of the solid deposit by hand labour and cartage, but the owner suggested that the tanks might be more conveniently and cheaply emptied by pumping the contents on some adjacent fallow—to which "it could do no harm;" and although it was in the winter, if the rains were not so very heavy as to wash it all away it might do some good—and this course was taken, and the succeeding rains were very heavy; but, to the surprise of all persons, the summer crops everywhere displayed, "to a splash," the effects of the application of the manure in the preceding winter—affording on a large scale a demonstration that liquefied manures are not held in mechanical suspension, as the Baron Liebig and other patentees of solid manures have assumed and alleged, but are at once received in secure chemical combination. A familiar proof of this combination is the immediate suppression of offensive smells, even from decomposing manures, which is so important for sanitary objects, as well as for agricultural economy, in the prevention of the further waste of manure. Mr. Walker, of Newbold Grange, near Rugby, who receives nearly the whole of the sewerage of that town upon his own estate, has given important demonstrations of the principle for which I have contended. Every day except Monday, throughout the year—and except days of very severe frost—the sewerage manure of that town is applied to some part or other of the adjacent land by steam power, and by hose and jet as distributory apparatus. By the total abolition of cess-pools, and of brick house-drains or brick sewers of deposit, and the substitution of pipe drains and pipe sewers properly adjusted to the flow—and which are, therefore, self-cleansing, as all properly constructed tubular drains are, and require no flushing—all the refuse of the town is discharged at a rate of upwards of two miles an hour, and before it can enter any advanced stage of decomposition. The sewerage from 900 houses has some odour at the outfall, though slight, but has not the odour of decomposition, and does not smell half so bad as the old cess-pool matter of a single cottage—as any one who goes to the spot may convince himself. All the refuse matter of the town discharged into the house-drains by 9 o'clock will, during nearly 300 days in the year, be upon the land, and not merely upon the surface, but in chemical combination with the soil of that portion of the farm to which it may be applied, freed from all odour, "disinfected," and preserved from all waste—usually before 10 o'clock, or within little more than an hour. Usually, not many days afterwards, upon the grass land, the portions last irrigated may be discerned by the gathering of the sheep and cattle, which have selected them, and are feeding upon them. Mr. Walker informs me that, when an accident has occurred to the engine, and the works have been stopped, in about three or four days bubbles of gas are evolved, and decomposition commences—that is to say, waste commences. Now, it is this waste which it is of importance to avoid by the application of the manure as constantly as practicable, before the decomposition can commence. Since the manure tanks must be emptied, no great difference will occur in the total amount and expense of labour, under proper arrangements, whether they are emptied soon or late. Mr. Walker has applied the sewerage of 900 houses to about 500 acres; but he finds that, pumping every day except Sundays, he only gets about three dressings in the year all over the farm from that number of houses. He is, nevertheless, well satisfied with the result, as

he obviously may be, in more than double crops in his cereals as well as his grass. But if he were to renew the work, he would, as I apprehend, now give a more concentrated application—ten dressings or upwards, on a limited area. And the example affords an important demonstration that the complete sewerage of 900 or 1,000 houses, including the external surface-washings of the streets and roofs of houses, may be absorbed, disinfected in nature's own laboratory beneath the roots of plants, and rendered productive, on about 200 acres of ordinary land. The older instances of the application of sewer-water to agricultural production generally—as at Edinburgh, Milan, the Clipstone Meadows, the Duke of Bedford's water-meadows at Tavistock—are irrigations chiefly with the surface washings of the streets, and consist merely of the overflows of decomposed manure from cess-pools, drains, and sewers of deposit, which is the strongest in periods of storm; but in the case of the sewerage of Rugby, from a general water-closet system and self-cleansing pipe-drains and sewers, the manure comes at once, without detention, undecomposed—unwasted, chiefly from the interior of houses, and is the weakest in the periods of extraordinary storms. The manageableness of the sewerage without large reservoirs, or offensive marsh surfaces, like the plain water meadows; the manageableness on limited areas are matters of great importance for towns. The Rugby experience demonstrates that the sewerage of the metropolis may be utilised inoffensively, far less offensively than the manurings of market gardens, on an area of 50,000 or 60,000 acres, or ten miles square, about the extent of the Plumstead marshes, or say a belt of land about a mile and a quarter wide, commencing, at the inner circle, about five miles from the centre of the metropolis. On such practical examples what I wish to urge in respect to farm-yard manures is that the liquid manure pump should be kept constantly going for the immediate deposit of the manure on some part of the farm or another; inasmuch as it will be better preserved on fallows than in the tank. In the tank, after decomposition commences, it not only wastes but becomes a source of danger to the cattle in the shed; inasmuch as from the manner in which the tanks have been commonly constructed, they are too frequently retorts for the generation of noxious gases, and the drain from the shed serves as the neck of the retort, to convey the gases into the shed, where they are sure to operate to a greater or less extent injuriously. In Flanders and Holland, where the sheds are kept remarkably clean, the escape of the concentrated gases from the long-kept liquid manure of their tanks has in certain conditions of the atmosphere been productive of great mortality amongst the cattle. The long-kept liquefied manures convert the tank into as dangerous a common cesspool or fosse as such as those which pollute the air and the interior of the houses of Paris. In the new cultivation, six, eight, or ten dressings with liquefied farm-yard manures have been deemed a maximum application. Yet to such an application a dressing of guano has been super-added, as I complain, whilst liquefied farm-yard manure was in the tanks and might have been made further available. I rely upon the evidence of market gardeners as to an experience of many years displaying the fertilizing power of farm-yard manures upon the same crops year after year; and the market gardeners to whom I have shown the results obtained on the new liquefied manure farms, exceeding, as they have already done, all other agricultural production, deem those results as nowise extraordinary; nor will they be found to be so, in relation to the green crops grown by market gardeners; and I rely upon the evidence of horticulturists of practical experience, and much superior production in quality as well as quantity, in asserting the expediency of far more frequent applications of liquefied manure than has yet been dreamed of by most of the managers of liquefied manure farms. Horticultural experience justifies me in saying that not ten, but more than twenty dressings in the course of the season, properly applied, will be attended with remunerative results. The applications of liquefied manure to the cereals may be intermitted or moderated during the period of growth, to avoid carrying the vegetation too far into stalk and leaf. But horticultural experience shows that when the leaves are withered and the plant is out of bloom and the corn is set, it should then be well fed to make the corn plump and heavy. If the soils are light and the weather dry, the food may be conveyed in the liquid twice a week. It may be conveyed to the roots of the standing crop by a hose with lateral apertures, as explained at p. 165 of the Minutes of in-

formation on the application of the refuse of houses and towns to agricultural production. What I wish then to impress is that it is more economical to have the manure on the land than in the tank; that all delay of the application until decomposition has commenced is wasteful and dangerous; that until the whole of the farm-yard manure is thus used up, any artificial manures are superfluous, and that they do not yet know how far their own farm-yard manure, the urine diluted and the dung liquefied will go. The information I have received warrants me in saying that the best of the liquefied manure farms may by this course far exceed their present crops. It has been stated as a deviation from the principle that on some liquid manure farms guano or solid manure are still applied as a dressing; but almost invariably this manure is "washed in" by the application of plain water, that is to say it is liquefied on the ground, instead of in the tank; and this is only another and commonly a clumsy mode of applying the principle.

In answer to the inquiries of Mr. Slaney and other members as to the expenses of the process, Mr. Chadwick stated that Mr. Walker had informed him that he estimated the establishment charges and working expenses of the new works, steam-engines, pipes, and labour of distribution, at £1 per acre per annum; but that was for pipes over double the area that would in future be used; and Mr. Chadwick said that according to the best of his information, 14s. per acre might be set down as the establishment charges and working expenses, including 10 dresses during the season. The expense of each additional dressing of 20 tons of liquefied manure (or watering with simple water) by steam power, was stated at about 1s. under ordinary circumstances. Where gravitation was obtainable for pipe distribution, the cost might be set down at from 7s. to 10s. per acre under ordinary circumstances. However, new farms had been lately laid down, and got into work on the principle, on heavy as well as light lands, by steam as well as by gravitation, which would afford further data.

Mr. Slaney thought that Mr. Chadwick would confer a favour on the agricultural community if he would prepare from the various returns in his possession, or to be obtained by him, a succinct tabular statement of facts in reference to the application of liquid manure, so that economic farmers who wished to employ it might at once be enabled to deduce, in pounds, shillings, and pence, the advantages they were likely to derive from its adoption: adding to such statement practical information of every kind required to guide them in procuring the requisite engines, horse-powers, hose, jets, and other apparatus necessary for carrying out the operations. He also referred to the advantages to be taken of declivities in the distribution of liquid manure; and to the location of homesteads on such elevations that the sanitary conditions of the family, as well as the agricultural advantages to the farm, might equally be adjusted.—Mr. Gadesden remarked that Mr. Mechi had furnished all the details Mr. Slaney thought desirable, at least as far as his own operations were concerned. He had inspected Mr. Walker's arrangements, which he understood could now, from the experience he had gained, be made much more economically than they had originally been: His crops were looking most luxuriant.—Mr. Raymond Barker alluded to the impediment that would arise to the continuous laying on of liquid manure from the frost in winter.—Mr. Scott considered it ruinous to irrigate meadows during the continuance of frost. Arable land ploughed up in time of snow gave no crop the following year.—Mr. Sidney considered the natural system of gravitation in liquid manure to be infinitely superior to artificial distribution. The most successful instances of irrigation were to be found in Italy, where the essen-

tial requirement occurred of a constant stream of water rapidly passing over the land. Mr. Robert Smith, at Exmoor, had a stream from the top of the hills, which, passing through his farm, when in time of heavy rain men were employed to stir up the manure, was capable of irrigating 80 acres in the course of half an hour. Steam-power, Mr. Sidney thought, should only be employed in the absence of natural privileges. He felt compelled, from his own experience, to enter a strong protest against Mr. Chadwick's system, which, although aided by every advantage of publicity since 1842, had not, in Mr. Sidney's opinion, made much way. Mr. Sidney maintained that liquid manure was only available for green crops, and that it was only to such that it was applied in Italy. The farmers of this country had shown so great a willingness to adopt every rational mode of improvement proposed to them, that he was quite sure they would also have adopted Mr. Chadwick's plan had it been their interest to do so. They had evinced on all occasions a readiness to pay a reasonable interest on the permanent improvements made by their landlords. Mr. Scott remarked that in Cheshire the tenants paid 10 per cent. interest on the bones applied by their landlords to their land.—Mr. Chadwick appealed to the facts he had adduced, showing the advantages farmers had derived from the employment of liquid manure. Yields of one quarter more had been obtained by its means at less expense than by any other. Mr. Mechi grew 46 bushels on Tiptree Heath, others 60, and others again 80.—Mr. Scott was acquainted with Mr. Telfer, who had told him that his own operations constituted an experiment which he had not yet asserted was remunerative, or was ever likely to pay an ordinary farmer. The climate of Italy and the natural advantages of Edinburgh were not fair examples to cite. Sir William Cubitt had reported that we had not yet made the slightest approach to the solution of the great problem of town-sewerage.—Mr. Chadwick remarked that Mr. Telfer had stated that 25 acres of his farm would maintain a steam-engine.—Mr. Sidney had not found a single instance in which liquid-manuring was advantageous to corn-crops. In Italy it was never applied to corn-crops, but only to common grass-crops, and to Italian rye-grass, at the right time, immediately after cutting, to furnish supplies of green food for their dairies. Chemistry had shown the valuable matters contained in concentrated manures, in guano and other substances yielding ammonia. In Cheshire, cess-pool matter, even before its dilution, fetched only one-half the price of horse-dung.—Mr. Chadwick cited the authority of Count Gasparin as to the value of liquid manure; and referred to the growth of cereals in Peru by means of irrigation.

Mr. Slaney, in moving a vote of thanks to Mr. Chadwick, remarked, as the result of his experience in public life, that good humour, dogged perseverance, and calmness in the discussion of every great question, would invariably and eventually succeed when its advocate was in the right, and would assuredly fail, as it ought to do, when he was in the wrong. Guano undoubtedly was a compact and manageable manure. He quite agreed in the opinion expressed that tenant farmers

ought not to be called upon to lay down expensive apparatus for the cultivation of the land.—Mr. Scott seconded the motion, remarking that Mr. Chadwick, however led away perhaps on some points by an excusable enthusiasm in the pursuit of his object, possessed the best stored mind statistically of any man living in reference to the application of liquid manure.

**FRENCH PINES.**—Mr. Baskerville Glegg, having found that the Pine seeds he presented to the Council on a former occasion had grown exceedingly well on his estate in Cheshire, favoured the Council with the following statement respecting the foreign cultivation of that tree:—

“The *Pinus maritima* has long been extensively cultivated on the waste lands in France, and is particularly calculated for sowing on the sand hills on the sea coast, as it is one of the few of the tribe unaffected by the sea breezes. The mode of culture consists in breaking up the surface and sowing about 20 lbs. of seed to the statute acre. It vegetates quickly and well, and the plants come up very thick, and are thus drawn up very straight. When about the thickness of walking-sticks they begin to thin them out. The first use made of them is to support the Vines, there used as fences for the railways, and put to different purposes till they reach fourteen years' growth; by this time they stand at regular distances, and are called upon to pay their yearly rent. This is done by a strip of the bark being taken off about the width of the hand and 7 feet high. In the summer the turpentine exudes from the wound, and is scraped off as it forms; the following year another strip of the bark is removed, and so on every year till they come round to the part from which the bark was first removed; by this time the sore is healed, and they begin to tap it again. It is considered that each tree pays about 5 sous, or 2½d. a year; and this land, which twenty years ago might have been purchased at 10d. an acre, is now worth £4. The French Government sow extensive tracts of these wastes every year, and it is considered that the timber is benefited rather than injured by the process, and found to be harder than those trees that have not been tapped.”

**EARTH-BARROWS.**—Mr. Slaney furnished the following statement of the advantages of sliding barrows for the removal of loose earth from one place to another:

“This contrivance is a simple machine for moving earth or soil short distances, and chiefly on a slight decline. The importance of lessening the cost of moving earth will be understood by all conversant with rural improvements. In the case of enlarging fields, levelling banks and mounds of earth, lowering headlands, filling up pits and holes, and making farm roads, any facility in moving earth is of consequence. The usual method is by carts or wheelbarrows. In either case the soil has to be loaded by spade and hand, lifted in one case—often from 4 to 6 feet, and always 2 to 3 feet—from the ground; requiring much labour in time. The mollebart, or Flemish barrow, is something like a common barrow without a wheel or legs, with a sharp iron edge in the front, and is so contrived as to slide easily under any loose earth, and thus load itself without using a spade. A short tackle fastened to it on each side is attached to one horse—on a word the horse draws on the little machine, the handles are elevated a little, and its edge slides under the earth, and it is loaded. The handles then being pressed upon, the edge is elevated above the ground, and on a word the horse advances, dragging the load in any direction; and on reaching its destination, the handles being loosed, the load turns over. The empty machine is afterwards drawn back for another load, and the process is repeated. The soil ought to be first loosened by a fork or a plough, and when so loosened can thus be easily moved a short distance. Mr. Hammond has been good enough to send me a model of a little machine for a similar purpose. It is somewhat like a barrow without legs, with the bottom taken out, pressed down on loose earth, and then dragging it along the ground to its destination. I bring these implements

forward, hoping they may elicit observation and improvement. Mr. R. Stephenson, C.E., with whom I have had the pleasure of acting on the late Commission on Health of Towns, &c., and whose name is known throughout Europe as one of our ablest civil engineers, tells me that hitherto almost all earth work is carried on in the old way, moving the soil in harrows or carts, and loading it by spade or forks. It is evident that any simple improvement which would lessen the cost of these operations would, in this country, be valued. I therefore have ventured to bring this matter before the Society, trusting others may improve on the hints already given."

The late Rev. William Rham, in his Paper on the agriculture of the Netherlands, published in the second volume of the Society's Journal (page 61), gave a drawing and description of the implement referred to by Mr. Slaney.

DEEP-DRAINING.—An interesting discussion took place, which we regret that our limits will not allow us to give, on the question of the depth and frequency of drains on different soils. Mr. Beale Brown hoped a lecture would be given before the Society on this subject.

He had found four feet the most useful depth. The minimum of depth in any case was considered by the meeting to be from 3½ to 4 feet, and the maximum 5; while very deep drains (as of 10 feet) had been found injurious. Mr. Scott, during his extensive experience, had never known Mr. Parkes's principles fail if only properly applied; he had found 4 feet the standard depth, with the drains not nearer than 24 feet on the closest soil. Mr. Slaney had used 4 feet deep and 36 feet apart, with great advantage.

MISCELLANEOUS COMMUNICATIONS.—Count Sparre and Messrs. Burgess and Key transmitted the result of trials (privately made) of their respective churns. Miss Banister, of Steyning, communicated her plan of a home-stead, having special reference to the feeding of cattle.

The Council adjourned to the 23rd of April, at 12 o'clock, when Prof. Way would deliver a lecture "On the Progress of Chemical Science, both at Home and Abroad, in reference to Agriculture."

## "THE SKIN DISEASES OF OUR DOMESTICATED ANIMALS."

Few topics have engaged the attention of the successful breeder of our improved domesticated animals more than skin diseases produced by insects, in consequence of the manner in which both the breeding and feeding qualities of stock are affected by them. This arises from the little progress scientific inquiry has experimentally made in the physiology of these tiny parasites by means of the microscope, and the consequent paucity of reliable scientific works on the subject. Hitherto, half the conclusions of our veterinary surgeons relative to their natural history has been drawn from the traditionary philosophy of our forefathers, and not from actual examination either with the eye of the modern physiologist or morbid anatomist; while our entomologists have had too much to do, to overtake the other branches of zoological science, to fill their cabinets with specimens of the class in question—a class far more varied than the animal kingdom itself; every different race of animals being not only infested with a different brood of insects (mites), but almost every organic substance, animal and vegetable.

A very superficial acquaintance with these facts must convince our readers of the importance of the lecture on this subject delivered by Professor Simonds before the Council of the Royal Agricultural Society of England, on the 9th inst., accompanied with drawings exhibited on the wall, and specimens under his microscope. The former, drawn to a greatly magnified scale, illustrated in a very conspicuous manner the different stages of vitality, from the *ovum* to the insect in all the vigour of matured life. But to us, and several other members who examined them, the latter appeared the most interesting; as nothing can exceed the fidelity with which the microscope exemplifies nature, though all but invisible to the naked eye, confirming in the most satisfactory manner the soundness of the conclusions at which the Professor

arrived, differing as they did in many respects from those hitherto drawn both by veterinary surgeons and entomologists.

Referring to the report of Mr. Simonds' first lecture, in another column, the task which devolves on us is to apply it to the daily practice of the farmer, so as to profit by its deductions. These were principally confined, it will be seen, to *scabies* and *æstrus* in sheep and other animals, with a few observations on the dog-flea (*pulex canis*).

Scabies is a pestiferous disease, whether it affects the horse, the ox, the sheep, swine, dog, or poultry, inflicting a loss not easily estimated; hence the maxim of every intelligent farmer is to avoid it. With him "prevention is better than cure," and therefore his grand desideratum is to guard against contagion. Sheep are, perhaps, more subject to it than any of the other animals, arising as much from the nature of their skins and coats as from the fecundity of the *acarus ovis*, and the greater vicissitudes of the weather to which they (sheep) are exposed. Certain parts of the body are more liable to be affected than others; and so is an unhealthy skin than a healthy one. Indeed, it has been said that an unhealthy state of the skin will itself produce *scabies* (?); but this conclusion does not appear to be well founded, for a disease dependent upon the presence of living parasites can never arise spontaneously, but must be effected by contagion, either by means of their eggs, or the insect in some other stage of its existence.

Now, from what has just been said it will appear obvious that cleanliness, a healthy skin and state of the body, and a separation from foul animals and ground, are the means necessary to avoid contagion. The truth of these will, perhaps, be better understood if we first review the important distinctions which Mr. Simonds makes between the habits of the *acarus scabiei* of the

human body, and the *acari* of our domesticated animals; the former burrowing in the skin; but the latter living on its surface, clinging to the skin, hair, or wool with their trumpet-shaped vesicular-cushioned feet, to prevent their being thrown off by the animal when shaking, rubbing, or nibbling itself. Hitherto distinctions of this kind have been overlooked, writers generally concluding that the *acari* of quadrupeds burrowed in the skin like those of man, thus proving the little use which had been made of the microscope in examining the former, as it shows them to be incapable of living in the skin, from the configuration of their bodies. Indeed, to have made similar *acari* for naked skins as for those covered with hair, wool, or feathers, would have been an oversight on the part of Nature; while the fact that *acarus scabiei* will not live on the horse, nor *acarus equi* on man, or *acarus ovis* on the ox, or *acarus bovis* on the sheep, and so on, proves that greater differences exist than the mere configuration of the animal structure; all pointing to the above means as necessary in every case to avoid so great a pest—one which appears to form an integral part of that curse inflicted on the whole creation by the fall of man.

The importance of cleanliness, and its concomitant health, to prevent contagion, may be further illustrated thus. We have just seen above that an *acarus*, although a loathsome pest, is yet very nice in its taste, and particular about a *nidus* in which to deposit and hatch its eggs. It enjoys the highest degree of prosperity on the unhealthy skin, multiplying there fastest; so that if it creeps from it to the opposite—the sleek healthy one of the horse or ox, or dry wool of the sheep, it feels itself from home, and before it even reaches the skin may be brushed or shaken off. If, however, it creeps upon the unhealthy animal with its “staring coat,” it soon reaches the skin, and commences its direful work, everything there being congenial to its happiness; hence, the incredible speed at which it propagates its species, until it either consumes its victim alive, or is arrested at its fatal work by the timely unguent of the veterinary surgeon.

Again, when a dirty animal shakes itself, as it invariably does after rubbing itself against anything, less or more scurf, dandruff, and dust is thrown into the atmosphere, and carried to a distance by high winds. Now, under such circumstances, when affected with scabies, it is manifest that the smallest of these puny insects, as well as their eggs, will be blown from one pasture to another—that the latter will lodge in the dirty staring coat of the unhealthy animal, when they will be blown off that of the clean sleek one, or be brushed off before they reach the skin, or any *nidus* capable of hatching them. In this manner we can trace contagion from one animal to another, and thus account, in harmony with entomological science, for what has hitherto been termed spontaneous cases of scabies in some of our domesticated animals, while others have escaped the

disease, though all herding together in one field. We can also account for the fact why the disease is more liable to break out among sheep than horses and cattle, without coming in contact with strange flocks; because the coats of the latter are more likely to be impregnated with eggs than those of the former, while they afford a better *nidus* for hatching them.

With regard to health, it has even been said that the blood of scabbed animals is diseased—nay, that the blood of all animals is loaded, less or more, with the eggs of *acari*, and that they are hatched under certain cutaneous affections; thus accounting for spontaneous cases differently from the atmospheric distribution of eggs. Hence the reason why sulphur and mercury are taken internally, as well as externally, to get rid of the disease. But this sanguiferous doctrine of distribution is more difficult to reconcile with entomological science than the atmospheric one.

Contagion, again, by direct contact of clean animals with diseased, or where the former enter foul ground, will be difficult to avoid, so long as the commerce of live farm-stock is conducted as at present; for diseased animals will be sent to market, although contrary to the spirit of the law; thus, not only communicating the disease to all they come in contact with but also infecting the market-place. According to the experiments made by Mr. Simonds, *acari* left upon a post, hurdle, or hedge by a scabbed beast will survive for fourteen days, and at the end of that time lay hold of any animal coming in contact with it, and thus communicate the disease; consequently our weekly and fortnightly markets are little better, during the warm months of summer, than nests for propagating these malignant parasites. It would be well, then, if a very stringent statute were enacted by Parliament, confiscating all diseased animals offered for sale, and that microscopical examinations were enforced in all suspicious cases, so as to guarantee its healthy operation.

It will thus be seen that the means for preventing contagion may be summed up in two words—*improved management*. At a very early period in our own history, *Acarus scabiei* was much more common among our forefathers than among their posterity of the present day. The change which has taken place is obviously attributable to progress in dietetics, clothing, and medicine; and among our domesticated animals it is no more than reasonable to conclude that similar causes will produce similar effects. In point of fact, improved management has already greatly reduced the prevalence of scabies among both our herds and flocks, thus holding out every encouragement to persevere in obtaining further progress. There is perhaps no branch of husbandry where greater advances can be made than in cattle-cookery—household accommodation, including grooming, &c.—and medicine; and when we contemplate how much cutaneous diseases are dependent upon management in each of those three respects, it were difficult to estimate what influence further improvements in them may have on the disease in question.

Having said so much on Scabies, we must postpone our remarks on bots and fleas “to a more convenient season.”

## SALE OF THE FAWSLEY HERD.

The chequered history of the various interests of mankind is generally intersected by startling events, jutting out in bold and prominent relief from the general evenness of daily occurrences. Such events become by-words in the memory of men; they are referred to, as landmarks in the researches of the past, and serve as terms of comparison, whereby a judgment is formed, and the progress or decline of the peculiar interest to which they belong is duly determined. Not only do such events constitute in themselves an unerring criterion by which the inquirer or the interested is fully able to appreciate the exact amount of estimation that interest commands in the minds of the community; but, moreover, it never fails to give a fresh stimulant to individual enterprise, and by the signal success it records, holds out to all a well-grounded expectation of a similar happy result.

What is a truism for all kinds of interests is especially so in the extraordinary and prosperous history of the breeding of short-horns. The Ketton, Barmpton, Wiseton, Kirkleavington, Tortworth, and Hendon sales have become as household words among breeders of all climes. The animals sold on these remarkable occasions have acquired thereby a fame which is not only peculiar to themselves, but which is invariably transmitted to their posterity. For we find that the animals directly descended from those herds not merely inherit the quality, symmetry, and peculiar merits by which their ancestors commanded the attention of breeders, but have also acquired a still more intrinsic value, which was duly appreciated by all not interested or envious parties.

The history of the short-horn breed of cattle has just been illustrated by another triumph. Its records, already so rich in glorious reminiscences, have just been emblazoned by another honourable distinction worthy of the past. It is, therefore, with the most unfeigned gratification that we announce to the agricultural world that the breed which the Collings, Bates, Lord Spencer, Lord Ducie, Mr. Tanqueray, the Booths, Mr. Maynard, Mr. Towneley, Mr. Fawkes, and so many others have laboured so judiciously and so perseveringly to establish and preserve in its excellence and purity, has not degenerated in the skilful hands of their contemporary to all, and the survivor of many—that distinguished individual who has been so happily styled a genuine specimen of the fine old English gentleman, Sir Charles Knightley.

Before we proceed with our report of the Faws-

ley sale, let us be permitted to pay a sincere tribute of respect, not mingled with regret, to that venerable gentleman, who, after nearly half a century of unremitting care in establishing his herd, feeling at last the pressure of old age craving for repose, reluctantly resigns the field of his labours to younger it may be, but certainly not to abler hands; and bestows upon the agricultural interest of various nations, among whom his herd has just been distributed, the benefit of his eminent ability, and the fruit of his life's experience and judicious exertions. Whatever may be our regrets at his withdrawal from that field in which he has been so eminently successful, let us at least congratulate him on the results of the Fawsley sale. The uniformly good prices readily bid for almost every animal in his herd are surely a striking proof of the high value at which they stood in the judgment of the numerous and influential gathering of agriculturists who on that day thronged his farm, and may be held as no mean compliment to the eminent breeder, who, without any illegitimate means of gaining notoriety, but with a modesty and unassuming earnestness springing from an innate and well-founded consciousness of skill and power, has formed a herd unsurpassed for the generality of its merits and the prolific character of its stock.

Let us here congratulate Mr. Strafford, who so ably presided at the sale. He has again associated his name with another event, the memory of which will never pass away wherever the name of short-horns shall be uttered. Few men have so completely identified themselves with the progress and extension of that admirable breed; few men are so thoroughly and so intimately acquainted with the history of its various tribes; and few men have done so much for their diffusion all over the world, and their due appreciation by the agricultural community of this country.

The history of the Fawsley herd is told in a few words. Sir Charles, from the moment he resolved to breed shorthorns, applied at once to the fountain head; he selected his first cows from the herd of breeders well known for the purity of their blood; and by the exercise of an exquisite judgment in the selection of his bulls, has succeeded in combining substance with quality, power and constitution with the graceful delineations of irreproachable symmetry.

By glancing over the catalogue of the sale, one is forcibly struck with the frequent repetition of the

same pedigrees; for we find that out of the family of that noble cow Walnut, bred by Sir Charles out of Pauline, which he bought so far back as the year 1821, there were no less than 33 animals in the sale, 32 of which (one not having been offered, on account of being laid with milk fever) have produced no less than £2,136; that is, an average of £67 for each animal, many of which were young bull-calves. The 21 cows and heifer-calves realized £1,518, that is, about an average of £72 5s. 6d.; the eleven bull-calves fetched £618, which gives an average of about £56 4s. In 1822, Sir Charles bought another remarkable cow, Valuable by Defender (194), of Major Bower (we believe a friend of the Booths). Out of this prolific animal we find 22 cows and bulls in the catalogue, which have realized about £1,857; which gives an average of about £84 10s. The 15 cows and heifers from that family fetched £1,274, and their average about £85. The 6 bull-calves produced about £583, which gives them an average of about £97. Thus, out of two cows, Sir Charles has managed, after a lapse of 35 years, irrespective of previous public and private sales, to array in his catalogue the names of 55 animals, which have realized nearly £4,000.

Every one at all acquainted with the science of breeding will readily understand the importance of this fact, which at once establishes the character of a herd, not only as a proof of the prolific qualities of the animals and the regularity of their breeding, but as a stamp of that originality and distinctness of blood, by which the famous herds of the great breeders were so eminently characterized. And this is not a slight merit. Any man can stock his farm with well-selected animals, and thus form a herd; but a glance over their pedigrees will immediately make manifest the heterogeneous character of their origin, and however successful the combination of the blood thus brought together may eventually be, yet the result can but be uncertain, and much valuable time may be thrown away in abortive experiments. When, on the contrary, a breeder can refer back to a great many generations of one family, and can extend his close observation over many individuals of that family, he at once ascertains their hereditary defects and qualities, and thus acquires an unerring guide in the selection of his bulls, whereby he may correct the one and perpetuate the other. Such is the basis upon which every breeder ought to rest his enterprise. It is by no means an easy task: many will not do it. Time alone, exquisite judgment, patient and unremitting attention, the most scrupulous jealousy in the infusion of new blood, to improve existing qualities, and create those that are wanting; such are the essential requisites for the formation of a herd—such is the difficult task of the breeder; and such has been the successful performance of a few men, among whom the venerable proprietor of the Fawsley herd holds so prominent a rank.

This is the seventh great sale of short-horns that has taken place since the creation of the breed, and the result, which we give below, shows that it is

not the least in importance and character. No similar event in our recollection has excited more attention among agriculturists, or gathered a more influential or more numerous assembly. For days before the sale, a great number of noblemen and gentlemen had come to inspect the herd, and many were represented by their agents at the sale. From the elevated sphere of royalty and peerage, down to the humblest tenant farmer—from John o' Groat to the Land's-end—from Norfolk to the West of Ireland—from France, America, nay even from the Australian antipodes—a vast assemblage of eager purchasers had gathered round the Westcomb Farm Ring, notwithstanding the unpropitious weather that unfortunately prevailed.

Among the company (which could safely be computed at between two and three thousand) we noticed Mr. Wilson, the Prince Albert's agent; Lord Hill, Lord Southampton, Lord Denbigh, Sir Thos. Munro, Sir J. H. Crewe, Sir W. Lawson; the agents of the Marquis of Exeter, the Earl of Zetland, Lord Spencer, Lord Burlington, the Marquis of Tweeddale, Lord W. Paulett, Colonel Pennant, Hon. G. W. Hayter, &c., &c. There were also present J. Banks Stanhope, Esq., M.P.; E. Holland, Esq., M.P., Col. Vyse, M.P.; Messrs. Jonas Webb, Torr, Sanday, Cartwright, R. W. Saunders, Beasley, Barnett, Fowler, Kirkham, Ladds, Barthropp, Eolden, Combe, Marjoribanks, Christy, Crawley, Shepherd, Dudding, Dixon, Gamble, Lowndes, Garne, Parkinson, Robinson, Timm, Tanqueray, Trotter, Topham, Wiley, Yorke, &c.: in fact, nearly all the well-known and eminent breeders in the kingdom. Luncheon was spread in a large and commodious booth, and from an early hour was thronged by eager occupants, who seemed to have done ample justice to the bountiful and hospitable spread supplied by the munificent proprietor. No less than 120 gallons of strong ale, 312 bottles of wine, 10 huge rounds of beef, 10 pieces of roast beef, 12 hams, 6 tongues, 60 chickens, 4 chins of pork, 4 pig-cheeks, 6 large joints of veal, a cart-load of bread, &c., &c., were consumed on the occasion. Urgent, indeed, must have been the craving of agricultural appetites, so complete was the utter consumption of that Pantagruelic repast. The unfortunate writer of this report, cruelly feeling at one time the pinching of hunger, stole away to the booth, with a pleasing anticipation of ham and cold chicken; but, lo! such a complete annihilation of earthly things—such a picture of emptiness and nothingness never met his glance before; in fact, nothing of that character was left but the plates, the knives and forks, and, as far as he could judge, the tables and benches also. The south side of Sebastopol alone could offer such a prospect of desolation.

There were 78 animals in the catalogue, of which 77 were sold. The total amount realized was £6,163 10s. There were altogether 49 cows and heifers, 48 of which were sold, and which realized £3,979 10s.; the 29 bulls produced £2,184. Thus we have the following averages:—

Females . . . . .	£82	18	1½
Males . . . . .	75	6	2½
The whole herd ..	80	1	0

Among the bulls will be found the famous Duke of Cambridge, which Sir Charles bought at the Hendon sale for 280 guineas, and which has just been bought by Mr. Cator for 330 gs. Another bull brought a high price, amply justified by its extraordinary merit; we allude to Bosquet, No. 7, which realized 200 guineas.

We were highly gratified to see among the purchasers Mr. J. S. Tanqueray, of Hendon celebrity. It was with great regret we chronicled his discontinuing such spirited breeding. From the fact of his having bought such a complete animal as Oldbuck, No. 16, we are led to indulge the pleasing anticipation of seeing him again enter the ranks of short-horn breeders, among whom he held so distinguished a position.

Lot.	Names.	When Calved.	Price.	Names of Purchasers.
			Gs.	
1	Flourish .....	Dec. 13, 1841	32	Mr. Jonas Webb
2	Butterwort ....	Jan. 26, 1847	41	Mr. Timm
3	Anemone.....	Dec. 22, 1847	74	Mr. Bult
4	Meadowsweet ..	April 4, 1848	71	Mr. Blythwaite
5	London Pride ..	Nov. 25, 1848	54	Mr. Banks Stanhope
6	Amaranth .....	March 11, 1849	120	Mr. Thorne (America)
7	Garland .....	June 3, 1849	91	Messrs. Sanday and Torr
8	Kissinda .....	Nov. 11, 1849	46	Mr. Wythes
9	Sweetwater ....	Jan. 19, 1850	50	Mr. Timm
10	Floda .....	Jan. 25, 1850	155	Mr. R. W. Saunders
11	Maiden's Blush.	May 17, 1850	..	Not offered for sale
12	Cyrilla .....	Aug. 31, 1850	125	Sir W. Lawson
13	Mimosa .....	Dec. 17, 1850	50	Mr. Whitehead
14	Kishmee .....	May 31, 1851	95	Sir J. H. Crewe
15	Cold Cream....	Sept. 7, 1851	100	His Royal Highness Prince Albert
16	Aloyse .....	Oct. 21, 1851	96	Lord Burlington
17	Drapery .....	March 6, 1852	100	Mr. Stirling
18	Henna .....	April 3, 1852	35	Mr. Stone
19	Eugenie .....	June 29, 1852	82	Mr. Banks Stanhope
20	Blonzelind....	Sept. 2, 1852	80	Mr. Thorne (America)
21	Catchit .....	Sept. 20, 1852	105	Sir W. Lawson
22	Wheedle .....	Oct. 4, 1852	61	Mr. Sanders
23	Chrysalis .....	March 8, 1853	155	Messrs. Torr and Sanday
24	Chemisette ...	May 17, 1853	105	Mr. Stirling
25	Albreda .....	June 4, 1853	93	Col. Peunant
26	Alix .....	June 4, 1853	100	His Royal Highness Prince Albert
27	Cambine.....	June 15, 1853	80	Marquis of Exeter
28	Claribel.....	Sept. 8, 1853	110	Mr. Grenfell
29	Erminstade ...	Sept. 11, 1853	54	Mr. Jonas Webb
30	Blanchefleur ...	Jan. 28, 1854	77	Sir W. Lawson
31	Elgitha .....	Feb. 3, 1854	100	Mr. Thorne (America)
32	Froullet .....	April 17, 1854	40	Mr. Sanders
33	Gundreda ....	April 26, 1854	53	Mr. Eaton
34	Hamedryad ...	May 23, 1854	100	Lord Spencer
35	Lady's Slipper..	June 14, 1854	155	Mr. R. W. Saunders
36	Mrs. Flather ..	June 19, 1854	150	Mr. Thorne (America)
37	Olga.....	July 29, 1854	42	Mr. Stacey
38	Flutter.....	Aug. 8, 1854	36	Mr. De la Trehonnais
39	Turfrida .....	Sept. 20, 1854	76	Mr. C. P. Leslie
40	Blondelle.....	March 25, 1855	105	Sir Thomas Munro
41	Wrinkle .....	April 15, 1855	67	Mr. Holmes
42	Fretwork .....	April 28, 1855	50	Mr. Simkins
43	Isolda .....	May 31, 1855	62	Mr. Stirling
44	Florimell .....	May 31, 1855	61	Mr. Stacey
45	Tawdry .....	June 25, 1855	50	Mr. Holmes
46	Coquelicot ....	July 6, 1855	90	Mr. Langstone
47	Cithara .....	July 13, 1855	38	Mr. Packe
48	Erigone .....	Aug. 31, 1855	37	Lord Spencer
49	Doralisa .....	March 16, 1856	41	Mr. Stewart Marjoribanks

BULLS.

1	Earl of Dublin..	August, 1848	75	Sir J. H. Crewe
2	D. of Cambridge	Dec. 15, 1852	330	Mr. Cator
3	Wolfsbane ....	May 13, 1854	125	Mr. Beasley
4	Craigsman ....	June 6, 1854	60	Lord Wm. Paulett
5	Blandamour ..	June 14, 1854	95	Messrs. Marshall and Smoot (America)
6	Purple Top ....	July 28, 1854	80	Mr. Holmes
7	Bosquet .....	July 29, 1854	200	Mr. Shephard
8	Alba.....	Aug. 6, 1854	27	Mr. Adkina
9	Effinell.....	Aug. 13, 1854	43	Mr. Dixon
10	Humphrey ....	Dec. 5, 1854	90	Mr. Thompson
11	Blattergowl....	Jan. 11, 1855	43	Mr. Dodwell
12	Dagobert.....	March 8, 1855	30	Mr. Jackson
13	Florentin.....	April 17, 1855	82	Mr. Abbot
14	Belbec.....	May 4, 1855	30	Mr. Selby
15	Gardante.....	May 18, 1855	85	Mr. Kirkham
16	Oldbuck .....	May 23, 1855	115	Mr. Tanqueray
17	Pope's Eye ....	May 31, 1855	45	Mr. Bult
18	Triamour.....	June 5, 1855	85	Mr. Holmes
19	Pricket.....	June 14, 1855	30	Mr. Gomme
20	Tristrem .....	June 16, 1855	30	Mr. Beasley
21	Shabbakuk ....	June 23, 1855	76	Mr. Brewin
22	Mosquito.....	June 30, 1855	50	Mr. Blythwaite
23	White Frost ..	Aug. 6, 1855	20	Mr. Simkins
24	Amiens .....	Aug. 9, 1855	32	Mr. Mann
25	Vandumper....	Aug. 31, 1855	54	Mr. Davis
26	Malbecco.....	Nov. 30, 1855	41	The Marquis of Tweeddale
27	Leonine .....	Jan. 23, 1856	35	Mr. Dennis
28	Belesis.....	March 1, 1856	37	Mr. Thomson
29	Feramorz.....	March 3, 1856	35	Mr. Page

If we remember rightly, for we quote entirely from memory, not having our notes at hand, this must be ranked as the fourth important sale of Short-horns. Charles Collings' and Lord Ducie's averaged about an equal amount, that is, we think, £151. Robert Collings' averaged about £128 or £129. Sir Charles Knightley's comes next, over £80; then Mr. Tanqueray's, £78, or thereabouts; Lord Spencer's, £68; and Mr. Bates, £67.

TENANT-RIGHT, ALIAS EQUITY, VERY PROFITABLE TO THE LANDLORD.

SIR,—I beg to observe that no journal upon the face of the earth has said one-tenth so much for many years in favour of tenant-right as the *Mark Lane Express*, and the file of the said paper will prove what I assert. The truth is neither puffing nor flattery; and tenant-right is *wise, just, reasonable, and profitable*, both to landlord and tenant, but much more beneficial to the lord of the soil than the tenant. As a plain proof, look at North Lincolnshire, where they have had a tenant-right, *alias* justice to the tenant, through which land since 1823 has improved from 1,000 to 1,200 per cent. per annum. Let the owners of the soil read Mr. Algernon Clarke's prize essay, of 1852, on the "Farming of Lincolnshire," where he says some of Mr. Chaplain's great estates, on Lincoln Heath, were let as rabbit warrens, of 1,000 acres in each warren, at 2s. 6d. per acre, as late as 1823—now let at from 25s. to 30s. per acre, with about 6s. per acre tithe upon it. Would this have been done had there been no tenant-right? The tenant of course has done well, but the landlord has done better, by having his estate improved under tenant-right from 1,000 to 1,200 per cent. Common sense and equity call out aloud far and wide, and boldly says that the North Lincolnshire tenant-right or custom is a fine example to all the world. Were our 12,500,000 acres of waste improvable lands in Great Britain and Ireland farmed under tenant-right, like

North Lincolnshire, the British people would be great corn sellers, instead of large corn buyers. The lords of the soil in Great Britain and Ireland must of course be blind to their own interest not to allow a tenant-right; because when a tenant leaves a farm under tenant-right, the money for unexhausted improvements does not come out of the pocket of the landlord, but out of the pocket of the tenant who enters upon the farm, as he steps into the leaving tenant's shoes; and the in-coming tenant receives the same benefit, should he leave the farm. If the great luminary, I mean the Emperor of the French, Na-

oleon III., were to think proper to obtain English farmers to cultivate some of the land in France, let him only offer to the English cultivators a North Lincolnshire tenant-right, and he would soon see plenty of English farmers in France, and with them their fine Durham, Devon, and Hereford cattle, and Leicester, Southdown, Lincoln, and Cotswold sheep. All an English tenant farmer requires is tenant-right *alias* equity—"Live, and let live."

SAMUEL ARNESBY.

No. 18, Norfolk-street, Hyde park, London,

March 24, 1856.

## ROYAL DUBLIN SOCIETY'S SPRING SHOW.

The cattle and implement exhibition for the current year of the Royal Dublin Society has just been crowned with unprecedented success, both departments of the show having surpassed by a long way, in point of merit, those of any previous meeting. This is encouraging to the Society, holding out a fresh stimulus to its members, individually and collectively, to persevere in the great national work—the advancement of husbandry and the useful arts in the sister country—for which it has now been incorporated for upwards of a century. It also affords another proof, if that were wanting, of the rapidly improving state of Irish agriculture, and the important place it is yet destined to hold in the industrial resources of the kingdom.

In the live stock department such an extensive and splendid concourse of animals brought together was never seen in Ireland in the annals of the Society—a conclusion equally applicable to breeding and fat stock. And what deserves especial notice is, the unanimity of opinion which prevailed on the subject among competent judges—second impressions confirming the soundness of the first, as the eye and hand run along the different divisions and classes of the show-yard—neat cattle contending for the palm with sheep and horses, and pigs with poultry, throughout their almost endlessly varied sections and subdivisions.

Although our space will not permit us entering upon details in this place, yet we cannot avoid noticing, with the highest approbation, the unparalleled splendour of the Shorthorns; the sight of which must have cheered the heart of that ardent admirer of the breed, Mr. Strafford, of Euston-square, who was present. The eye of such a judge, in reviewing the great-grandsons and daughters of his old friend "Hub-back," must have seen, in tracing the purity of parental blood throughout the different families of this celebrated breed, something more than promising in the judicious blending together or formation of family connexions. Writers on Irish agriculture have in every age portrayed in the most glowing colours the productive resources of Ireland as a cattle-growing country; and now we are beginning to realize the soundness of their predictions. Well then may our most successful breeders in Yorkshire exclaim, "It is high time for England to take care of her laurels;" for there cannot be a doubt that the sister country is entering upon a new era in the history of this far-famed tribe of cattle, with many natural advantages in her favour which England and Scotland do not possess.

The implement department merits, if possible, a still more favourable notice. Hitherto agricultural mechanics in Ireland, if we may use the phrase, have been illustrated by the bones and sinews of her unfortunate

peasantry—in a manner, too, which eye-witnesses only can comprehend. Every intelligent farmer is aware that certain seasons of the year require more than triple the work performed that others do; hence the consequences in the sister country: landlords and large farmers being induced to encourage the growth of a surplus population in every rural district to do this work in time. This work once done, the poor people were then turned adrift to employ their spare time in reclaiming from waste lands small holdings for themselves. With agricultural improvements and the increase of large farms, arose an increasing demand for labour; hence, on the other hand, the subdivision of small holdings, and the hardships which followed when these were no longer fit to support their impoverished tenants. The result of all this was an amount of misery and enslaving degradation such as no language can describe, until the potato-disease finished the heart-rending tragedy, some ten years ago. Since then a change has been gradually taking place, progress in agricultural mechanics having been made in every province; and now, at the spring meeting of 1856—an epoch long to be remembered—we have portable steam-engines, and all the other improved implements and machinery of this country, being brought to bear upon the Irish soil! What a contrast between this picture and that! Retrospectively viewed, what a humbling scene does the history of Irish agriculture extend before us! Prospectively, how different is the prospect to every intelligent eye! How full of promise, no less to the Irish farmer than the English agricultural implement-maker!

With such facts before us in both departments of the show-yard, so meritorious and promising in every respect, we are in duty bound to conclude that more than the members of the Royal Dublin Society have this year received encouragement to persevere in the march of improvement; for that Society has now done more than established its growing claims upon the support of each of the four great provinces of the sister country.

We thus open our remarks strongly in point of favour, it is true; but in this we are supported by the opinions of old frequenters and good judges. Premising thus much, and taking the exhibition in order, as the same stands in the Society's catalogue, we proceed to notice the first section of the show, under the heading of "Shorthorned Bulls." This section may be considered in priority, as it stands the leading one in the yard. It contained the unusual number of 134 animals; and, with the exception of a few, the list claims to be considered as one of a very superior order of merit. Some sixty or so could have been selected such that it would be difficult indeed to produce their equals as a class. Speaking of the particular bulls to which prizes were awarded, we have first to notice "Field Marshal," the winner of the first—a *very perfect animal*. "Grand Master" was the winner of the second prize. The hind-quarters and

general good quality of this bull were very good; but, in consequence of a slight deficiency in his flank, he was compelled to yield the palm to his successful rival. The third prize was awarded to "Remnant," a very useful animal. Several in this section were commended by the judges, and were well worthy the distinction.

Passing on to the second section in the catalogue, several very fine animals were exhibited. The winner of the first prize—a roan bull, "Jacob"—deserves particular mention, as being a very good specimen of the well-known "Victoria" breed. "Alabaster," a white bull, and winner of the second prize in this section, will make a very useful animal, like his sire, the celebrated bull "Valiant."

The third section embraces a bull belonging to the Right Hon. the Earl of Clancarty, which may not only be noted as having taken the first prize in his class, but as having carried off the gold medal as the best bull in the yard, and also the 100-guinea challenge as "the best animal in the Breeding Classes" exhibited.

Passing over the Devon bulls (a small number only being shown), the West Highland (also very scantily represented), and the Scotch polled, Ayrshire, Alderney, and Kerry bulls, we come to the "Best bulls of any breed calved prior to 1853." This class, as a whole, also deserves especial mention, as it contained the well-known bulls "Gainsford the Fourth," "Grand Turk," "Matadore," and "Cato." The first prize was carried off by "Gainsford the Fourth," a very neat animal, with capital flesh. The second prize was awarded to "Grand Turk," also a noble-looking animal. This is reported as being the only award upon which opinion seemed to be divided—beautiful colour, great size, and fine hind-quarters operating very much in favour of the latter-named animal.

Next in rotation came the division embracing short-horn cows and heifers. In section 1, for heifers calved in 1855, the first prize was awarded to "Lady Barryscourt," the property of Mr. J. Christy. This animal, though plain in colour, may be considered as one of the neatest in the yard, the back and shoulders being very good. For the third time, we are informed, Mr. Christy has succeeded in carrying off "The Townley Challenge Cup." "Lady Mary," the winner of the second prize, is also a very superior animal, and reflects the highest credit upon her breeder (Mr. H. Ambler.). Speaking of this class in point of quality, only few in the yard could equal it. Scarce an animal comprised in the same but is worthy of commendation. Amongst the short-horned heifers (two-year-olds) that deserve especial mention, "The Ace of Hearts" (first prize), also "Embroidery" (second prize), are two. In the next class there were but four animals entered, of which "Jenny Roan" (first prize) may be spoken of in terms of high praise. "Florence," the winner of the second prize in this class, will make a very useful cow.

Section 4, embracing short-horned cows of any age, likewise deserves especial mention, several first-class animals being exhibited in it.

The remaining classes were not numerously represented, though they contained a few nice-looking animals. In fat stock, the ox bred by Mr. W. Barton not only carried off the first prize in its class, but also succeeded in securing the honorary certificate for the like merit. A West Highland cow, the property of Mr. J. O. G. Pollock, in like manner not only took the first prize in her class, but also won the honorary certificate as the best fat cow in the yard.

Of the show of horses we are not able to speak, as at the time of our leaving the yard on Thursday evening, this part of the stock had not been placed in order for

exhibition; for what reason we cannot tell. Certainly, the absence of so much of the show upon the two principal days presented a great blank, which we hope hereafter to see remedied by the executive. To our mind the Irish-bred horses would not fail to impart one of the greatest attractions to the exhibition, to say nothing of the additional stimulus that would unquestionably be thus imparted to the breeder, who certainly requires all the co-operation that the Society can afford. No animal being more generally sought after or commanding a better price than a good horse, whether as a racer, a fencer, a roadster, or a machiner.

The sheep show can scarcely be considered as equal to what might be expected, after receiving such a first-rate display of horned cattle; but this may be attributed chiefly to the early period at which they were exhibited. We are, however, satisfied that this department is improving every year.

The show of pigs, as usual, was of the first description. We have hardly time, however, to go so far into particularizing this department as we could wish, and point to the list of prizes in support of its merit.

We now come to the Implement Department—a rising feature in connection with the Royal Dublin Society. We understand this year's exhibition to be the first at which a portable engine or thrashing machine has been seen; neither, we believe, have any regular trials before taken place. This point argues very much in favour of a step taken in the right direction; and we were informed, upon authority, that the Royal Dublin Society had resolved to carry out the principle in course of adoption by the Royal Agricultural Society of England, of classifying implements intended for future exhibition, those used in the production of various kinds of crops being put upon their trials in separate years from others used in the conversion of such crops into food. In accordance with this plan, the trials have this year been confined to engines, thrashing machines, chaff cutters, and the like; next year's trials promising to be devoted to implements of cultivation only. The exhibitors of portable engines and machines embraced the well-known names of Messrs. Ransome and Sims, of Ipswich; Messrs. Garrett and Son, of Saxmundham; Messrs. Barrett, Exall and Andrewes, of Reading; Messrs. Richmond and Chandler, of Salford; Messrs. Crosskill, of Beverley; Messrs. Dray and Co., of London; Messrs. Smith and Ashby, of Stamford; Mr. Coleman, of Chelmsford; Messrs. Smith brothers, of Glasgow; Mr. Bentall, of Heybridge; and Mr. James, of Tivoli, near Cheltenham, as ranking high in connection with the opinion that may be formed of the implements they exhibited. Messrs. Richmond and Chandler introduced three new implements—a furze cutter, so geared as to reduce the furze to the sixteenth of an inch—a double turnip drill, with improved balance seed distributor, and throw-out motion to prevent waste of seed—and a pulper, with disc of steel for reducing roots to a pulp. We observed no other implements essentially new, and to pass through the entire list would occupy too much space. We have, however, a word of praise to record in favour of the excellent way in which shelter was afforded to the cattle and implements. As regards the cattle, indeed, with the addition of canvas to protect them on the weather sides, the arrangements made were complete. To Mr. Corrigan, the Curator to the Society, the credit derivable from these remarks we believe is really due.

#### LIST OF PRIZES.

##### JUDGES.

BREEDING STOCK.—John Wright, Esq., Terrace, Chesham; John Hall, Esq., Kiveton Park, Worksop; Henry Smith, Esq., Drax Abbey, Yorkshire.

FAT STOCK.—Robert Holmes, Esq., Samuel Garnett, Esq., Robert C. White, Esq.

**SHEEP.**—Caleb Goig, Esq., C. G. Grey, Esq., P. Tomalin  
**SWINE.**—Henry Eddison, Gateford, Workaop, Hon. Capt.  
Arbuthnot, Colonel Hill.

**POULTRY.**—Wm. H. Clarke, Esq., J. M. D'Olier, Esq.,  
Capt. Croker.

**IMPLEMENTS.**—C. G. Grey, R. C. Wade, G. J. Adair,  
Thomas Ball, Wm. Owen, Esqrs.

### BREEDING STOCK.

#### BULLS.

Best shorthorns calved in 1855, Richard Challoner; second best, Henry Ambler; third best, Thomas Lee Norman. Lord Dufferin, P. J. Kearney, William Charley, and Thomas Barnes commended.

Best calved in 1854, Ambrose Bole; second best, C. L. Ellison, Loughglyn, French Park. James Topham highly commended.

Best calved in 1853, Earl of Clancarty; second best, Sir Percy Nugent. H. S. M'Clintock highly commended.

Best Devon calved in 1855, Earl of Charlemont; best calved in 1854, R. P. Alexander, Esq.

Best West Highland bull of any age, W. S. Trench.

Best Scotch polled bull, Earl of Clancarty.

Best Ayrshire bull, D. Cunningham.

Best Alderney bull, Miss Roberts.

Best Kerry bull, Earl of Charlemont.

Best bull of any breed calved prior to 1853, William Owen; second best, Henry Ambler. Hon. L. H. R. Harman highly commended.

Best of all the prize bulls, Earl of Clancarty; second best, Richard Challoner.

#### COWS AND HEIFERS.

Best shorthorned heifer, calved in 1855, John Christy; second best, Henry Ambler. Rowland Campion highly commended; Thomas Barnes, Lord Monck, Thomas Ball, H. Ambler commended. Best heifer, calved in 1854, in calf, or producing a live calf within twelve months subsequent to date of show, John Turner; second best, John Christy. John Christy highly commended; Rowland Campion, Thomas Ball, H. Ambler, J. J. Turner, R. W. Reignal commended. Best heifer, calved in 1853, giving milk, or in calf, Rowland Campion; second best, John Christy. Best cow, of any age, in calf, or having had a live calf within twelve months preceding the date of the show, Right Hon. Lord Viscount Monck; second best, ditto. Earl of Clancarty highly commended.

Best Devon heifer, calved in 1855, Earl of Charlemont. Best heifer, calved in 1853, giving milk or in-calf, R. Q. Alexander.

Best West Highland heifer, calved in 1853, giving milk or in-calf, W. S. French. Best cow, of any age, in-calf, or having had a live calf within twelve months, W. S. French.

Best Scotch polled heifer, calved in 1855, Lord Talbot de Malahide. Best heifer, calved in 1853, giving milk, or in-calf, Lord Talbot de Malahide, commended. Best cow, of any age, in-calf, or having had a live calf within twelve months, E. Atkinson, jun.

Best Ayrshire heifer, calved in 1853, giving milk, or in calf, W. Boyle. Best cow, of any age, in calf, or having had a live calf within twelve months, W. Boyle.

Best Alderney heifer, calved in 1853, giving milk, or in calf, Ponsonby Moore, Esq. Best cow, of any age, in calf, or having a live calf within twelve months, Alex. McNeil.

Best Kerry heifer, calved in 1855, W. Owen. Best heifer, calved in 1853, giving milk, or in calf, W. C. B. Roberts. Best cow of any age, in calf, or having had a live calf within twelve months, R. S. Cusack. Best of all the prize breeding heifers, giving milk, or in calf, John J. Turner. Best three heifers under four years old, in calf, or having had live calves within twelve months, John Christy.

Best of all the prize milch cows, Lord Monck.

"The Irish Farmers' Gazette" Cup, value £105, Lord Clancarty.

The Tenant Farmers' Cup, value £50, John Christy.

Best short-horned fat ox, calved prior to 1853, Nathaniel Barton.

Best Devon fat ox, calved prior to 1853, Edward Rotherham. For the best pair of fat oxen, of any breed, that have been fairly and bona fide worked as plough bullocks up to May, 1854, Nos. 339, 340, Nathaniel Barton.

Best of all the prize fat oxen, Nathaniel Barton,

#### FAT COWS, OF ANY AGE.

For the best short-horned, R. M. Carden. For the best Devon, Edward Rotherham. For the best West Highland, J. O. G. Pollock. For the best Kerry, J. L. Naper. For the best of all the prize fat cows, J. O. G. Pollock.

#### HORSES.

Best agricultural draught stallion, of any breed, foaled prior to January 1, 1852, Archibald Molloy; second best, Marquis of Downshire; third, S. Rait.

Best agricultural draught stallion, of any breed, foaled since January, 1852, Patt Farrell, Edenderry; second best, Captain M'Clintock Bunbury, R.N., M.P.

Best agricultural draught brood mare, of any breed, in foal, or with a foal at her foot, Patrick Gahan, Rathfarnham; second best, John Clarke, Newtown, Mount Kennedy.

Best agricultural draught colt, foaled since Jan. 1, 1853, John Mill, Corballis, Donabate; second best, Andrew Chalmers, Glenagary, Dalkey.

Best agricultural draught filly, foaled since Jan. 1, 1853, R. W. Reynell.

Best agricultural draught colt, foaled since Jan. 1, 1854, William Waldron, Finglass; second best, Thomas M'Court, Swords.

Best agricultural draught filly, foaled since Jan. 1, 1854, Andrew Chalmers, Dalkey.

#### SHEEP.

For the best one-shear Leicester ram, John La Touche, Charles Leslie. For the best two-shear ram, W. Owen, Charles Leslie. Best three hogget rams, never clipped, R. W. Reynell, W. Owen. For the best five ewes with their lambs yeaned in 1856, or in lamb, W. Owen, Charles P. Leslie. Best five ewe hoggets, never clipped, Miss Roberts, C. P. Leslie.

For the best long-woolled ram, of any other age, Samuel Stroude. Best three hogget rams, never clipped, Sylvester Rait. Best five ewe hoggets, never clipped, Hon. H. L. K. Harman.

For the best one-shear short-woolled ram, Edward Atkinson, W. Owen. For the best two-shear ram, Gustavus Lambert, W. Owen. For the best ram of any other age, Viscount Powerscourt, W. Owen. Best three hogget rams, never clipped, W. Owen. For the best five ewes, with their lambs yeaned in 1856, or in lamb, Edward Atkinson, Viscount Powerscourt. Best five ewe hoggets, never clipped, Miss Roberts, L. H. K. Harman.

For the best one-shear Cheviot ram, Marquess of Conyngham. For the best two-shear ram, same. For the best ram, of any other age, Lord Clermont, Marquess of Conyngham. Best three hogget rams, never clipped, W. S. Trench. For the best five ewes, with their lambs yeaned in 1856, or in lamb, Marquess of Conyngham, W. S. Trench. Best five ewe hoggets, never clipped, same.

For the best pen of five long wool fat wedders, not exceeding two-shear, Sylvester Rait, John La Touche. For the best pen of five short wool fat wedders, not exceeding two-shear, Mrs. O'Reily. For each of the second best animals or lots in this division, honorary certificate.

#### IMPLEMENTS

FOR WHICH, AFTER PRACTICAL TRIAL, WERE AWARDED PRIZES IN MONEY, TOGETHER WITH THE HONORARY CERTIFICATE.

For the best portable steam engine for agricultural purposes, not exceeding 8 nor less than 4-horse power, with £5 additional provided the engine shall have been employed on ten hirings in Ireland, £20; Garrett and Sons.

For the best portable threshing machine, with £5 additional provided the machine shall have been used in ten hirings, £10; same.

For the best threshing machine, not exceeding 3-horse power, £10; Barrett, Exall, and Andrews. Garrett and Son commended.

For the best machine for winnowing and dressing corn, Garrett and Son, highly commended.

For the best hummeller, Garrett and Son, highly commended.

For the best chaff-cutter, Richmond and Chandler, highly commended.

For the best corn and linseed bruiser, Richmond and Chandler, highly commended.

For the best machine for breaking agricultural produce into meal for stock feeding, Richmond and Chandler, highly commended.

For the best cake breaker, £1; Garrett and Son, Smith and Ashby, and Ransomes and Sims, highly commended.

For the best apparatus for cooking food for agricultural purposes, £5; Richmond and Chandler.

For the best one-horse farm cart, £5; Crosskill. Allan and Mitchell, highly commended.

For the best machine for reducing roots to pulp, Bentall.

For the best machine for preparing gorse or furze as food for horses and cattle, £3; Barrett, Exall, and Andrews.

For the best trough for feeding pigs, £1; Herneilewicz and Maine.

For the best weighing machine, indicating from 1lb. to 2½ tons, £5; Smith Brothers.

For the best weighing machine for barn purposes, £3; Richmond and Chandler.

For the best field gate, iron or wood, £3; Dray and Co. Herneilewicz, Maine, and Co., highly commended.

*Highly Commended for their General Collections.*

Richmond and Chandler, turnip drill, £2.

Caulson and Son, manure distributor, £3.

Garrett and Son, manure distributor, £2.

Garrett and Son, turnip thinner, £1.

Ritchie, for Firdlayson's plough guide, £2.

Bentall, for Howard's harrow improvements and broadshare improvement, £1.

Kenyon, machine for drawing wire-fencing and hedge-knives, &c., £2.

M'Grath, for cattle brands, £1.

PARIS UNIVERSAL EXHIBITION.

OFFICIAL REPORT ON AGRICULTURAL IMPLEMENTS AND PRODUCE.

By J. EVELYN DENISON, M.P.

To the Right Hon. the Lord Stanley of Alderley, President of the Board of Trade, &c.

My Lord,—The International Jury of Agriculture (Class III.) of the Paris Exhibition consisted of—

Count de Gasparin, President . . .	France.
Evelyn Denison, Vice-President . .	England.
Count Hervé de Kergorlay, Secretary	France.
Boussingault . . . . .	France.
Barral . . . . .	France.
Yvart . . . . .	France.
Dailly . . . . .	France.
Vilmorin (Louis) . . . . .	France.
Monny de Mornay . . . . .	France.
Robinet . . . . .	France.
Delehayé . . . . .	Belgium.
De Mathelin (Léopold) . . . . .	Belgium.
Ramon de la Sagra . . . . .	Spain.
Dietz . . . . .	{ Grand Duchy of Baden.
Baron de Riese Stallbourg . . . . .	Austria.
Dr. Arenstein . . . . .	Austria.
Baron Delong . . . . .	Denmark.
Wilson, J. . . . .	England.
Amos, C. E. . . . .	England.
Nathorst, J. T. . . . .	{ Sweden and Norway.

It was quite time that France and England should be better known to each other, and that it should be made apparent what great benefits would accrue to both countries from an improved acquaintance and extended intercourse.

Up to the year 1851, till the time of the Exhibition of London, we are told by a French writer of high authority, "that in France, more perhaps than elsewhere, notwithstanding our near proximity, an opinion had prevailed that in England agriculture had been neglected in favour of trade and commerce. The tariff regulations of Sir R. Peel, not well understood in their design or in their consequences, had tended to fortify this assumption. Nothing, therefore, created more surprise than the vast collection of agricultural implements which the Exhibition of London contained, and the proof they afforded of the high development of agricultural skill and science in the United Kingdom."

It has been reserved for the Paris Exhibition of 1855 to give new force to these impressions; to carry into the heart of France, and to display before the eyes of hundreds of thousands of spectators, these evidences of the skill of our machine-makers, placed in immediate contrast with the works of their competitors from all quarters of the world.

The approach between the two nations, which was invited by the Exhibition of 1851, has been advanced and quickened by the Exhibition of 1855. The cordial and friendly reception given to Englishmen of all classes in Paris has been thoroughly appreciated and responded to—new interests have been called into action. The advantages to be derived by both people from a more free communication have forced themselves upon public attention, and have taken root in public opinion. Such a result alone would be worth all the labour and all the cost of both Exhibitions.

It was not till the 25th of October, shortly before the close of the Exhibition, that I was made acquainted with your Lordship's wish, that I should furnish a report on the Class of Agriculture. If I had known this wish at an earlier period, some matters, especially matters of detail, might have been noted, which it would not be easy now to go back upon. But I bear in mind that this is not a report accompanying and justifying an adjudication of prizes. Such a report will be furnished to the Imperial Commission by officers specially appointed in each class, and will be accessible to all.

The terms of the letter addressed to me by your Lordship's directions are, "That I would furnish a report, to be laid before Parliament, of the position which the United Kingdom held in the Paris Exhibition, compared with foreign countries, in the Class of Agriculture, and the progress, if any, which has been made since 1851 in respect of this class of objects."

I propose to follow the course pointed out in this letter of instructions.

It may be well to consider at the outset the position of the two countries as regards agricultural practice at the present moment. Such a picture, full of life and interest, has been drawn to our hands by the able pen to which I have already referred. As the comparison is very favourable to this country, I prefer to employ the words of a French author, rather than to make use of my own.

In natural gifts of soil and of climate, the advantages are beyond all question on the side of France. It may be that France has relied too much on these excellent gifts; while England, less favoured, has been urged by her necessities to increased exertions.

"SYSTEMS OF CULTIVATION.

"France has devoted herself too exclusively to the production of corn crops, which are the immediate food of man, without sufficiently considering the means necessary

\* M. Leonce de Lavergne, author of "Essai sur l'Economie Rurale de l'Angleterre, de l'Ecosse, et d'Irlande." This essay formed part of a course of lectures delivered at the "Institut National Agronomique." The information it contains, as regards the condition and prospects of agriculture in these islands, is so correct, and exhibits such a thorough knowledge of the subject in all its branches, that it is a reasonable assumption that a writer who writes so accurately about the affairs of a foreign country may be relied upon when treating of his own. This essay has gone through two editions in France, has been translated into English, and has undergone the ordeal of Scotch criticism.

to uphold the fertility of the soil under this exhausting process. England, on the contrary, has been led, partly by the nature of the climate, partly by design, to take a sort of by-path, which reaches corn crops through the intervention of green crops; finding, in the rearing of cattle and the supply of manure, the restorative process which is necessary.

"The experiment has entirely succeeded, and is extending itself day by day; and the remarkable fact is, that in proportion as the head of cattle increases, the quantity of corn increases also; the gain in intensity exceeds the loss in extent. Thus, on a surface of 31,000,000 of hectares, reduced to 20,000,000 by the waste lands, the British Isles produce more food for animals than the entire surface of France, of double the extent.\* Hence, the supply of manure is, in proportion, three or four times greater. The average produce per hectare in France is 6 hectolitres of wheat, about 5 of rye, and 1 of maize or buckwheat—collectively about 11 hectolitres. In England, 25 hectolitres of wheat (3½ quarters per acre), more than double in quantity, and three times more in saleable value. Scotland and Ireland are included in this estimate. If the comparison is made with England alone, the results are far more striking. This little country, not larger than one-fourth of France, produces 38,000,000 of hectolitres of wheat, 16,000,000 of barley, 34,000,000 of oats. If France produced as much in proportion, she would produce, deducting seed, 150,000,000 hectolitres of wheat, 200,000,000 of oats and other grains; that is, at least double her actual production.

"Taking all products into account, animal and vegetable, it appears that the produce of England per hectare nearly doubles that of France.

"The great lesson which these figures teach, beyond the disproportion of the results, is the relation of vegetable to animal products. In France the vegetable products form four-sixths of the whole, and the animal products two-sixths only; showing at first sight an exhausting cultivation, and one at least stationary. In the United Kingdom, the animal products are equal to the vegetable. Thus the animal products alone of an English farm are equal to the entire products, animal and vegetable, of a French farm of the same extent.

#### "SHEEP.

"The most remarkable feature of British farming, in comparison with that of France, is the number and quality of the sheep. According to the statistical returns and estimates, the number of sheep in France and in England is about equal, about 35,000,000 of sheep in France, and 35,000,000 in England. But this apparent equality conceals an inequality the most marked. 35,000,000 of sheep in the United Kingdom live on 31,000,000 hectares of land. 35,000,000 of sheep in France live on 53,000,000 hectares. France, in order to have as many sheep in proportion as the United Kingdom, ought to have 60,000,000. If the comparison is made with England alone, the difference is far greater, England feeds 30,000,000 of sheep on 15,000,000 hectares of land; that is, proportionally, three times as many as France.

"But the great difference is in the quality of the sheep, upon the breeding and improving of which, with a view to weight and early maturity, so much care and attention has been bestowed. The weight of an English sheep is twice that of a French sheep. So that an English farm on an equal surface gives six times as much mutton as a French farm.

#### "HORNED CATTLE.

"In the case of cattle, the same care in breeding from selected animals in the United Kingdom, and continually improving the races, in studying meat-producing qualities and early maturity, has effected results similar to the results produced in sheep. France possesses 10,000,000 head of cattle, the United Kingdom 8,000,000. In France three products are demanded from cattle—labour, milk, and meat. In England, only two—milk and meat. The yield of these two valuable productions is materially inter-

ferred with by requiring work also from cattle. It might appear, at first sight, that the work of cattle could not in an important degree influence the supply of meat, and it is not difficult for people to persuade themselves that labour in utilizing the life of an ox enables meat to be sold at a lower price. But experience has proved, that if this is sometimes a truth in detail, it is an error in the gross.

"The habit of labour forms hardy, vigorous races, which, like men devoted to hard work, eat much, fatten slowly, develop their bony structure, make little flesh, and make it slowly. The habit of inaction, on the contrary, forms races gentle, tranquil, which fatten early, assume round and fleshy forms, and give with equal food a far larger yield to the butcher. If we look to labour, the ox is killed when he has finished his task. If we look to meat, the ox is killed at the moment when he yields the largest amount. Cattle, in France, are killed too young or too old; among the 4,000,000 head killed, figure 2,000,000 calves, giving each only 30 kilogrammes of meat. Those which survive are killed at an age when the growth has long ceased, *i. e.*, when the animal has long been consuming nourishment which has not added to its weight.

"In England, on the contrary, animals are killed neither so young, because in their youth they make the most meat, nor so old, because then they make none. The moment is seized when the animal has reached his maximum of increase.

"In France, the number of animals killed annually is about 4,000,000 head, producing 400,000,000 kilogrammes of meat, averaging therefore 100 kilogrammes per head.

"In the United Kingdom, the number killed is 2,000,000, producing 500,000,000 kilogrammes of meat, averaging 250 kilogrammes per head.

"Thus, with 3,000,000 head of cattle and 30,000,000 hectares of land, British agriculture produces 500,000,000 kilogrammes of meat; while France, with 10,000,000 head of cattle, and 53,000,000 hectares of land, produces only 400,000,000 kilogrammes."

Such a description of the high attainments of English agriculture having been placed before the public of France, it was natural that great expectations should have been formed, both as to the display of live stock and the exhibition of agricultural implements. Nor, I venture to say, were these expectations disappointed. The cattle of our improved breeds found a crowd of admirers and many purchasers. The Durham Shorthorns have been imported largely into France for some years by the agents of the French Government, and very good specimens of this race, bred in France, were exhibited. The first prize, for young bulls of the Durham breed, was awarded to the Marquis de Talhoust, for a bull sixteen months old. More surprise was created by our sheep, especially by the large size and admirable symmetry of our Southdowns. The jury decided that a gold medal of the first class should be struck in the name of Mr. Jonas Webb, for the collection of Southdown sheep bred and exhibited by himself. The Cattle Show took place before the juries for the Palace of Industry were summoned to Paris; I had not the good fortune myself to see the show. The deputation who accompanied the President of the Royal English Agricultural Society were greatly pleased with the excellent arrangements of the show, and with some of the continental breeds of cattle, especially with the French Charolais race, as very good in themselves, and offering a stock very suitable for crossing with Shorthorn bulls; also with the Métis-merino sheep, pointing out the road which French breeders must pursue to accomplish the end of their mission—the supply of meat at a reasonable price to the markets of France. Though horses formed no part of the show, I must not omit to mention the race of draught-horses known by the name of Percheron. They are strong, muscular, hardy horses, of great power and activity, worthy the attention of English breeders, better suited for the quickened step of improved farming than the heavier sort of English cart-horse.

The collection of agricultural implements was formed by Mr. Brandreth Gibbs, under the direction of the Board of Trade, assisted by a committee of the English Agricultural Society. The selection was made with great judgment; the implements sent were not too numerous, and they were all

\* I preserve the French measures, together with the calculations of the author. The French hectare is equal to 2.471 English acres.

of established excellence. They consisted of ploughs, harrows, cultivators, broadshares, drills, horse-hoes, rakes, rollers, reaping machines, haymakers, &c., portable steam-engines, thrashing machines, chaff cutters, corn crushers, and machines for making draining tiles. But the French system of classification placed in the list of agricultural implements those implements only which are used in the fields. It removed the articles last on the list—thrashing machines, chaff cutters, corn crushers, machines for making draining tiles—from the jury of agriculture, and placed them in Class VI., "Mécanique spéciale." This led to some practical inconvenience in the conduct of the trials, and to a seeming inconsistency, connected with the change made in the tariff of duties, of which I shall presently speak.

"The first trial of implements took place on the 7th of July, at Trappes, about ten miles beyond Versailles, on the farm of M. Dailly, a member of the jury, who afforded every possible accommodation and the most liberal hospitality both to the exhibitors and the members of the jury.

The day was chiefly devoted to the trial of ploughs. An English hay-maker was exhibited, and tried on newly-mown lucern. In England it is employed generally only for meadow grass, for which it is best suited. Though a machine of very long standing in this country, it appeared to be a novelty in France, and was much admired and approved.

Subjoined is the report of the experiment on ploughs, furnished by Mr. Amos, my colleague, consulting engineer of the English Agricultural Society, who assisted at the trials.

"EXPERIMENTS ON PLOUGHS.

"Trappes, July 7th, 1855.

"Fifteen were used from various countries. A great difficulty was experienced in obtaining the names and addresses of the exhibitors, through the cards or marks not being placed on them. This accounts for the imperfection of the first column, viz., 'Makers Names.'

"The land was light, and offered but little resistance to well-made ploughs, but the experiments would have been more valuable had more 'field room' been given, so that each plough could have made three or four turns before the dynamometer was applied. Each plough should also have worked to the same depth, as the ground was harder at bottom.

"The 'ground' is also usually harder near the old 'water furrow,' and lighter near the old 'ridge;' hence each plough should have had a 'land' or 'ridge' to itself, and then, had the dynamometer been applied at an equal distance from the old 'furrow,' greater truth would have been obtained.

"The dynamometers tried were one provided by the French, one from Denmark, and one from England (by Bentall). The latter was used, but it is imperfect when used with ploughs of 'light draught,' as it gives the 'resistance' of such ploughs too small. This arises from the driving 'disc plate' having a hole in its centre, and although that hole is of no consequence or inconvenience when ploughs are used on 'heavy land,' yet when used with ploughs of small resistance on 'light lands' the spring of the dynamometer is not compressed enough to keep the 'driving disc' clear of the hole; hence the 'registration' is too small with light ploughs. This may account in a degree for the difference (as recorded) in the draught of the ploughs of our best makers.

"The following table gives the length, breadth, and depth of 'earth removed,' which, being multiplied together, gives a 'total' in cubic feet. The tabular number in the seventh column is the number recorded by the dynamometer. This number in each case multiplied by 100, and the product divided by the number of cubic feet of earth removed in each experiment, gives the tabular numbers in the eighth column. The numbers in the eighth column show the 'comparative eos' or 'expenditure of power' of removing an equal quantity of land, the lower number showing the greater degree of excellence of the implement.

"In carrying out the details of the experiments, the able assistance rendered me by Mr. Edward Combes, C.E., of Paris (a gentleman recommended by Professor Wilson), was eminently useful. "C. E. AMOS."

EXPERIMENTS ON PLOUGHS AT TRAPPES, NEAR VERSAILLES, JULY 7TH, 1855.

No. of Trial.	1. Maker's Name.	2. Country.	3. Mean Breadth.		4. Mean Depth.		5. Length in Feet.	6. Quantity of Earth in Cubic Feet.	7. Dynamometer in feet.	8. Comparative Resistance.	9. REMARKS.
			Centimes.	In.	Centimes.	In.					
1	Florian Mauer . . .	Duchy of Baden . . .	.25	9.84	.16	6.20	1,414	611	—	—	Made excellent work. Called the "Geometrical Plough." This was so badly managed, and its coulters arrangement so imperfect, that the experiments could not be finished.
2	Bussy . . .	England . . .	.25	9.54	.17	6.70	1,414	661	42	6.3	
3	Barrosch and Jasper . . .	Austria . . .	.27	10.63	.175	6.9	1,414	725	—	—	
4	Benkman . . .	Belgium . . .	.23	9.00	.17	6.70	1,444	604	43	7.1	Rough work. Furrow not well turned.
5	The "Brier" Plough . . .	Canada . . .	.28	11.00	.12	4.74	1,444	322	—	—	Worked very well.
6	The "Toronto" . . .	Belgium . . .	.20	7.87	.19	7.48	1,444	299	45.5	7.7	Good work.
7	The "Grignon" . . .	Belgium . . .	.25	9.84	.17	6.70	1,444	661	29	4.4	The land side left extremely rough.
8	Jos. Dixon . . .	England . . .	.23	9.00	.175	6.90	1,444	700	42	6.0	Very Good. Draught, very light.
9	Howard . . .	Austria . . .	.23	9.00	.16	6.20	1,444	622	16	2.6	Without a coulter; the mould board set very obtuse, and the land side very rough. Called the "Ruhadlo."
10	Barrsch and Jasper . . .	Austria . . .	.25	9.84	.16	6.20	1,444	611	62	10.1	
11	Ball . . .	England . . .	.22	8.66	.19	7.48	1,444	650	22.5	3.4	Very good. Mould board set very obtuse, causing an excessive resistance.
12	The "Thael" Plough . . .	Saxony . . .	.24	9.44	.18	7.11	1,805	840	.136	16.2	Work very well done, land rather harder.
13	Ransom and May . . .	England . . .	.23	9.00	.18	7.10	1,805	801	50	6.2	Worked Well, the land well turned over and pulverized.
14	J. M. Odours . . .	Belgium . . .	.26	10.23	.165	6.51	1,805	833	57	6.8	
15	The "Toronto" Iron Plough . . .	Canada . . .	.22	8.63	.20	7.87	1,805	854	72	8.4	Very good.

C. E. A.

The trials, for the reasons above-mentioned, could not be considered entirely complete or satisfactory. The indications of the dynamometer were unduly favourable to the ploughs of the lightest draught; but making the fullest allowance for this, the difference between the resistance offered by the different ploughs will appear very remarkable.

The best French plough, the "Grignon," was light, cheap, simple in construction, and did very good work; but in comparison with Howard's plough, the dynamometer marked 29 as against 16, in comparison with the best Belgian plough "Odeur," 57 as against 16.\*

It was objected against the English ploughs, and indeed against the English machines in general, that they were too heavy and too costly, but the trials showed that a light plough does not always make light work, nor is an implement, cheap at first cost, always the cheapest in the end. The same objections against iron ploughs, and in favour of the old wooden ones, have been freely made at home, but they are passing away under a long experience. To do good work in the field you must have strong and well constructed implements. The best implements are the cheapest in the end, they are fast superseding inferior machines at home, and they will no doubt in time obtain the same preference, wherever they shall be put fairly to the test.† The value of solidity and strength was fully recognised in the implements akin to ploughs—drags, scarifiers, and broadshares—by which so much of the labour on the best cultivated farms is now effected. The implements by Garrett, Bentall, and Coleman were the first of their class, and their superiority was not contested.

The position of the English exhibitors of agricultural implements was not an encouraging one. They sent specimens of their newest inventions and most approved machinery. These might be examined, copied, purchased as models, by foreign competitors. The individual machines exhibited might, indeed, be sold at the close of the Exhibition, on the payment of a duty of 20 per cent. *ad valorem*. But the sale of a single machine was, of course, a most inadequate compensation for the trouble and expense incident upon the Exhibition; nothing more, however, was in view. The duty on the importation of machinery was so high, that it amounted to a prohibition. It was not to be expected, under such circumstances, that any great zeal or enthusiasm should prevail among the English machine-makers, busy at that moment in preparation for the Carlisle show. Still, when notice was given of the intended trials at Trappes, at a few days' warning only, several of the makers themselves came over, bringing with them their workmen, and they appeared on the ground ready to contend for the honour of victory, though victory should be barren of all but honour. At the close of the day their conduct through the trials drew from Count de Gasparin, the President, these complimentary words:—"Your countrymen have, indeed, set an example to all. They have brought good implements, men to manage them, an interpreter to speak for them, an engineer to advise with. This is the way in which business should be done."

An international exhibition, which had broken down no barriers of prejudices or partial laws, which had ended without exciting friendly sympathies, or promoting friendly intercourse, would have been but a barren display. The enlightened Frenchmen, with whom I had the good fortune to be associated, were the first to pronounce in favour of free exchange. Our class agreed unanimously to make a representation to the Imperial Government in favour of a reduction of the duty on foreign agricultural machinery. The representation was successful: an Imperial Decree appeared in the *Moniteur* of Sept. 7, making a considerable reduction in the duty on many manufactured articles, and specially reducing the duty on agricultural machinery to 15f. per 100 kilogrammes. This duty being by weight, 15f. per 100 kilogrammes (equal to 2 cwt.) operates unequally in different classes of machinery.

On an iron plough, for instance, in which the weight of the raw material, in comparison to workmanship, is considerable, the duty will be something above 20 per cent. *ad valorem*. In the more complicated machines, in which labour enters more largely, as in drills, horse-hoes, &c., &c., the duty will be from 15 to 20 per cent. *ad valorem*.

This concession was accepted with much satisfaction by our machine-makers; orders to some extent were received for machines. The barrier, at all events, which had hitherto stood between the industry of the two countries was broken down, and ground was laid for a trade, which may be ripened and matured into results of mutual benefit to both countries.

I have said that portable steam-engines, and thrashing-machines, and tile-making machines were not included in the list of agricultural implements.

Unfortunately the classification in the books of the Custom-house corresponds with the classification in the catalogue of the Exhibition; consequently those machines, not falling under the denomination of agricultural machines, do not partake of this reduction of duty.

Of all machines connected with agriculture, there are none in which greater improvements have been made in late years than in machines for making pipe tiles for draining. There is no class of machinery which would be more useful in France. The excellent results of draining are there thoroughly understood and appreciated. Specimens of draining were exhibited by the Marquis de Bryas (Gironde) and the Viscount de Rougé (Aisne) from the opposite extremities of France.

The draining of the Medoc vineyards by Count Duchâtel has been attended with complete success. It is computed that one-seventh of the surface of France requires draining. It is understood now that draining not only keeps land drier during the rains of winter, but keeps it cooler and more moist during the heats of summer, preventing the baking of the surface by the sun, and promoting the constant progress of vegetation. It is the foundation of all improvements—the first step in the path of good cultivation. No machines attracted so much attention as the tile machines of Messrs. Clayton and Whitehead, exhibited in work. They were surrounded, from morning to night, by a crowd of spectators. I cannot think it probable that the Government of France, anxious to promote improvements, and to strengthen the hands of French agriculture, will decline the benefit which is offered to them by the possession of these approved machines.

Under the law, as it at present stands, the cost of introducing a tile machine into France exceeds the prime cost of the machine. Mr. Clayton thus reports his experience:—

"The sale of tile machines for France would have been much greater, but the numerous applicants were deterred by the high rate of duty; it amounts, indeed, almost to a prohibition. I sold, the other day, a tile machine and pug mill, to be delivered at Fresnes, near Paris. The sale value of this machinery amounted to £58; the cost for transport and Douane charges amounted to £62—£4 more than the entire cost of the machinery."

The thrashing machines were tried by the jury of Class VI. The English machine by Hornsby, and the American by Pitts, of Buffalo, State of New York, were the most approved. The details of the trials have not yet been published, and they are not in my possession.

These trials do not appear to have been conducted with all the care and exactness necessary to place the decisions beyond the reach of cavil.

#### REAPING MACHINES.

Though reaping machines have, up to this time, disappointed the sanguine expectations which were formed of them at their first appearance, the various specimens in the exhibition were regarded with much curiosity, and the trials of them excited a lively interest. Mr. W. Fairbairn, President of Class VI., has favoured me with the following report on these machines. The name of Mr. Fairbairn will be a sufficient warrant for the value of this report.

#### REPORT ON REAPING MACHINES.

Machines of this kind are of great antiquity. They were known to the Romans, but we hear nothing of them during the middle ages; and from those remote times we have few traces of improvement, or any successful attempts to substitute machine-reaping for the sickle. It

\* Further trials on the 1st and 2nd of August, and on the 14th and 15th of August, made with the dynamometer of General Morin varied in some degree these results. They were made in the absence of the English makers and their workmen. They were favourable to the light draught of the Grignon plough.

† Howard's plough was bought on the ground for the Government Establishment at Grignon.

was reserved for Mr. Bell, of the Carse of Gowrie, in Scotland, in 1826, to construct a machine that answered all the purposes of a good reaper. Mr. Bell has used his machine, and gathered his harvest by it, for the last twenty-nine years, and it is not too much to say that most of the machines now in use are based upon the principle of Bell. There is great similarity in nearly the whole of these machines, and the Universal Exhibition of Paris exhibits nearly the same characteristics in principle and construction as those shown at the Exhibition of 1851. It is true there are some slight improvements introduced by Mr. McCormick and others, but the principle of the machine remains unaltered, excepting only the receiving-boards, which in those brought forward for competition at the Paris Exhibition are exceedingly variable, and some of them very ingenious.

The period of the General Exhibition at Paris was most favourable for giving a fair trial to machines of this description, and the month of August afforded an excellent opportunity for testing the merits of each machine by actual experiment. Through the liberality of M. Dailly, a distinguished agriculturist, and member of the jury, a field of oats on his farm at Trappes was set apart for the exclusive purpose of ascertaining the properties and proving the value of each machine. The Imperial Government, always alive to the interests of the community and the advancement of mechanical art, took a deep interest in the trials, and in order that the jury might not be incommoded, several mounted gens-d'armes, a few soldiers of the line, and a drummer, were sent forward to Trappes to prevent the crowd from inconveniencing them. On the 2nd August, at 11 o'clock, the machines were divided into three groups, and the contest for superiority commenced as follows :

<i>Group 1st,—</i>		Metres.
M. Cournier's allotment . . . . .		1,628
M. Atkins' " . . . . .		1,733
M. Lawrent's " . . . . .		1,825
<i>Group 2nd,—</i>		
M. Mazier's " . . . . .		1,826
M. Manny's " . . . . .		1,900
M. Crosskill's " . . . . .		1,958
<i>Group 3rd,—</i>		
M. McCormick's " . . . . .		1,987
M. Dray's " . . . . .		2,256
Canadian " . . . . .		1,650

Having grouped the machines as above, the conditions were, as far as I could learn—the time required to cut the allotment, the number of hands employed, and the perfection with which the work was executed without injury to the grain. These conditions being ascertained, the first group commenced operations, by beat of drum, at 11 o'clock, all three starting at the same time.

GROUP 1.

*Cournier's Machine* (French) on Bell's principle.—This machine, with one horse, cuts clean, but is liable to get entangled in the cutters with straw. A great deal of time was lost from this cause, and this defect appears to be common to all the machines when the speed happens to be reduced under two miles and a-half an hour. In this respect I found the maximum velocity of the machine to be as nearly as possible three miles an hour, and the knives for every eighteen feet in distance made eleven single or twenty-two double cuts for one revolution of the wheel. This machine had a sliding rake motion for the convenience of the reaper, and in order to enable him to clear the receiving-board of the grain as it is cut. With some improvements, this machine may be made much more effective, and would work much better with two horses and a wider cutting-board, so as to take a greater width of grain, and maintain the speed necessary to accomplish a maximum result. From the frequent clogging of the cutters it required sixty-seven minutes to cut 1,628 square metres of corn. The reel in this machine for gathering the corn went too fast, and proved injurious by striking the grain too high up the stalk.

*M. Atkins' Automaton Machine* (American) executed 1,733 square metres in twenty-four minutes. This machine is nearly self-acting, and only requires the driver; one at-

tendant, indeed, following the machine in case anything goes wrong. Its novelty consists in a rake worked from the wheel that drives the cutter-shaft. It is attached by an arm or connecting-rod to the bevel wheel, and by a combination of levers it receives a rotatory motion, which, along with that in a longitudinal direction, drags the grain forward over the side of the board. In order, however, to make sure of the discharge, another rake or cleaner strips the before-mentioned one of its load, and lays the straw in parallel lines, ready to be bound into sheaves. This machine, like Cournier's, has some clever devices about it; but like all new attempts at improvements, there still remain some further improvements to simplify and make the machine more effective and complete.

*Lawrent* (French).—This machine, like Cournier's, was constantly choking with the straw round the cutters. It is a copy of Bell's, and requires two men at the pole, a driver, and a reaper, to work it. It is a heavy machine, and almost too much for two horses to work, and the reason of its entanglement was a falling off in the speed. In all these machines speed is an element of success, as might be seen whenever the velocity of the knives and the speed of the machine were reduced; on such occasions, choking or entanglement of the straw was the result. This being the case, it is therefore a consideration of much importance to have all these machines of such dimensions as to enable the horses to work them with ease at the required velocity.

GROUP 2.

*Mazier's Machine* (French).—This machine is of light construction, adapted for one horse, and cuts a breadth of two feet seven inches in line all round the field. It cuts either right or left, by means of the frame containing the cutters turning on a central axis. The knives are worked by a wheel and worm, and are well calculated for cutting light grain, such as oats and barley, but might prove inefficient in operation on a field of heavy wheat. The machine, as a whole, was rather slender for the work it had to perform; but if well constructed, and the parts judiciously proportioned for two horses, there is no reason why it should not reap any description of grain. In the attempt to cut the allotment, it unfortunately broke down, by some of the parts giving way.

*J. M. Manny* (United States).—Mr. Manny's allotment consisted of 1,900 square metres, which he cut in twenty-six minutes. The machine is worked by two horses, and cuts a breadth of four feet six inches. Mr. M. speaks highly of his machine, and gives numerous testimonials of its efficiency, exclusively of medals, premiums, and awards from different districts in America, and from different countries in Europe, for its performance. According to Mr. Manny's account, 'it will cut either grass or corn when down, wet or dry, and in whatever direction the wind blows, without being stopped for a single instant.' Mr. M. further observes, 'that it can easily be converted, in a few seconds, from a reaper into a mower, and the only thing required is to withdraw the platform and change the scythe of the reaper for the cutting scythe of the mower. The cutting apparatus for corn or for grass is made in such a way that it cuts as well backwards as forwards when the machine is reaping; the wheat is received on the platform, gathered, and put into a heap by the action of a wing-board; and by a single stroke of his rake the attendant puts down on the ground at the back of the machine the already made sheaves, which only require tying.' It will not be necessary to follow Mr. Manny further in his description, which evinces great confidence in the superior performance of the machine; suffice it to observe, that it did its work—with the exception of some parts not very clean cut—moderately well, and in twenty-six minutes completed the quantity it had to perform.

*Crosskill's Machine* (English) is an improvement on Bell's, and in great repute amongst the farmers of the North Riding of Yorkshire and other parts of England. In the hands of Crosskill it has received several improvements; but unfortunately on this occasion the key of the connecting rod that works the knives got loose, dropped out, and stopped the process of reaping. Under these circumstances, it was thought desirable to withdraw the machine, and leave the field open to the other competitors.

GROUP 3.

*M'Cormick* (American).—This reaper is probably one of the best machines of its class. It reaped 1,987 square metres in seventeen minutes; and judging not only from the quantity of work done in so short a time, but from the manner in which the ground was cleared, and the grain cut, it evidenced much greater perfection in its operations than any of the others whose powers were brought to the test. It cuts a clean track of five feet six inches wide, and performs the operations with a degree of certainty and precision sufficient to account for the very short time in which the allotment was cut down. This machine, like most others, is susceptible of still further improvements; and I am glad to find that Messrs. Burgess and Key, the makers, are about to introduce a new moveable apparatus, consisting of three Archimedean screws, for delivering the grain from off the receiving-board as it is cut. The great defect of this machine was the imperfect way in which the grain was delivered from the platform after being cut, and the evident want of some method of laying the heads and straw parallel and in bundles and sheaves, and also for clearing the ground and leaving the track clear for the horses on the return cut. This defect in distributing the cut grain as it falls from the knives appears to be the principal objection to this machine. Burgess and Key's clearing apparatus, if properly constructed, may probably remedy this evil, and render the machine much more perfect in its operations than it has been heretofore.\*

*W. M. Dray and Co.'s Machine* (English) is of exceeding compact form. It is entirely without a reel for gathering in the corn to the cutters, and requires only one man as a reaper to watch the cutters and discharge the corn as it is received upon the board or wooden platform behind. The cutters are five feet wide, and it reaped 2,250 square metres in 35 minutes.† The peculiar features of this machine are its portable construction and the receiving-board, which moves upon an axis. By the pressure of the reaper's foot the platform is tilted, and the grain drops behind, ready for the person who follows to bind and tie it up. The only objection to this process is that it requires the binding to be done immediately; otherwise the horses, at every succeeding cut, would trample over the previously reaped corn, and, moreover, would effectually impede the working of the machine. Under these circumstances, the track previously cut must be entirely cleared, in order to prepare for that which succeeds. This operation of the tilting-board, which throws the grain upon the track behind, appears to be the chief defect in the machine. A different clearing apparatus, to effect the discharge of the cut grain in a lateral direction, would render this machine much more valuable. It would give time for binding up the grain into sheaves, and at the same time it would clear the track for the horses and machine in their return for the next cut.

The last machine (the Canadian), which completes the three groups, was withdrawn, from some cause that was not explained.

On a careful examination of the several machines entered for the prizes, it will be observed that in every one of them an attempt was made to effect a certain purpose by certain means of transmission, calculated to retard rather than facilitate the progress of cutting. In machines of this description, where horses are employed as a motive power, it is desirable to make the action as easy as possible, and to effect the motion of cutting, reaping, &c., with as light wheels and gear as practicable. Now, these small wheels and their attachments at present in use appear to me to be the very worst and heaviest parts of the machine; and I would earnestly urge upon the makers of reaping machines the absolute necessity of increasing the diameters and dimensions of the gear which works the cutters, and at the same time to fix and attach the journals and ends of the shafts into one casting, so that they cannot vary in position, but must move, and, technically speaking, go and

\* A trial has been made of this apparatus since the above was written, but without success. I am not prepared to state from what cause, but will take an early opportunity of ascertaining the facts, or of witnessing its performance at some future trial.

† Some say 34 minutes.

come with the machine. These alterations being made, the proper clearing apparatus being attached to the receiving-boards, we might then look forward to the labours of the harvest being performed with much greater certainty and effect than is now accomplished by the present machines. The following table, which Mr. Edward Combes has kindly handed to me, gives the results of the different trials as follows:—

TRIAL OF REAPING MACHINES on the farm of M. Dailly, at Trappes, near Paris, August 2nd, 1855.

No.	Name.	Country.	Breadth of cutting.	Square metres.	Time.	No. of horses.	Price.	Remarks.
1	Courmier .....	France ..	ft. 4 3	1628	67	1	£ 26	Driving-wheel 3 ft. 3 in.; crank makes 11 revolutions to 1; knives not serrated.
2	Atkins .....	America .	5 3	1733	24	2	36	Diameter of driving-wheel 4 ft. 4 in.; crank makes 24 to 1.
3	Lawrent .....	France ...	5 0	1825	66	2	—	Diameter of driving-wheel 3 ft.; crank makes 15 to 1; similar to Bell.
4	Mazier .....	France ...	2 7	Broke down.		1	—	Small machine, cutting either right or left, by means of the cutting-frame turning on a central moveable axis; knives worked by wheel and worm.
5	Manny .....	America .	4 6	1900	26	2	26	Diameter of driving-wheel 2 ft. 6 in.; crank makes 13 to 1.
6	Crosskill's Bell's	England .	5 0	Broke down.		2	45	—
7	M'Cormick ..	America .	5 6	1987	17	2	30	—
8	Dray .....	England .	5 0	2250	35	2	25	—
9	The Canadian.	England .	6 6	Retired.		2	—	—

From the above table, it will be seen that M'Cormick's American machines performed the most work in the least time; that Atkins' and Manny's executed as nearly as possible the same quantity of work in the same time, there being a fraction in favour of Manny; and that Dray was the next in the order of time and the quantity of work done.

Reducing the whole work done to a standard of two thousand square metres, the competing machines will stand thus—

M'Cormick's	would cut 2,000 metres in	27.36 minutes.
Manny's	"	17.00 "
Atkins'	"	27.69 "
Dray's	"	31.11 "

If we are, therefore, to take the quantity of grain cut in the least time, Mr. M'Cormick's machine will stand first on the list, and the others according to their position in the above scale.

In the investigation of this subject, we have hitherto confined our observations to the machines. There is, however, another element equally important and essential to the efficiency of the process of reaping, and that is the preparation of the land; and in fact, before we can look forward to ultimate success, the surface must be levelled, and the present injurious system of ridges dispensed with. To a casual observer it is obvious that the present state of cul-

ture, as pursued in most parts of Europe, is not calculated to afford the necessary facilities for ensuring a successful progression to machinery. To apply machinery successfully to the labours of the farm, the land must be prepared, not for hand, but machine labour; and the successful introduction of reaping machines will chiefly depend upon the preparations that are made for their reception. The system of ridges may be tolerated and overcome by the sickle; but to give to the new process of reaping by machinery its full effect, a totally different plan of operations must be pursued, and the fields laid down with a perfectly smooth surface. The larger description of stones and other obstructions should be removed; and in place of the superfluous water not required for the nourishment of the plants being allowed to flow between the ridges on the surfaces of the field—sweeping, in heavy streams, as it now does, everything before it—the new system of drainage will require to be adopted, and the water carried under in place of running over the surface.

To make a machine, such as the reaping machine, work well, everything must not be left to the machine; the agriculturist must do his duty as well as the engineer; and that duty once duly performed on both sides, a certainty of action will be secured, which will solve the problem, and effect satisfactory results. Having arrived at these happy results, we may then, *and not till then*, reasonably look forward to the crops being well and quickly gathered by machinery, to the exclusion of a laborious process, effected with difficulty, and often imperfectly, by the human hand.

W. FAIRBAIRN.

I regret that the Exhibition closed without any declared progress in the great problem of steam cultivation. Hopes had been entertained that a steam cultivator, the invention of Mr. Romaine, brought from Canada, promoted by funds voted by the Canadian Legislature, would have been so far perfected that it might have been presented to the jury for examination; but unforeseen difficulties beset the path of the inventor, and he was compelled reluctantly to give up the cherished hope of signaling his machine by a public display at Paris.

Still it is just to Mr. Romaine that I should bear testimony to what I saw, and to the point which he had attained. I saw in a field near the walls of Paris Mr. Romaine's machine, carrying its own boiler and engine, travel by its own locomotive power 100 yards up the field, and break up and cultivate the land in its course.

Besides taking the lead in promoting cultivation by steam, the Canadian legislature voted a large sum of money (£10,000 currency) for the general objects of the exhibition, and sent some good machines and a magnificent collection of products.

The Exhibition of 1851 brought favourably into notice the great resources of Canada, increased the general confidence in the security of sums invested in its public works, and facilitated the introduction of capital into the colony. The display which was made at Paris cannot fail to fix on broader and firmer foundations the confidence in the natural resources of the colony, and in the intelligence and public spirit of its inhabitants.

The sales of English agricultural machinery have been for some years past much more extensive to the German states than to France.

Belgium exhibited some good machinery; the first prize for churns and for chaff-cutters were awarded to her. The Commissioners of her Government were diligent in turning the Exhibition to good account. They purchased several of the best English implements, which will no doubt speedily be reproduced, possibly with improvements, in her active and well-appointed workshops. It may be sufficient for the purposes of this report, to say of the foreign agricultural machinery in general—the collection of which was very large, and of which only a small portion was subjected to trial—that, without venturing to express an opinion of the merits of some of these implements, or of their adaptation to the different localities where they were employed, it did not appear to our machine-makers or to our consulting engineer that they offered models which it would be important to adopt for the purposes of English farming.

Gold medals of honour in Class III. for agricultural machinery were awarded to six individuals only. Five of these exhibitors were from England, and one from the United States of America.

*Grand Medal of Honour.*

Mr. McCormick, of Chicago, United States of America, for his reaping machine.

*Medals of Honour.*

Messrs. Garrett, Saxmundham; Hornsby, Grantham; Howard, Bedford; Ransome, Ipswich; Crosskill, Beverley; for agricultural machinery.

AGRICULTURAL PRODUCTS.

The collection of agricultural products was very large, and of high interest. To give a detailed account of them would extend this report beyond reasonable limits; nor for the purposes of this report does it seem necessary, as in the majority of instances there was no question of comparison or competition.

The fine wools of Germany were a class to themselves.

The tobacco of Cuba was without a rival; various specimens, the produce of the soil of Europe, followed at a respectful distance.

In the important article of flax, France, Belgium, and Ireland received an equal award from the jury.

The rich and varied products of the wide domain of France and Algeria were set forth in long and imposing array.

The agricultural products of these islands were combined in a single collection, formed by my colleague, Mr. Wilson, under the directions of the Board of Trade. It was very complete, carefully arranged and classified, and called forth the warmest commendations of the jury.

No unimportant share of the interest of the Exhibition was supplied by the dependencies of the British Crown, by India, by the continent of Australia, by Van Diemen's Land, by Jamaica, Guiana, &c. The value of their contributions was fully appreciated, and suitable acknowledgments were made by the votes of the respective juries.

Amid all the beautiful specimens of wheat from Algeria, from Australia, from Van Diemen's Land, from Canada, it was admitted that no single specimen equalled in excellence the specimen sent from South Australia to the Exhibition of 1851. It does not appear, from the information that has reached me, that these fine grains sown in this country retain the excellence of their original type. Grains matured under a hot sun form, according to the commonly received opinion, the most valuable seed; but in the case of wheat the practice seems to be the reverse of this. It is certain that our strong and prolific wheats are imported largely into France for seed. Not less than 5,000 qrs. were imported early in last autumn for this purpose. These strong and coarse wheats, no doubt, refine in colour and in quality under a more southern sun. It does not appear that the exchange of the fine grains of the south to our northern latitudes is attended with results equally advantageous.

It would be desirable that some careful experiments should be made to induce to greater certainty on this point of so much interest.

Among the specimens of artificial manure, that made from fish, the *Engrais Poisson*, was considered by Professor Wilson specially worthy of notice.

The fish, after having been steamed, are pressed into cakes and dried. In this form the manure is said to contain from 10 to 12 per cent. of nitrogen, and from 16 to 22 per cent. of phosphate. The price, about £8 per ton.

PROGRESS SINCE 1851.

In reply to the second, and not the least interesting question—"What progress has been made since 1851?" a reply may confidently be given that progress has been made on every side. In machinery, in scientific acquirements, in field practice; and to such an extent, that beyond all question, the productive powers of these kingdoms have been more largely increased within the last four years than within an equal space of time at any former period.

In machine making, though some interesting novelties have appeared, the characteristic feature has been the con-

stant improvement, tending to perfection, of our established implements, and a great extension of their use through the body of the farming community, a fact significant of the superior intelligence which is now brought to bear on farming affairs, promising a sure and continued progression.

First on the list in point of interest, first in its remarkable increase, stands steam machinery.

No farmer who has ever had a steam engine on his farm will ever again be without one; no farmer who has ever thrashed his corn with steam power could bear again to see his horses toiling in the wearisome circle, now jerking onwards when the whip sounds, now brought almost to a stand-still, when the machine is clogged by a careless feeder. The regular stroke of the untiring steam engine gives excellence to the work, keeps everybody in his place, and introduces among men, even the most careless, something of its own exactness and precision.

It was thought a remarkable thing that in the year 1851, one firm, Clayton and Shuttleworth of Lincoln, a firm not known to the agricultural world ten years ago, should have constructed and sold in one year 140 portable steam engines. Since 1851, the annual progress has been as follows:—

Engines.		Aggregate horse power.
1852	sold 243	1,349
1853	„ 293	1,723
1854	„ 363	2,297
1855	„ 491	3,332
<hr/>		<hr/>
1,390		8,701

Besides the constant increase in numbers, it will be seen there is a constant increase also in the power of the machines. In the year 1851, each engine averaged scarcely the power of five horses. In the year 1855: they averaged nearly seven.

It is computed that 90 per cent. of these engines are used for agricultural purposes in England; the remaining 10 per cent. are sent abroad, or are used for purposes not connected with agriculture. We have therefore in the last four years, deducting 10 per cent. from the whole number of 8,701, a power equal to 7,831 horses added to the force of the farmer from one firm alone. Messrs. Clayton and Shuttleworth direct their attention exclusively to steam engines, and to machinery moved by steam power. This devotion of the undivided attention to one class of objects is of itself an indication of progress, and conducive to perfection.

The increased power afforded by steam has induced to improvements in all machinery moved by steam, in none more than in thrashing machines. The corn now is commonly delivered from the stack upon the machine, and delivered from the machine into sacks ready for market; a great economy of time and of money. For these and similar processes, the use of steam power is making rapid strides, and will continually extend itself, to the great help and furtherance of every operation to which it can be applied.

Our leading machine-makers all concur in attributing marked results to the Exhibition of 1851.

Messrs. Garrett have foreign orders, arising from connexions formed at the Exhibition, still coming in. One customer in Hungary has had not less than £8,000 worth of machinery, chiefly drills and thrashing machines. Drills have been improved by a new steerage patented in 1854.

Chambers' patent manure distributor is a new instrument, the invention of a practical Norfolk farmer: it will sow from 1 to 100 bushels of artificial manure per acre, delivering it with great regularity, and is excellent for the simplicity of its construction.

Drills for liquid manure are still undergoing improvement. If found useful in this country, how much more valuable are they likely to prove in the dry and sun-burnt plains of Southern Europe!

Messrs. Hornsby consider the improvements in thrashing machines to be equal to a new creation of the implement. Their business has increased threefold since 1851.

Messrs. Howard find the demand for improved implements to come now mainly from the tenant farmers: formerly it was in a great degree confined to amateurs and large pro-

prietors. The business of all the leading machine-makers has doubled since 1851.

Messrs. Ransome concur as to the improvement in thrashing machines, and as to increased demand for machinery. Much has been done, but much remains to be done still.

Messrs. Smith and Ashby date the wide diffusion of good implements from the Exhibition of 1851. The Paris Exhibition has opened to them several new sources of trade, in France, Algeria, and Germany, and has led to the appointment of an agency in Berlin for the introduction of improved machines into Germany, at the instance of a spirited merchant of that city.

Messrs. Bentall have found the demand for improved machinery increase largely since 1851.

Such has been the uniform tenor of the replies from all the leading machine-makers from whom communications have been received. There is a host of local makers, equally alive to the importance of improvement, and adding largely in their respective spheres to the stock of good implements.

#### AGRICULTURAL CHEMISTRY.

In speaking of the progress of agricultural chemistry, the name of Mr. Lawes must be placed by English farmers in the first place of honour. Without entering on the high controversy between Baron Liebig and Mr. Lawes, lately revived with increased animation, the English farmers have wisely accepted the teaching of Mr. Lawes, based on experiments, in the care and accuracy of which full reliance may be placed, and the results of which are open to the view of all. They have learnt that the approved artificial manures are not mere stimulants, but agents of fertility which, when properly applied, may be depended upon with certainty to produce a crop. The principles on which the growth of corn depends are better understood. The repetition of corn crops on the same soil can no longer be considered as necessarily faulty in principle, and to be unconditionally condemned. It is rather a question of expediency, to be decided by the costs of manure and of produce.

These lessons the English farmers have learnt from Mr. Lawes. They have accepted them with becoming gratitude. They are practising them with increasing confidence, day by day, to their great and proved advantage.

Mr. Way, to whom also the farming world is under the greatest obligations, has snatched a few moments from his professional pursuits to furnish me with the following sketch of the general progress of agricultural chemistry.

This department of applied science is now attracting to itself the attention of able chemists in all countries; and the contributions to knowledge resulting from the various investigations have, during the last few years, been very considerable. To attempt anything like an account of these results in this place is obviously out of the question, and we content ourselves with little more than an enumeration of the principal and most interesting investigations.

In this country, Mr. Lawes has continued his experiments on the laws concerned in the feeding and fattening of animals, taking, for the objects of trial, pigs and sheep. The number of animals experimented upon, the intelligence and care brought to bear upon every detail of the experiments, and the very considerable expenditure which has evidently accompanied them, place these investigations far in advance of any of a similar kind that have been undertaken elsewhere. Although the results are of a practical character, the experiments of Mr. Lawes must not be classed with the very numerous trials on the feeding of animals that are to be found dispersed through agricultural publications, and which are *merely* practical, being undertaken without reference to general principles. The results of Mr. Lawes' inquiries are too numerous to be stated here; but they seem to point out that a just balance of the different constituents of food is of more importance in the feeding and fattening of cattle than a predominance of any one; that neither the albuminous nor farinaceous elements of food have an exclusive value for the purposes to which they are applied; and that the classes of vegetables which are peculiar in containing a high proportion of nitrogenous matter are not necessarily, from that circumstance, the most adapted in practice to produce that part of the animal

body (muscle) which most resembles them in composition. According to Mr. Lawes, therefore, the valuation of foods in relation to their contents in nitrogen is attended with much fallacy.

Amongst other papers, Dr. Vœlcker, of Cirencester College, has published an account of experiments made with a view of ascertaining the cause of the fertility produced by burnt clay when used as manure. He has arrived at the opinion that the effects are partly mechanical, but principally due to the liberation of potash from silicates of that alkali existing in the soil, but only slowly available until released by torrefaction.

Mr. Way has published two further papers on the important subject of the absorption of manure by soils, in continuation of his first research on this subject, which was published in 1850. Mr. Way attributes the power possessed by soils to remove various alkaline bodies (as potash, ammonia, &c.), from solution in water, to the existence of a class of double silicates of alumina and another base, which is generally lime or soda. Mr. Way has succeeded, for the first time, in producing this class of salts; and he argues, from the effects observed in soils, that these latter contain the silicates in question in small quantity, and hence their power to preserve soluble manure from loss by rain and drainage. His second paper on this subject refers to the action of lime on soils; and he endeavours to show, from the large quantity of ammonia existing in almost all soils, which, according to his experiments, very far exceeds the doses of this alkali usually applied in manure, that lime acts much in the same way as ammoniacal manures themselves, by furnishing indirectly a supply of nitrogen to plants. The effects of over-liming are accounted for in the same way.

Mr. Way has also given an account of his examination of certain beds lying immediately below the chalk formation, which contain large quantities of what is known to chemists as "*soluble silica*." This form of silica has not hitherto been met with naturally, except in the case of some strata in the Department des Ardennes, in France, which were examined four or five years ago by M. Sauvage. From their peculiar nature they are supposed to be available with advantage for many purposes in the arts, and as a source of soluble silica for agricultural use.

The subject in the chemistry of agriculture, which has lately, however, attracted the greatest share of attention, both in this country and abroad, is that of the source from which plants derive their *nitrogen*. It has been satisfactorily proved that plants growing in the ordinary way often contain more of the element nitrogen than they can obtain from the soil in which their roots are placed; and it is obvious that in some way or other this accumulation is derived from the atmosphere. Now, the air surrounding the globe is composed of a mixture of nitrogen and oxygen gases in the proportion of about four parts of the former to one part of the latter; it also contains small quantities of other gases, such as carbonic acid, nitric acid, and ammonia. The question at issue is, as to whether plants can, under any circumstances, make use of the great bulk of the nitrogen of the air in building up their tissues, or whether they derive the observed excess from the ammonia and nitric acid in the air. This question, the interest of which, both in a purely scientific and agricultural point of view, can hardly be overrated, has enlisted the energies of chemists on both sides, and has given rise to some admirable researches. It has also involved the extended examination of air and rain-water, in order to ascertain how much ammonia and nitric acid are usually contained in the one, and brought down by the other. The principals in this discussion in France are M.M. Boussingault and Ville; both of these chemists have made extended series of experiments on plants grown in glass-cases; their conclusions are, however, diametrically opposite: M. Boussingault contending that plants cannot make use of the atmospheric nitrogen, but must be indebted to the nitric acid and ammonia in the air for their supply in excess over that furnished by the soil; M. Ville maintaining that in the absence of both of these, an increase of nitrogen in plants still takes place. A Commission of the French Academy of Sciences, recently appointed to look into this matter, leans rather in its report to the side

of M. Ville, but the question is still far from being set at rest.

M. Barral has determined the quantity of ammonia and nitric acid brought down by rain in Paris. M. Boussingault has repeated these experiments as regards ammonia in Alsace, and finds the quantity very much smaller than in the rain of the city, a circumstance which we should be prepared to expect. M. Boussingault has also examined, with the same object, the water of fogs and dew, and of rivers and streams. M. Ville has carefully determined the ammonia existing in the air both in the interior and suburbs of Paris.

Mr. Lawes and Dr. Gilbert have published the results of an inquiry into the quantity of ammonia and nitric acid in rain falling at Rothamstead, in Hertfordshire. The methods of determining small quantities of nitric acid are at present so imperfect, that Messrs. Lawes and Gilbert have not thought it well to publish their results as to this substance, but they are led to believe that in quantity it exceeds that of ammonia in rain. Besides the names we have mentioned in connection with these researches, other continental and English chemists might be referred to, if circumstances admitted of greater amplification. It is, however, obvious, that in this hurried sketch we have omitted all notice of many investigations on this and other subjects of agricultural chemistry which might well claim attention in a more extended review.

Finally, we must not omit to mention that the trade in artificial manures, which is rapidly rising into such national importance, especially in England, is receiving the most important aid at the hands of chemical science. Not only are the various waste substances of manufactures and of daily life worked up into available form, but the manures produced by chemical means, more especially the superphosphate of lime, are daily improving in character, mainly through the suggestions of chemists who have specially devoted themselves to this branch of science. Fresh sources of guano have also been discovered, and new supplies of substances useful to the farmer have in several places been obtained.

It is, therefore, not without reason that we congratulate ourselves on the progress which has within the last five years been made by that department of agriculture which is based upon chemical science.

#### FIELD PRACTICE.

The greatest improvements in cultivation and management have taken place in the strong lands. Draining is the foundation of all these improvements. Draining, now better understood and generally well executed at a sufficient depth, has changed the character of whole districts, turning unmanageable and unprofitable soils into easy-working and productive land.

It would be interesting to ascertain the extent of land drained each year; but no sufficient data exist for a reliable estimate. Draining operations are carried on by means of the public loan, the capital of private companies, and of individual proprietors.

Of the public loan of £4,000,000, the sums issued for works in each of the last three years have been:—

1852	...	...	...	...	£410,478
1853	...	...	...	...	318,637
1854	...	...	...	...	322,728

£1,051,843

What proportion do the lands drained by the public loan bear to the lands drained by private capital? If the example of this district should be a clue to the whole area of the country, the lands drained by the public loan would not be more than one-fourth of those drained by private capital. In such case, the total sum expended in draining for the last three years would amount to £5,257,615, and allowing £5 for the expense of an acre, the extent of land drained would exceed 1,000,000 acres. This sum, or whatever sum may have been expended in draining, will have been capital supplied mainly by the proprietors of land. A sum equal to the above in amount has been expended, mainly by the tenant farmers of the three kingdoms, in the pur-

chase of a single article of manure; and this is not a vague estimate, but an ascertained certainty.

The sales of Peruvian guano by Messrs. Gibbs for the last three years have been:—

	Tons.
1852 ... ..	118,000
1853 ... ..	135,000
1854 ... ..	177,000
	430,000

Allowing £12 per ton for cost and carriage, the sum expended amounts to £5,160,000.

To this must be added the large outlay on linseed cake, on bones, rags, on minerals containing fertilising principles, on lime, plaster, &c. With these combined efforts on the part of the owners and occupiers of the soil, there can be no danger in asserting that the productive powers of these islands have largely increased, and are continually gaining new force.

I have said that the most marked improvement has taken place on the strong lands. Draining and autumn cultivation, materially assisted by good implements, have enabled the occupier of strong land to add Swede turnips to his course of cropping. The importance of this addition is beginning only to make itself felt. This root, which, with its different varieties, created the value of the light lands, is now performing a service almost as great to the strong lands—not, as on light lands, for feeding sheep, but for feeding cattle. The quality of the turnips grown on strong lands is greatly superior. The land will bear the whole crop to be carted off to feed cattle in yards. Cattle supply manure, manure gives corn. It is difficult to estimate the addition, in meat and in grain, which this alternating process will surely afford.

It may be thought by some that too much stress has been laid on the value of improved implements. It may be worth while to examine the point more closely.

What saving might be effected on a farm of 200 acres of arable land (the rental, say 25s. per acre), drained and laid into fields of a suitable size, by the use of good implements? All land is ploughed at least twice a year. The difference in labour between ploughing drained or undrained land is very great.

It would be an estimate much below the mark to put it at 1s. per acre for each ploughing.

For the year, 2s. per acre.

The next process would be sowing the seed.

On the old system, 2½ bushels of seed wheat would be sown broadcast per acre.

On the new system, with an improved drill, 1½ bushel would be sown, with better results.

There would be a saving, therefore, of one bushel per acre on the 50 acres sown with wheat, which, at 7s. per bushel, amounts to £17 10s., or per acre, over the whole area, 1s. 9d.

On 50 acres of barley there would likewise be a saving of one bushel of seed per acre, which, at 4s. per bushel, would give a saving per acre of 1s.

Next comes the preparation of the grain for market. There are to be thrashed the produce of 50 acres of wheat, at a yield of four quarters only per acre, 200 quarters; of barley, 50 acres, at a yield of five quarters per acre, 250 quarters. The cost of thrashing wheat by the flail and dressing is 4s. per quarter; by an improved steam machine, 1s. 6d. Saving on 200 quarters of wheat, £25, or per acre 2s. 6d. The cost of thrashing barley by the flail is 3s. per qr.; by steam machine, 2s. Saving on 250 quarters, £12 10s., or per acre 1s. 3d.

Total saving by the use of drill and thrashing machine, 8s. 6d. per acre, or one-third of the rent, 25s.

Besides the economy and direct gain to the farmer, the saving of one bushel per acre of the grain employed in reproduction is an important aid to the consumer, and when multiplied over the total area of land still cultivated under the old system would form no insignificant addition to the annual resources of the country.

The rapid spread of useful information and of approved practice must be laid to the account in no small degree of

the *Journal* and of the meetings of the Royal English Agricultural Society. The meetings of the Society, held in each year in different districts, enforce precept by example, and communicate every variety of useful information in the most attractive form.

Such are some of the proofs of the onward march of agriculture, and of the progress which it has made since the Exhibition, and, in many points, by virtue of the Exhibition of 1851. Still we feel ourselves to be only on the threshold, and much remains to be done. We ask of science to penetrate yet deeper into the secrets of Nature's laws. We ask of mechanical art to bring to our aid in the field the mighty agency of steam.

We call upon the farmers to continue and increase their efforts: so alone will they be able to keep pace with the demands made upon them by a population ever increasing in numbers and in wants, and to maintain the place in the front rank which they now honourably hold.

The verdicts of the Paris jury will be a warrant that no jealous or narrow spirit ruled its deliberations.

It is a pleasing duty, in closing this report, to be permitted publicly to acknowledge, not only the personal courtesy, but the spirit of fairness and candour, which characterized the entire conduct of my colleagues of all nations. It was my fortune, in the Council of Presidents and Vice-Presidents, and as one of the Committee of seven for the final revision of the awards, to assist in the proceedings of the Commission to their close. The same honourable spirit animated this high council, under the immediate guidance of the illustrious Prince its President, who himself afforded an example to all, of fearless impartiality and even-handed justice.

I have the honour to be, &c.

J. EVELYN DENISON.

## TO THE FLOCKMASTERS OF THE UNITED KINGDOM.

GENTLEMEN,—Having perused with the greatest interest and pleasure the lecture delivered by Professor Simonds (Veterinary Inspector to the Royal Agricultural Society of England), on the subject of parasitical insects in general, but more especially those producing the *scab* in sheep, and fully concurring with that gentleman as to the cause of, and also the treatment of that disease, which I consider most judicious and effective; I feel much satisfaction in making known to you at the earliest possible period, that the remedies I am now offering to the flockmasters are closely identical with those recommended by the learned professor. I need not say that to be supported by so high an authority, cannot but be highly flattering and gratifying to me: in support of which, I beg to refer you to an important testimonial (in another column) kindly furnished me by the farm-bailiff to the Marquis of Salisbury, of whose flock *one thousand sheep* were infected with *scab*, and which were *perfectly cured* by the use of my *specific*.

Permit me also to draw your attention to the importance of *first dipping* the sheep in my Composition, to destroy the travelling *scab-mites* in the fleece; and then, after an interval of a day or two, come down upon the *scales* or *scabs* with a dressing of my *specific* or *ointment*. The latter, in course, being of an unctuous nature, is sometimes preferred; although, I believe, both are *equally* effectual.

The luminous and graphic description given by Professor Simonds has so thoroughly established the theory which I have ever maintained, and shewn to you, as representing the real character and nature of this loathsome and ruinous disorder and its treatment, that I am more than ever encouraged to urge such of you as are so unfortunate as to have it in your flocks to adopt, for your own sakes, the remedies that I offer you.

Leicester House,  
Great Dover-street, Borough,  
London, April 15.

Believe me to remain,  
Yours truly,  
THOMAS BIGG.

\* \* \* See Advertisement in another column.

## PLATE II.

## Mc CORMICK'S REAPER,

AS IMPROVED BY MESSRS. BURGESS AND KEY,  
AND TO WHICH THE FIRST PRIZE OF THE  
ROYAL AGRICULTURAL SOCIETY OF ENGLAND  
WAS AWARDED IN 1855.

McCormick's Reaper was introduced to the English farmer by Messrs. Burgess and Key in 1851. Practical experience has proved that the sickle-edge knife is the only one which will cut our crops without clogging, and stand to its edge any length of time. This machine is as wide as Bell's, and considerably wider than Hussey's, yet the power required to work it is one-third at least less than either of them. Previous to last harvest it required two men to work it—one to drive and one to rake the cut crop off. Where the crops were light it answered well; but where the crops were heavy it was very hard work for the man to rake off, and it was therefore considered desirable that the machine should be self-acting and deliver the corn in swathe; and the Royal Agricultural Society, believing that by combining McCormick's knife with Bell's delivery a good machine would be produced, in 1853 gave the prize to Bell's Reaper, recommending such combinations to be made. It was attempted, but found to a great extent impracticable, on account of the arrangements of the parts in Bell's Reaper not admitting a knife of the same angle as in McCormick's own Reaper, so that in fact it had the disadvantage of clogging, without decreasing to any great extent the enormous draught to the horses, which was one of the chief points aimed at. It was also a serious objection that the man who steered walked behind both horses and machine; it was not only hard work, but he was in the worst position to see where it was going. The web delivery apparatus was also found to be so extremely complicated and liable to derangement that its operation could not be depended on with any degree of certainty; and the great power it required was another serious item.

With a knowledge of these facts, and the result of practical experiments made by *themselves* during the last four years, on farms in almost every county in England, Messrs. Burgess and Key were enabled last year to introduce Mc Cormick's Reaper with their Patent screw platform to the Royal Agricultural Society of England, and also to place machines in the hands of good practical farmers, so as to have their invention thoroughly tested during the harvest. The result is the award of the Royal Agricultural Society's prize of £30, and testimonials from every one who has used them. It will be seen, on reference to our drawing of the

Reaper, that the platform on which the cut crop falls has three Archimedian screws, the back one being longer than the first or second. As the machine moves forward the screws revolve, and the cut crop is screwed off and delivered in swathe, at right angles with the machine; and it is found that it takes no more power to work than it did to draw the man who before raked off.

The following is an extract from the report of the judges made after the adjourned trial of the Reapers at Leigh Court:—

“*McCormick's Reaper*, improved and exhibited by Burgess and Key.—This machine cut a clear track of 5 feet 6 inches; and in every operation in which it was tested exhibited a decided superiority. It cut with great precision both wheat and barley, standing and partially lodged; and in cutting through weeds and grass, showed no tendency to choke; the delivery is peculiar to this machine, and is the principal and most important improvement effected since last year; the corn, on being cut, falls on a series of rollers, fitted with Archimedian screws, by which it is delivered in a continuous and well-formed swathe at the side of the machine. This delivery being effected by the machine dispenses with the attendant necessary in Dray's and Palmer's machines; and it was proved to be capable of cutting wheat and barley with no other attendance than a boy strong enough to drive a pair of horses. The draught also was much lighter than any other machine; and the horses were not required to travel faster, or to exert greater power, than would be necessary in ploughing in land of medium strength.

“The superiority in cutting in this machine appeared to be the result of a larger stroke in the knife, equal to  $5\frac{1}{2}$  inches; and the reduction in draught and speed the consequence of a more correct calculation and distribution of power.

“The Judges had no hesitation in awarding to this machine the Society's first prize of £30; and they feel assured that all who witnessed the trials will concur in that decision.”

SCAB IN SHEEP.—We are requested to insert the following important testimonial to the good effects of Mr. Thomas Bigg's Specific for Scab in Sheep:—

“Hatfield, Herts, 31st March, 1856.—Dear Sir, You are at liberty to state that I have used your Specific for the Scab on one thousand sheep this year, and find them to be perfectly cured, and free from disease.—(Signed) JOHN GARDNER, Bailiff to the Marquis of Salisbury.—To Mr. Thomas Bigg, Leicester House, Great Dover-street, Borough, London.”

MALT.—During the year from the 10th of October, 1854, to the 30th of September, 1855, 4,513,718 qrs. of malt were made, and 3,843,931 qrs. used by brewers and retail dealers in beer. Of this quantity, 3,464,160 qrs. were used by brewers and victuallers, and 379,771 qrs. by retail brewers. 3,557,074 qrs. of malt were used in England, 114,839 qrs. in Scotland, and 172,018 qrs. in Ireland.

METEOROLOGICAL DIARY.

BAROMETER.			THERMOMETER.			WIND.		ATMOSPHERE.			WEAT'R.
1856.	8 a.m.	10p.m.	Min.	Max.	10p.m.	Direction.	Force.	8 a.m.	2 p.m.	10 p.m.	
	in. cts.	in. cts.									
Mar. 22	30.06	30.12	36	46	42	N. West	gentle	cloudy	fine	cloudy	dry
23	30.12	30.17	31	52	40	N. West	airy	cloudy	fine	cloudy	dry
24	30.03	29.99	36	48	38	E.N.E.	fresh	cloudy	fine	cloudy	dry
25	29.91	29.81	36	43	37	East	fresh	cloudy	cloudy	cloudy	dry
26	29.81	29.81	35	43	34	East	strong	cloudy	fine	fine	dry
27	29.81	29.85	31	52	35	East	lively	fine	sun	fine	dry
28	29.90	29.95	27	46	37	East	lively	fine	fine	fine	dry
2	30.10	30.20	30	48	32	East	brisk	fine	sun	clear	dry
30	30.25	30.21	24	51	32	E. by S.	gentle	fine	sun	clear	dry
31	30.18	30.03	25	61	39	E. by S.	airy	fine	sun	clear	dry
April 1	29.93	29.85	39	67	52	S.W. & S.E.	gentle	fine	sun	clear	dry
2	29.74	29.78	46	64	50	Southerly	brisk	fine	cloudy	cloudy	rain
3	29.84	29.72	44	54	48	S. by W.	strong	fine	cloudy	cloudy	wet
4	29.67	29.77	45	55	44	S. by W.	var.	fine	sun	fine	dry
5	29.60	29.36	37	55	42	South	gentle	fine	sun	fine	dry
6	29.27	29.27	40	55	43	S. by E. & W.	gentle	fine	sun	fine	showery
7	29.40	29.46	37	55	44	Westerly	airy	fine	sun	fine	showery
8	29.27	29.22	43	52	45	Westerly	fresh	cloudy	cloudy	cloudy	showery
9	29.27	29.27	37	52	47	West by S.	fresh	fine	sun	cloudy	showery
10	29.15	29.45	44	54	50½	W. by N.	fresh	cloudy	fine	fine	showery
11	29.65	29.60	49	54	51½	S.W., S.	gentle	fine	cloudy	cloudy	showery
12	29.49	29.55	49	69	47	W.S.W.	fresh	cloudy	sun	fine	dry
13	29.62	29.70	44	63	50	S.S.W.	gentle	fine	sun	fine	dry
14	29.73	29.72	42	54	50	N. East	brisk	baze	cloudy	cloudy	showery
15	29.81	30.07	42	53	42	N. East	brisk	baze	fine	cloudy	dry
16	30.11	30.11	38	—	38	N. East	brisk	cloudy	sun	fine	dry
17	30.14	30.14	36	50	41½	E., N.E.	brisk	cloudy	sun	cloudy	dry
18	30.14	30.09	40	55	46	E. by S.	airy	cloudy	sun	cloudy	dry
19	30.13	30.27	42	52	42	East	gentle	cloudy	fine	fine	showery
20	30.27	30.30	33	52	42	East	gentle	cloudy	sun	clear	dry
21	30.27	30.17	32	56	42	East	brisk	fine	sun	fine	dry

ESTIMATED AVERAGES OF APRIL.

Barometer.		Thermometer.		
Highest.	Lowest.	High.	Low.	Mean.
30.54	29.200	74	29	49.9

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
53.566	37.6	37.95

WEATHER AND PHENOMENA.

March 22. Smoky clouds; perpetual change.—23. Fine sun at 2 p.m. only.—24. Overcast, chilly.—25, 26. Fierce cutting wind; lull at sunset.—27. Very fine.—28. Not clear; cold night.—29, 30, 31. Fine; the month ends with splendour, and a peerless blue sky.

LUNATION.—Last quarter, 29th, 2h. 31m. p.m.

April 1. Superb; hot sun; heavy dark clouds.—2. Still fine; more clouds form.—3. Wet.—4, 5. Fine days.—6 to 11. A showery period; total

rain-fall here 1.17 inch.—12 and 13. Two fine days.—14. Night shower, yielding 0.275 rain.—15 to 21. Keen, steady, easterly winds; fine weather; very drying.

LUNATIONS.—New moon, 5th, 5h. 53m. morn.; first quarter, 12th, 4h. 52m. morn.; full moon, 20th, 9h. 14m. morn.

REMARKS CONNECTED WITH AGRICULTURE.

The general character of March was aridity, with rather low temperature, and much splendour of sun at its close. April came in fine, but clouds soon formed, and a showery period came on, which furnished a welcome supply of rain. This was succeeded by drying east wind, and at a low temperature. Works of husbandry have proceeded favourably, and everything is beautiful and of high promise. Mangel wurzel still holds out in the stores, but we observe no turnips. Hay grasses are quite green, and pastures are well rolled. With more heat and a renewal of showers growth would be rapid.

Croydon, April 21.

JOHN TOWERS.

## CALENDAR OF AGRICULTURE.

The work of the farm is now very pressing, and requires from the farmer every exertion and diligence. The planting of potatoes and beet-root must be finished, and the sowing of grass seeds and the hoeing of drilled crops must have constant attention. Sow Swedish turnips in the latter half of the month—purple and yellow top varieties, and continue with Aberdeen yellow bullocks as a later sowing. Plant cabbages, kohlrabi, savoys, and winter brocoli; these plants require a large supply of farm-yard dung. Sow rape to be eaten on the ground preparatory for wheat, and sow early white turnips for use in autumn.

Pare and burn lands constantly during this month, and prepare turnip and clay fallows for wheat. All dung heaps must be turned over for ten days before being used, that a fermentation may take place; all lumps and large pieces must be carefully broken and shaken out. Watered meadows may now be shut up for hay—gates and fences must be thoroughly repaired for summer use.

Cattle of all ages may now be sent to the grass fields; the milch cows in a well watered and fenced field; the store cattle arranged in the pasture fields according to age. A proper arrangement conduces much to the well-being and thriving of the animals. The calves of the year must be similarly arranged, the oldest in a grass paddock provided with water

and a shelter shed, and have one suckling daily, with clovers and vetches in racks. The young calves in the pens should have green food given them, in order to induce the eating of such food previous to being turned out.

The ewes giving milk must have oats and oilcake in troughs till the early vetches and rye be ready. Part of the green food may be consumed on the ground, or cut and placed in racks, or carried to the yards for soiling horses, cows, and swine; litter amply. As the land is cleared, plough it for a turnip fallow.

Hop-grounds are dug this month, and the bines tied to the poles—young hedges weeded, oak trees felled, bark stripped and dried.

Wash sheep by hand in a running stream a week or two before shearing commences: to prevent the maggot-fly depositing their eggs on the animals, sprinkle them from head to tail from a dredging box with a mixture of hellebore root powder and black brimstone,  $\frac{1}{4}$  lb. to  $\frac{1}{2}$  lb.

No month in the year brings more business to the farmer than the present, and if the work loses ground now it will rarely be recovered during the season. The preparation of the turnip and clay fallows is in the critical season; the first crops must be planted, and the rest prepared for with the utmost attention and dispatch.

## AGRICULTURAL REPORTS.

## GENERAL AGRICULTURAL REPORT FOR APRIL.

The long continuance of cold easterly winds has had the effect of keeping vegetation in check in all parts of the country; and the want of the usual supply of moisture at this period of the year, has been productive of some inconvenience to our graziers, whose pastures are unusually bare of grass. Nevertheless, our accounts of the general appearance of the wheat plant are very favourable, notwithstanding that it has made comparatively little progress. Barleys, too, though not much above ground, have required moisture; whilst oats, beans, and peas have been greatly in want of rain. The backward state of the spring has compelled most of the leading stockmasters to purchase large quantities of hay—which is daily becoming very scarce—at a heavy outlay of capital; indeed, in

some quarters nearly, or quite, the whole of the winter's supply of turnips, &c., is now exhausted. Both beasts and sheep, however, have been remarkably healthy, and scarcely any losses have resulted from disease. We find, however, that the lambing season has not turned out so favourable as in some previous years—numerous losses having been sustained in the northern districts.

The close of warlike operations has had its accustomed influence upon the corn trade. Buyers, under the impression that "peace signifies plenty," and with the growing conviction that we shall receive immense quantities of food from the Baltic and Black Seas, as well as the Sea of Azoff, have operated with great caution; and not a few of our farmers have evinced much anxiety to become sellers even at reduced rates. The trade has, therefore, been in an inactive state, and prices have had

a downward tendency. Now, to us, it is a matter of great doubt whether we shall receive anything like the quantity of corn from Russia this year that many parties seem to anticipate; and this opinion is, in a great measure, confirmed by numerous advices from merchants long resident in the northern and southern ports. They intimate that the quantity of grain, &c., at the various seaports ready for shipment, is unusually small; and they contend that, owing to the unusually severe sacrifice of life during the last two years, and to the immense numbers of people drawn from the land for military purposes, it will be impossible to bring down from the interior very large supplies of grain during the next three or four months. But assuming that we shall receive 1,000,000 qrs. of wheat from all Russian ports this year, the practical man must at once see that that amount of supply—when our wants are fairly considered—cannot have a very depressing influence upon value. We are not arguing in favour of any permanent advance in the quotations, because we consider such an event most unlikely; but, at the same time, our impression is that we shall not import more corn than can be conveniently consumed. In confirmation of our views in reference to the export of food from Russia, we may quote the following from St. Petersburg:—"We are informed that the conclusion of the war was followed in London by a rapid fall in the price of Russian commodities, partly provoked by the notion that Russia has accumulated quantities of merchandise of all sorts during the war, and that it must now dispose of them at a low figure. In calculating thus, the English merchants forget that throughout the war Russian exports have continued by way of land, and that thus we shall not be compelled to sell the old stocks cheaply. The supposition of a great quantity of Russian merchandise prepared in anticipation is equally erroneous. Russia cannot at this moment export any other grain than that already found in our sea-ports, or in their neighbourhood, since there would not be time to bring anything from the interior for the navigation of this year. The corn in store in the southern ports will have probably been already purchased on the account of French merchants. It is only, then, between the autumn and next spring that Great Britain can hope to find corn cheaper in Russia than in America." We must, as a matter of course, receive the above with some reserve; but, at the same time, it is evident that from the crippled state of the resources of Russia, a very large outflow of grain cannot be expected; hence, it follows that a low range in the value of English produce is an event not likely to happen this year.

A great scarcity of English barley continues to

be felt. That article has therefore sold briskly, on higher terms. The whole of the imports from abroad have been readily disposed of, on favourable terms. Much discussion has been carried on in reference to the stocks of wheat now in the hands of our farmers; and upon this important question appears principally to hinge future prices. That great inroads have been made upon last year's crop, must be evident to all engaged in the cultivation of the soil; still, when we bear in mind that many of our small farmers have wheat on hand—and at a time of the year, too, when their rick-yards are frequently "cleared out"—that the various local markets are steadily supplied, and that there has been scarcely any demand at the large outports to meet inland consumption, we are convinced that the actual quantity has been much under-estimated. The stocks of spring corn, however, are now reduced to a very low point.

The enormous produce of the potato crop in all parts of the United Kingdom last year, and the fine condition in which it was secured for winter use, are now more and more apparent. Even up to the present time, immense quantities are coming forward perfectly sound and fit for use. This important feature has no doubt greatly interfered with the consumption of the better kinds of food, and assisted to keep prices in check. The present prices in the London market vary from 35s. to 95s. per ton.

In Ireland and Scotland agricultural operations are very forward; indeed, they have experienced no interruption during the whole of the month. Shipments of grain to England have been small, and prices almost generally have been drooping.

The wool trade continues unusually healthy. In the manufacturing districts it is readily purchased at high prices, although nearly 50,000 bales of colonial will be offered at public sale in May. The rapid expansion of our commercial industry will no doubt ensure our farmers large returns for their wool, for a considerable period.

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#### THE REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

During nearly the whole of the month, the various markets have exhibited very moderate supplies of both beasts and sheep, whilst those of other kinds of stock have been small for the time of year. The demand having been active, the trade generally has ruled brisk, and prices have steadily improved. It must be a matter of no ordinary importance to our graziers to ascertain the causes which have led to so much activity in the demand; and the leading features in the trade at this moment are of a cha-

racter calculated to have great influence upon value for a long period. It will be recollected that for a considerable time we have contended that the imports of foreign stock would of necessity fall off, from the fact that France had become a great rival buyer both in Holland, Belgium, and Spain. When we consider that France imported last year more than double the supplies of stock received into England, it must be patent to the most casual observer that prices must be dear in the great producing countries on the continent; and when we bear in mind that the consumption of food in the United Kingdom has rapidly increased, it becomes apparent that prices must keep pace with the demand—regulated by the extent of supply. We have been accused of taking a very different view of late, of this important trade, than we did some two or three years since; but be it understood we have to deal with facts, not theories; and we have to avail ourselves of the best sources of information to clear up every mystery by which the trade may have been surrounded. Now, in 1852, 1853, and 1854, we imported more foreign stock than we actually required: we had little or no demand on French account, to check the enormous outflow from Holland to this country; whilst we drew average supplies of beasts and sheep from Spain, Holstein, Germany, &c. Within the last few months, however, the very reverse has been the case. Taken as a whole, our imports have been insignificant; the English grazier has had scarcely any competition to meet, and our labourers and artizans have been well and fully employed, consequently have been good customers to the butchers. Thus stands the question at this moment: and when we consider its future effects upon prices, we are fully convinced that live stock will be very dear throughout the year. France is still buying largely in the Netherlands; the war with Russia is over; capital is becoming more and more abundant; and France is exhibiting the same spectacle as England, viz., great commercial prosperity. Price, we need scarcely observe, will always be regulated by supply and demand. Supply, then, is limited; and the demand will, no doubt, continue active. Who, then, we ask, seeing these important changes in operation, would be disposed to contend that we have argued upon false assumptions, or that we have ever intentionally sought to mislead the grazier?

As shipments of linseed are being made from Russian ports at low prices, that article has been exceedingly heavy and drooping in price. Evidently the supply this year—because we must bear in mind that immense quantities will be received from India for several months—will be unusually large. The cake market has suffered in an equal ratio. The winter supply of food in our large

grazing districts is now almost wholly exhausted, and consequently the graziers have been compelled to use large additional supplies of dry fodder, frequently purchased at very high prices. It must be satisfactory to learn that the health of the stock, both beasts and sheep, has been good. The lambing season has passed off well, though we hear of numerous losses, owing to the severity of the weather.

The imports of foreign stock into London have been as follows:—

	Head.
Beasts .....	613
Sheep .....	849
Calves .....	462

Total..... 1,924

In the corresponding month in 1855 we received 4,253; in 1854, 4,760; in 1853, 14,787; in 1852, 5,444; in 1851, 10,289; in 1850, 4,667; and in 1849, 3,810 head. These figures will prove the soundness of our conclusions respecting price.

The annexed supplies have been exhibited in the great metropolitan market:—

	Head.
Beasts.....	18,427
Sheep.....	482
Cows.....	102,030
Calves.....	789
Pigs.....	2,375

The numbers of beasts are about the same as last year, but those of sheep exhibit a decline of 9,000 head. In April, 1854, there were shown in Smithfield 20,813 beasts, and 107,840 sheep. The arrivals of beasts in the month just concluded have been 9,800 from Norfolk, Suffolk, Essex, and Cambridgeshire, 1,800 from other parts of England, 1,720 from Holland, and 446 from Ireland, chiefly *via* Liverpool.

Beef has sold at from 3s. 2d. to 4s. 10d.; mutton, in the wool, 3s. 6d. to 5s. 8d.; lamb, 6s. to 7s. 4d.; veal, 4s. to 5s. 8d.; pork, 3s. 6d. to 4s. 8d. per 8lbs. to sink the offal.

COMPARISON OF PRICES.

	April, 1855.		April, 1854.	
	s.	d.	s.	d.
Beef ..	3	2 to 5	0	.... 2 10 to 4 6
Mutton	3	2	5 0	.... 3 2 5 0
Lamb ..	5	4	7 0	.... 5 4 7 4
Veal ..	3	8	5 0	.... 3 10 5 8
Pork ..	3	4	4 4	.... 3 6 4 8

Newgate and Leadenhall have been steady at very full prices. Beef, from 2s. 8d. to 4s. 4d.; mutton, 3s. 2d. to 4s. 8d.; lamb, 5s. 2d. to 6s. 4d.; veal, 3s. 10d. to 5s.; pork, 3s. 2d. to 4s. 8d. per 8lbs. by the carcase.

ESSEX.

The old adage, "that March comes in like a lion, and goes out like a lamb," was this year verified to the letter. Again, "A pound of March dust is worth a king's ransom," would, if calculated at the rate mentioned, defray our national

debt, but estimated comparatively was to undrained England at the time it came into use as stated—the comparative estimate of a forthcoming crop with a dry March and April, or its opposite a wet one, would in the event of the former be double; and therefore prevails also to a certain extent at the present time. Upon tenacious clay land it is more in itself than all other favourable circumstances put together, and never in our remembrance, we may say, has the land under wheat crop up to this time been more favourably situated; still there are drawbacks, as there must always be: the severity of the frost has operated severely upon the young wheat, both early and late in the season, and the plants are now generally found to be too scanty. Much speculation has consequently arisen upon this subject, the loss of plant being attributed to the injury sustained by the larvæ of insects, but upon which in our last report we gave an opinion to the contrary, and that the grubs found infesting the plants were an effect rather than a cause of the injury; and in that opinion upon closer examination we are more and more confirmed. All entomologists know that the larvæ of insects feed upon decaying vegetable matter in preference to that which is in a growing and healthy state; and the presumption is that the plants infested by them have been injured previously, either by frost or some other cause, and when in a dying state became attacked by them, which the unusually mild weather of January and February facilitated. In this opinion we are to some extent confirmed, from having drilled upon a portion of clover ley previously mown several varieties of wheat—all prepared and drilled on the same day, in a similar manner; upon four acres nine varieties were put in, which came up in succession, as the earlier or later character of the kind indicated, the whole being put in late in November, and consequently had not appeared above the surface when the severe frosts of December took place. Upon first coming up, however, no deficiency was noticed in the plant; but at the present moment a very great deficiency in some portions is found to exist—so much so, that twice the number of plants upon a square foot upon one kind is found over that of another kind on either side; and upon about one acre ploughed some time previously, the plant is far superior to that of any other. Upon observing the roots very assiduously upon the portion of the field referred to (the remainder having been in potatoes the previous year) a close examination was made, and small grubs in considerable numbers were found, and which it was apparent the roots were seeking. Two specimens of rough chaff wheat—the white and red—are a full plant; the Talavera and golden-drop the most deficient; indicating the hardy character of the former over the latter. In other instances the injury is traceable to the severity of the frost, which overtook the wheat grains whilst under the process of vegetation: those fairly established went on uninjured; but those not established, in porous soils, became so far injured as not to come up healthy, and ultimately died; facilitated, no doubt, by the attack of the grubs, by which they became infested. Whenever turnips, potatoes, cabbages, or indeed any description of vegetable is decomposing, myriads of grubs will be found attached to the roots; in fact it is one of the modes Nature has devised for freeing the earth of the decaying vegetable and animal matter upon its surface. In this operation all the beetle tribe are especially prominent, and whenever warmth and moisture prevail in the atmosphere, it is carried on more extensively than at any other period. But to return to our subject: taken as a whole, the prospect of a crop of wheat at the ensuing harvest is favourable; whilst that of all descriptions of spring-sown corn is more especially so, and the agreeable change of weather is now bringing everything into active life and vegetation. The prevailing cold weather of the past month has diminished all descriptions of winter food, and but little beyond mangold wurzel of any description can be found. The quantity of hay is unusually short, and it is advancing in price. Taking the past into consideration, we are of opinion that, as the severity of the winter set in earlier than usual, and the ice in the North Sea broke up soon afterwards, and the cold so prevalent in April from N.E. winds also took place earlier this year, we may predicate an earlier spring than usual; he whoever that stakes his reputation as a prophet upon the weather, it is said, holds it upon a precarious tenure; but with this knowledge we notwithstanding are inclined to the opinion as before stated. The preparation of the land for root crops has never been more fully carried out or better effected, and

upon the whole we may say that the cultivation of land in general has never been so high for several years past. Prices, however, are retrograding; almost every description of produce is 50 per cent. lower than in November last—wool and hay excepted: the former is now mostly out of the hands of the growers: the sudden start induced them to sell, and the downward tendency of every other production at the same time was a still further inducement. The grazing of oxen has, at late prices, been attended with numerous losses; and well might it be expected, when feeding upon oil-cake at a price equivalent in value to meat at 6s. 6d. per stone, and with beans linseed, and every other article in equal ratio. The store beasts were purchased also at a price equal to 3s. per stone in their lean state; yet with all these causes operating at the same time, many of our graziers purchased oxen at from 15*l.* to 19*l.* each, which they have been selling out at prices not exceeding 2*l.* advance, and in many instances far lower. Sheep have lately advanced considerably; but when it is recollected that a sheep-skin and offal realizes 10s. to 12s., it is equal to about 12d. per stone upon their dead weight, giving the butchers in their slang a “good pull” to start with. Hoggets, however, maintain their value; but ewes and lambs have been selling at low prices: pigs under four months old are also selling extravagantly high. The dry weather that now prevails is rather discouraging to the growers of mangold wurzel, as the soil is too dry to cause vegetation of the seed. It is, however, still in excellent season for depositing the seed, which under the prevailing state of the weather ought on no account to be previously steeped in water: sown dry it will take no harm; but, if sown in a moistened state, without rain sufficient to bring it forward immediately, mould is likely to ensue, and to destroy vegetation altogether: provided rain falls by the end of the month, or even a week later, it will be sufficiently early to produce a crop. Many farmers, however, in this district have sown for this crop a fortnight ago: the plant will be most likely to succeed, as fine showers have fallen since; but early sowing produces a tendency to run to seed, which becomes a considerable deterioration to the crop. We have been very particular in dwelling upon this subject, in describing how a crop may be best secured: by the assistance of this valuable root those farmers who still are fortunate in having it are not suffering from a scarcity of food for their oxen and sheep: those, on the contrary, who are without it are purchasing from their more fortunate neighbours at £1 per ton; and such indeed is the facility of growing it that no one need be without—unless from sheer inattention and carelessness. Prices of wheat have twice fallen, and on the succeeding market-days have again rallied. Stocks of flour are short; the quantity of wheat in the millers' hands is small, yet, notwithstanding, prices continue gradually to recede: no speculation whatever is on foot for English wheat, and when it is considered that it continues to sell at above its natural price, the probability is of a continuous decline in prices taking place up to the ensuing harvest. Potatoes everywhere are abundant, and selling at 3s. per cwt.: large breadths have also been put in under very favourable circumstances. The late frosts have checked the growth of grass and clover; the latter consequently will again be a deficient crop.—April 25.

#### NORTH NORTHUMBERLAND.

The late month (March) begun and ended the driest and coldest that has been remembered for many years past. Wind varying from N.E. to S.S.E., with a continuous withering blight on vegetation; trees and hedge-rows showing unmistakable proof of the ample supply of “March dust.” Field-labour was little interrupted, with the exception of a few mornings, when frost was too severe to admit the free working of seed-harrows; all other work progressing to the satisfaction of the farmer. At the same time, the entire abeyance of all vegetation on green herbage was making such undue consumptive demand on the turnip store, to supply the cravings of Nature for neat cattle and sheep, that by the end of the month supplies became generally very limited. April came in with milder atmosphere. On the 6th some refreshing rain fell; and again on the 9th and 12th we had distant thunder, with copious showers, which fell most opportune for those who had land to plough up for spring-sowing. To the 19th the weather was cold and ungenial, but for the last intervening days a milder atmosphere, wind S.S.W.; and the face of

Nature seems all that can be wished for at this critical period of the season. A green foliage is breaking out on the trees, and fields assume a little of richer colour. Store flocks of sheep, which have had bare picking for a sustenance, will have chance in a few such days of enjoying a full bite. Taking the lambing season generally, there is reason for thankfulness: casualties, which are always reported, will certainly not exceed former seasons with a full produce of lambs. Fat for the market will be short for some weeks hence, owing to the scarcity of nourishing feed. The same remark will apply to cattle, the home-stalls being very generally emptied earlier than usual; and, without supplies come liberally from the north, our markets will not be overstocked with large bullocks next month. On the upland districts the Cheviot flocks are about this time dropping their lambs, and a finer season, so far as gone, has not been experienced—only the early winter reduced both condition of the breeding ewe and the pasture; consequently, we cannot expect the milk abundant for the tender nursing. In our progressive preparation for supplies of the staff of life, wheat always classes first; and we must report the breadth sown *autumn* about or nearly medium, and *spring* the largest breadth sown for many years: the latter has braided slowly, but seems tolerably planted. Winter and autumn-sown are much complained of; thin, and in many places evidently faulty. Rolling and harrowing has been liberally applied, and, with continuance of the present fine weather, the tillering

of the plant will in all probability fill up what would otherwise be quite blank. Spring-sowing is all but finished, and generally well put in; oats and barley receiving a dry bed, and making good braird. The breadth seeded with oats may be set down about medium, barley considerably less than usual. Beans and peas also show good braird, all having been got planted with land in a good state of preparation. Potato-planting on many farms has been completed; seed plentiful. It is now fully twenty years since we had a supply of *the perishable esculent* in such abundance in the market. Hundreds of tons will be consumed by cattle, pigs, and horses. On the other hand, the turnip-store seems nearly exhausted; and, as a community, we cannot feel too grateful to Divine Providence for the prospect of early green feed, hay being scarce, and selling at a high figure. Straw plentiful, very little having been required for litter in February or March. The bulk of stacks to thrash will not exceed ordinary seasons, and believe less than usual of the wheat crop is held by the producer; the rule having been to market from the thrashing-floor, and will likely be brought out very sparingly as the supply of straw becomes less wanted. Our spring sales, as they come off, show no lack of purchasers; and the numerous "lets" of grass-parks recently on "both sides of the Tweed" have been knocked down at rentals 5 to 20 per cent. advance for pasturage. Labour in all departments of rural economy at full prices.—April 25.

## AGRICULTURAL INTELLIGENCE, FAIRS, &c.

**ALCESTER FAIR** was a flat and unprofitable one. Mutton brought from 6d. to 6½d.; beef, 6d. per lb. Some store pigs brought liberal prices.

**BRAMPFON FAIR** was well supplied, including a choice assortment of Galloways, some half-breds, and a sprinkling of shorthorns, the majority of the animals being well forward in condition, and in an excellent state for grazing. There was a good attendance of buyers, mostly from the south, and business was carried on with much spirit from an early hour in the morning until mid-day; after that time, the Yorkshire drovers, having completed their selections, a languor prevailed, and the remaining lots were not so advantageously disposed of. Prices ranged within a wide compass from £3 to £14 according to age, breed, and quality. Anything that was young, fresh, and likely to improve rapidly, was eagerly secured at terms somewhat inferior to those obtained last spring, leaving but little money for the trouble and expense of wintering. Of sheep there was an average display, but few lots changed owners, the greater portion of the flocks being sadly deficient in size and quality. In the pig department, a large number of young grunners were exhibited, very many of which met with a quick demand, at prices running from £1 to £1 6s. each.

**CHESTER FAIR**.—The attendance of buyers was larger than usual at this period of the year, and the number of horses shown was considerable. Everything desirable was quickly secured, but prices ran high. Good hunters brought as high as 90 guineas, and cart-horses ranged from 40 to 50. Saddle-horses were quoted from £30 to £40 each. As regards the stock market, there was a good show of milking beasts, all of which sold high; very little fat beef was exhibited, what there was sold from 6½d. to 7d. per lb. Sheep very dear. A small show of pigs, store animals fetching 10d. per lb.

**CLEOBURY MORTIMER FAIR**.—The attendance of farmers and dealers was large. The show of cattle was not so great as upon former occasions, but the quality was never surpassed here. The following are the prices: Beef, 6½d.; mutton, 7d. per lb.; store pigs, short supply, from 30s. to 60s. each; store bullocks and barren cows in great request, and realized high prices.

**COLCHESTER FAIR**.—The number of sheep and lambs penned was about 10,000, comprising some capital half-bred Leicesters, Norfolks, and Downs; they were principally hoggets, the supply of couples being comparatively small, but the lambs were in good condition. The prices asked being higher, the business in this department was rather slack, but towards the close of the day several lots changed hands; but buyers generally stood aloof, expecting the sums demanded for all

kinds of stock to be reduced. Hoggets fetched from 25s. to 50s.; two years old ewes, 40s. to 45s.; couples, 40s. to 50s.; store lambs, 12s. to 22s.; fat wethers, 5s. 4d. per stone. There was also a good show of fat beef, comprising some excellent Herefords and shorthorns, which found ready purchasers at prices varying from 14l. to 21l., or about 4s. 4d. per stone. Cows were few in number, yet tolerably good in quality, but the demand was slow.

**DEVIZES FAIR**.—There was fully an average supply of stock, and trade was good, prices rather in advance of late fairs having been given. Good tegs sold at from 28s. to 32s. a head. Heifers and calves met a quick sale at from 17l. to 24l. and 25l. Beef was scarce, and sold at 11s. to 12s. a score. Good horses, as usual, in demand, and fetching high prices.

**GLOUCESTER MONTHLY MARKET**.—This market was held on Monday last. There was a very limited supply both of beef and mutton, indeed scarcely sufficient to meet the requirements of one-half of the butchers who were in attendance, and an advance in prices consequently took place. Beef fetched from 6½d. to 7d., and mutton from 7d. to 7½d. per lb.

**HORSHAM MONTHLY MARKET**.—The largest and most active market we have had since it was established. There was a full supply of everything, and a numerous attendance of buyers. Of heasts there were 150 in prime condition, sheep 600, and pigs 180, with a plentiful supply of calves. The trade with sheep was unusually active, and a very high price was made of the best quality. Beef, 4s. to 4s. 8d.; mutton, 5s. 2d. to 5s. 9d.; veal, 5s. to 5s. 6d.

**LINCOLN FAIR**.—Monday: a large number of valuable horses has changed hands. As is usual on the Monday, the fair was principally confined to the sale of horses of a superior class, which being of a somewhat limited number, sales were very brisk at prices most satisfactory to holders. Saddle-horses of all description, both for army and other purposes, met with a ready sale, and realized high prices, almost as soon as they made their appearance. Tuesday: As on Monday, the best class of hunters, carriage-horses, and saddle-horses realized high prices, and met with ready sale, while the commoner breeds of horses were entirely neglected, doubtless until the far end of the fair. Wednesday: There was a great demand for good cart-horses, of which there was a large supply, and some of the best of this class realized as much as 50l. each. A grey two-year-old was bought for 50l., a brown two-year-old for 48l., another fetched 47l., and so on. Thursday: The sheep fair was much smaller than last year, and it was calculated that not quite 30,000 were penned. The trade was early very brisk, and most of the pens of hogs were disposed of to

the speculators at prices varying from 36s., 40s., 45s., 47s., and up to 54s. per head. A considerable number of the pens changed hands two or three times in the course of the morning, but later in the day trade was duller, and prices were slightly drooping. All were, however, sold.

**MUIR OF ORD MARKET.**—On Wednesday the sheep were sold. About 5,000 were exposed, chiefly half-bred and Cheviot hoggs. Nearly one-half of the stock was half-bred, but not of the best quality. The best of the lots had been in many instances sold already; and those exposed were only seconds. The best lots were bought eagerly. One lot of pure-bred Leicester wether hoggs was purchased as soon as they appeared at 28s.; within a couple of hours they were sold again at an advance of 2s., and again shortly afterwards at 32s. Another lot of ewe hoggs was sold at 14s., and very shortly afterwards at 16s. The highest price given for Cheviot wether hoggs was 21s. 6d.; the lot sold at this figure was a very superior one. The greater part of the sales were at from 16s. to 19s. A large number of sheep, and especially half-breds, were unsold. Probably, since there has been a market at the Muir of Ord, there has been no such turn out of cattle at any time on that stance as there was on Thursday. In number and quality the exhibition was without precedent. Some of the two-year-old crosses excited general admiration, and, indeed, the bad lots were outnumbered by the good; the only thing that was wanting was good prices, and these, unhappily, were not to be had at all. The decrease in price was not less than £2 10s. to £3 a-head on beasts which last year would have fetched £12 to £15. It was £2 a-head on animals of less value, and about the same—making, of course, a higher per-centage—on the least valuable kind of crosses. Several farmers familiar with the market calculated the depreciation at 20 per cent. Highland stock was almost at a stand-still.

**PAIGNTON MONTHLY MARKET.**—There was a very good supply of fat bullocks, which sold readily at from 58s. to 60s. per cwt. Sheep scarce, and sold 7½d. per lb.; cows and calves from £15 to £20; store bullocks from 40s. to 45s. per cwt.

**PENRITH FAIR.**—The supply was not so large as last year, or other years previous; but the market was brisk, and prices ran very high. We heard of one lot of half-bred hoggs which were sold at the amazing price of 51s. 6d., but about 38s. and 39s. was the average price for the best lots. Cheviot hoggs brought from 18s. to 24s. It was an excellent selling market. The cattle fair was a very large show: the Messrs. Young alone would have about a thousand head of grazing cattle, or upwards. Gelt cattle were in very brisk request, and good to sell. Prices would run from £10 to £14, and some very superior beasts were sold as far as £15 to £16. Calving cows were also very good to sell, and brought high prices, as far as from £15 to £18 each. There was a very large show of bulls—the largest ever known at this fair. The show of fat cattle was very small, and not of the most prime quality; the best trade was done in gelt cattle and sheep. The show of horses took place, as usual, in Burrowgate; there

was a large show of very fine animals, but the best show was for agricultural purposes. A few good blood horses were also shown.

**SHIPSTON-ON-STOUR FAIR.**—There was a numerous attendance of dealers, and a good supply of all kinds of cattle. The prices varied from £40 to £65. Mr. George Holtom, of Cherington, sold one in the rough, which had been turned out all the winter, for £75. Mr. Thomas Garrett, of Compton Scorpion, had four pure Hereford yearling bulls, which for symmetry and size were much admired; they were sold by auction, and three of them realized 22 gs. each. There was an excellent supply of fat sheep; those most remarkable for size belonged to Mr. Baker, Brailes; Mr. Harris, Brailes-buildings; Mr. Harris, Sutton; and Mr. Thomas Halford, of Newbold. Some of them out of the wool were sold at £3 each. Beef 6d. to 7d., mutton 6d. to 6½d. per lb.

**TENBURY FAIR** was scantily supplied with every description of stock; and prices ruled very high, being in advance over those of Cleobury and other fairs.

**TIVERTON GREAT MARKET.**—The show of stock was small; and this, coupled with the fact that the fine weather we have been favoured with lately holds out an inducement to the farmers to purchase more largely than they did in the winter, enabled exhibitors to dispose of their cattle at higher rates than were obtained at the great market in February last. Fat bullocks of prime quality were quoted at 11s. per score, cows and calves £13 to £14 each, good barreners 6s. to 6s. 6d. per score. The show of sheep was hardly an average one. Fat hogs, with their wool on, sold at from 7d. to 8d.; fat ewes, unshorn, 6d. to 6½d. per lb.; store hogs, 30s. to 35s. each; butchers' calves, 4d. to 5½d. per lb.; rearing calves, 25s. to 30s. each.

**WAREHAM FAIR** was very fully attended; and a good supply of stock was exhibited, mostly of a rough character. Those of a better description met with a ready sale, and realized prices far beyond the expectation of sellers.

**WELSHPOOL FAIR** was well attended both by dealers and stock. Barren cows and heifers were sold very high. Fresh bullocks were also in great demand. Of fat beef there was but a small show, which met with a ready sale at 6d. to 6¾d. per lb. There was only a small number of horses, which were soon disposed of. Good cart-horses were eagerly bought up, at high prices, several being sold for £50 each.

**WINSLOW FAIR.**—A short supply of stock. The cow kind were generally in low condition; and, as high prices were asked, but few sales took place. The supply of sheep was plentiful, and a good trade was done in them.

**WORCESTER FAIR.**—There was a good supply of cows, and cows and calves, and a ready sale. In horses a good business done. A plentiful supply of pigs, and fat ones sold at 10s. 6d. per score. Beef 6½d. to 7d. per lb., Mutton 7d. to 8d. Ewes and lambs sold well. Several sales were made, and the following prices obtained: For fat sheep, out of the wool, 58s. a head; ewes and lambs, 54s. per couple; fat cows, £24 each; fat oxen £25; Ayrshire heifers, £12 10s.; shorn-horn yearling bulls, 18½ guineas.

## REVIEW OF THE CORN TRADE.

### DURING THE MONTH OF APRIL.

As the month of March was a period of great fluctuation, in which a decline in price preponderated 4s. to 5s. per qr. on wheat, so the past month has been comparatively calm, with a continued downward tendency till near its close, which must be principally traced to the establishment of peace. The full persuasion that a lower range of prices must ensue after next harvest has evidently disposed farmers more readily to part with their stocks; and the circumstance that 46,448

qrs. more have been returned in the weekly sales during the first four months of this year than were returned in 1855, with the acknowledged plentifulness of the crop of the previous season, may be deemed conclusive of the general anxiety to sell. Stocks must, however, have proportionately diminished; and we begin to find complaints of this already in some quarters; and with the certainty that fully four months must elapse before the next in-gathering, there is every probability that we may

yet run short on the eve of plenty, and consequently see higher rates. The fear of a large and immediate influx of wheat from the Baltic is evidently groundless; the war and a bad crop in the interior of Russia leaving but little on the sea-board there, while the devastations of the Allies in the Sea of Azoff and Euxine, as well as the diminution of the facilities for shipment from the same causes, have both reduced the quantity in store, and placed the remainder at a greater distance from our shores. Italy has indeed relaxed in her prohibitory system, and the fear of lower rates on the part of speculators in foreign ports will doubtless contribute largely to our necessities, as well as to those of France and Belgium; but America, the source to which all eyes are turned, has disappointed expectations in her supplies hitherto, as well as in the rates maintained, which are higher relatively than our own. Her shipments to all parts of Europe and other places, from 1st September to 4th March last, were something under 1,500,000 qrs. of wheat and flour; while this kingdom had only then received 440,000 qrs. of wheat and 682,500 brls. of flour. Our total foreign imports for the first quarter of this year have been 454,250 qrs. wheat, and 220,837 cwts. (equal to 88,335 sacks) flour. At this rate of supply our foreign arrivals would be only half the usual amount, with a crop below an average; and with an increasing population this is likely to be felt, even supposing there were no future drain upon us from the near continental ports; and the circumstance of a 5s. rise on wheat, during the last week, in Paris, makes this highly probable. Maize, however, is plentiful; and this, with the low quality wheat expected, must be made to suffice. There is doubtless yet enough in the country to force markets down, and the absence of all speculation may temporarily depress overdone markets till once the impression of scarcity prevails.

The first Monday of the month opened with dulness, without large arrivals. Fine white wheat alone was eagerly sought, and obtained a full price; in good red the trade was quiet; while inferior was neglected. Little was doing in granaried foreign, and the bulk of the arrivals being then inferior, it was placed in store. Increased dulness prevailed through the week, and on the second Monday a reduction of 3s. per qr. ensued. The foreign supplies, with much of low quality, reaching to over 25,000 qrs., with a show of samples of home-growth better than usual, from the circumstance that many were left over from the previous week, the course of this week, as it respects trade, had features precisely similar to the preceding, having finished excessively dull, and with a general expectation that lower quotations would obtain on the following Monday. This, however, was not

the case; many of the last country markets, having showed symptoms of improvement; still, as with only moderate supplies business was dull, it was evident lower prices would have ruled on a plentiful market. With the last Monday, however, came a change rather in favour of sellers, the supply being only moderate from Kent and Essex. White wheat of fine quality was sought, and realized 1s. more; while all good red found a steady trade. In foreign more trade was passing, especially in the inferior kinds, for consumption in the country. Fine qualities are still held with some reserve. The country markets have followed the town reports; those held last showing more improvement, say 1s. to 2s. per qr. Liverpool closed with a firmer tone.

Nearly all through the month foreign markets were similarly affected with our own, through the tidings of peace, and many forced sales, by orders of the French Government, have been made both in Paris, Marseilles, Bordeaux, Havre, and other places, with the evident design of keeping prices down, and giving the appearance of plenty for political ends. It has also been announced that the calculated deficiency in the crops was supplied within about 800,000 qrs.; but, in spite of all these efforts, the country markets are getting bare, and giving evidence of greatly reduced stocks. Flour during the last week, in Paris, rose 8 francs per sack, and wheat 3 francs per 1½ hectolitre, say 5s. per qr.; while the Belgian markets are on the move, and the Baltic has little to send.

American supplies keep scanty on their seaboard, and Flour during the month has only yielded 2s. per brl.; while the light stocks of wheat have kept prices up. The month's supplies in London have been much on the same scale as in March, consisting of 23,589 qrs. English, and 56,817 foreign, half of which has been of low description from India, Egypt, and the Mediterranean, and nothing of first quality. The exports for the month were 1,711 qrs.

Business has become so changed by the railways, that the arrivals of flour for some time past have doubled those of English wheat, and to this may be traced the occasional greater depression of the London market. The weekly supplies from the country have exceeded those of March, and with an increased temperature, sales have been difficult at lower rates. The month has witnessed a decline of 3s. per sack on Norfolks, the periods when it took place being on the 2nd Monday, when it fell 2s., and on the 3rd, when a further reduction of 1s. was submitted to. The fourth Monday, on good supplies, found a better sale for both country and foreign samples. Norfolks closing at 47s. to 58s., Spanish being held at 55s., and fine American

at 40s. per brl. The month's supply has been 56,947 sacks country, 1,965 sacks foreign, and 19,821 brls. American. Forced sales on the part of the French Government produced such low rates at Havre that orders for American were sent there in preference to the place of growth, from the advantage of lower prices, and 1,800 brls. have arrived from this French port during the last week.

Barley has continued in short supply and active enquiry, especially all qualities fit for malting, which are scarce. The first and second Monday each successively obtained 1s. advance, and the following was firm, with a good business. Distillers finding English arrivals short, were glad to become importers of Danish, which arrived to the extent of 3,200 qrs., without appearing on the market, going direct to the distilleries. The last market closed with a steady trade, at fully the previous rates. The total arrivals for the month have been only 11,958 qrs. English, and 5,736 foreign, nearly all Danish.

The prices of oats during the month have gradually declined, without heavy supplies. The first Monday was dull, with only moderate arrivals, good corn selling with difficulty at former rates; while inferior required an abatement to force them off, the market continuing heavy through the week. Another moderate arrival on the second Monday was unable to preserve them from a decline; the reduction, however, was only 6d. per qr.; but on the following Monday, with a heavy supply of foreign, viz., 29,000 qrs., 7,000 Irish, and the average quantity of English, the rates further gave way for even the best sweet sorts fully 1s. per qr.; while cargoes out of condition could only be cleared by a still greater sacrifice. Buyers, however, whose stocks were getting low, evidently took this day for a favourable opportunity, and accordingly a large business was effected at the reduced rates. The fourth Monday showed only moderate arrivals, and business in all kinds was steady, with former prices well sustained, and a somewhat upward look. The continual decline in price of this grain, with less than the usual supply of Irish, seems unaccountable, the late importation of foreign generally leaving a serious loss. More Dutch corn has, however, arrived than anticipated; and the early departure of the frost from the Baltic has kept the market so regularly provided, that dealers have been indifferent purchasers, unless at tempting rates. The present prices, however, seem likely to increase the demand, and can hardly be expected further to recede, except in occasional gluts. During the month, 5,256 qrs. English, 21,077 qrs. Irish, and 56,527 qrs. foreign have been received. These have consisted principally of Danish, Swedish, and Dutch.

Beans have been at the point of stagnation, from the continued arrivals from Alexandria, though less than in the previous month, the total quantity being 7,164 qrs., with 1,385 qrs. English. Very little difference has to be noted in the quotations, which have, nevertheless, been downward, no extensive sales being possible without acceding to lower prices to the extent of fully 1s. per qr. The closing of the Mahmoudieh Canal, for cleaning, in Egypt, may ultimately relieve the present pressure on the market, by giving time for the consumption of accumulated stocks.

Peas, though they have come to hand on the most limited scale—the month's supply being only 566 qrs.—have been influenced by the liberal arrivals of beans and lentils, which latter, being highly nutritious, have found an extensive demand for sheep-feeding. No change has been made in the quotations.

Linseed has fallen considerably, the stocks having everywhere accumulated in Russian ports, whence large supplies must be expected. The declension for the month has been about 5s. to 7s. per qr. Cakes have not proportionately given way, the scarcity of keep placing them in continual demand. Some little reaction in favour of linseed ensued last Monday. The seed season may be considered closed. The demand for cloverseed has been below the average of years. Prices, therefore, are reduced and nominal, though stocks are low, and considerable shipments have been made to Germany, for this season's sowing. Canaryseed and hempseed have sold slowly, as well as mustardseed, crushers having generally supplied themselves according to their prospective wants. Rapeseed, carraway, and coriander have shown little variation.

CURRENCY PER IMPERIAL MEASURE.

	Shillings per Quarter			
WHEAT, Essex and Kent, white, new . . . . .	61	to 71	extra	— 74
Ditto, red, new . . . . .	59	65	„	— 71
Norfolk, Linc. and Yorksh., red, new	59	61	„	— 69
BARLEY, malting, new . . . . .	41	42	„	44
Distilling . . . . .	36	40	„	35
MALT, Essex, Norfolk, and Suffolk . . . . .	73	75	extra	81
Kingston, Ware, and town made . . . . .	73	75	„	81
Brown . . . . .	65	68	„	—
RYE . . . . .	—	—	„	48
OATS, English feed . . . . .	21	22	„	26
Scotch feed, new 23 24, old 26 27 . . . . .	23	24	„	26
Irish feed, white . . . . .	19	20	fine	22
Ditto, black . . . . .	18	19	„	20
BEANS, Mazagan . . . . .	33	34	„	34
Ticks . . . . .	32	35	„	35
Harrow . . . . .	35	38	„	38
Pigeon . . . . .	37	41	„	41
PEAS, white boilers 40 44 . . . . .	40	44	„	35
Maple 42 44 Grey 34 35 . . . . .	42	44	„	35
FLOUR, per sk. of 280 lbs., Town, Households 60s., fine 63 65	60	63	„	65
Country 47s. 49s. . . . .	47	49	„	52
Households . . . . .	50	52	„	52
Norfolk and Suffolk, ex-ship . . . . .	—	—	„	47

FOREIGN GRAIN.

		Shillings per Quarter			
WHEAT, Dantzic, mixed..	80 to 82 high mixed	—	82	extra	88
Konigsberg .....	78 80	—	81	—	83
Rostock, new .....	72 73 fine	—	76	—	84
American, white .....	72 74 red	—	60	—	66
Pomera., Meckbg., and Uckermk., red	73 79 extra	—	80	—	82
Silesian .....	74 76 white	—	78	—	79
Danish and Holstein .....	60 64	—	60	—	68
Odessa, St. Petersburg and Riga..	62 64 fine	—	66	—	68
Rhine and Belgium .....	— — old	—	—	—	—
Russian .....	French..	—	—	—	none
BARLEY, grinding 33 36 .....	Distilling..	—	37	—	39
OATS, Dutch, brew, and Polands 24s. to 26s.	Feed ..	—	20	—	22
Danish & Swedish feed 20s. to 23s.	Stralsund	—	22	—	24
BEANS, Friesland and Holstein .....		—	36	—	37
Konigsberg .. 35 36 .....	Egyptian ..	—	23	—	30
PEAS, feeding .....	35 36 fine boilers	—	42	—	44
INDIAN CORN, white .....	32 33 yellow	—	32	—	34
FLOUR, French, per sack .....	— — Spanish	—	49	—	56
American, sour, per barrel (nominal)	33 35 sweet	—	35	—	39

IMPERIAL AVERAGES.

FOR THE LAST SIX WEEKS.

WEEK ENDING:	Wheat.		Barley.		Oats.		Rye.		Beans		Peas.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
March 15, 1856..	67	11	36	3	23	2	43	2	41	0	40	3
March 22, 1856..	67	5	37	2	23	2	43	5	40	7	39	6
March 29, 1856..	69	10	38	1	24	0	46	5	41	3	40	1
April 5, 1856..	69	5	38	8	23	6	44	7	40	7	39	7
April 12, 1856..	68	7	39	0	23	8	42	4	41	4	37	10
April 19, 1856..	69	0	39	2	23	7	44	7	41	9	37	4
Aggregate average of last six weeks	68	8	38	1	23	6	44	0	41	1	39	1
Comparative avge. same time last year	67	11	30	8	25	4	39	8	40	8	38	3
DUTIES .....	1	0	1	0	1	0	1	0	1	0	1	0

COMPARATIVE PRICES AND QUANTITIES OF CORN.

Averages from last Friday's Gazette.			Averages from the corresponding Gazette in 1855.		
	Qrs.	Av.		Qrs.	Av.
Wheat...	114,354	69 0	Wheat...	93,446	68 8
Barley...	50,354	39 2	Barley...	36,163	31 5
Oats ....	12,281	23 7	Oats ....	20,127	25 10
Rye.....	81	44 7	Rye.....	117	38 11
Beans....	5,968	41 9	Beans....	4,921	41 5
Peas ....	768	37 4	Peas ....	757	36 10

PRICES OF SEEDS.

BRITISH SEEDS.

Cloverseed, red, (per cwt.) .....	65s. to 80s.
Ditto white .....	70s. to 90s.
Trefoil, (per cwt.) .....	30s. to 40s.
Tares, winter (per bushel) .....	7s. 6d. to 8s. 0d.
Coriander (per cwt.) .....	20s. to 24s.
Carraway (per cwt.) .. new .. s. to 50s., old .. a. to .. s.	
Canary (per qr.) .....	60s. to 62s.
Hempseed (none) .....	00s. to 00s.
Linseed (p. qr.) sowing .. s. to 63s., crushing 54s. to 57s.	
Linseed Cakes (per ton) .....	£12 10s. to £13 0s.
Rapeseed (per qr.) .....	new 88s. to 90s.
Ditto Cake (per ton) .....	£6 10s. to £7 0s.

FOREIGN SEEDS, &c.

Cloverseed, red, French .....	60s. to 70s.
Ditto, white, Dutch .....	70s. to 90s.
Tares, (per bushel) .....	5s. 0d. to 5s. 6d.
Hempseed, small, (per qr.) .. s. 56s., Ditto Dutch, 56s.	
Coriander (per cwt.) .....	15s. to 20s.
Carraway .....	42s. to 46s.
Linseed (pr qr.) Baltic, 52s. to 56s.; Bombay, 52s. to 57s.	
Linseed Cake (per ton) .....	£12 0s. to £12 10s.
Rapeseed, Dutch .....	87s. to 88s.

All agricultural Seeds continue very dull in sale, and prices are rather drooping. Linseed is heavy, and large parcels are declared for public sale. Calcutta, 48s. to 50s.; Bombay, 52s. to 53s. per qr. A moderate demand for Cakes, at late quotations.

HOP MARKET.

BOROUGH, MONDAY, April 28.

The scarcity of very fine and coloury samples of Hops has caused an advance of from 6s. to 8s. per cwt. for such qualities, and middling descriptions are somewhat more in demand, at fully the currency of last week.

WORCESTER, (Saturday last).—A better market for hops, and prices have advanced 2s. to 4s.; choice qualities scarce, and prices range from 75s. to 95s.

POTATO MARKETS.

SOUTHWARK WATERSIDE.

MONDAY, April 28.

Although the arrivals coastwise during the past week have not been large, the supply by rail has been liberal, which, with those left from former arrivals, have been fully equal to the limited demand, at the following quotations:

	s.	d.	s.	d.
York Regents .....	70	0	to	85 0
Kent and Essex do. ....	60	0		75 0
Perth, Forfar, and Fifeshire Regents.....	55	0		65 0
Do. Reds .....	40	0		45 0
Aberdeenshire and North Country Reds .....	30	0		40 0

BOROUGH AND SPITALFIELDS.

MONDAY, April 28.

We have received moderate supplies of Potatoes, coastwise and by railway, since our last report. The demand for all kinds is in a sluggish state, as follows:—York Regents, 80s. to 95s.; Scotch ditto, 60s. to 75s.; ditto Cups, 50s. to 65s.; middlings, 30s. to 40s.; Lincolns, 65s. to 80s.; Blues, 60s. to 70s. per ton.

COUNTRY POTATO MARKETS.—YORK, April 19: We had a good supply of potatoes, of excellent quality. They sold at from 4d. to 5d. per peck, and 1s. 6d. per bushel. LEEDS, April 22: A fair supply of potatoes, sold at from 6d. to 6½d. per 21lb. wholesale, and 7d. retail. MALTON, April 19: A good supply of potatoes sold at from 1s. 6d. to 1s. 9d. per bushel. SHEFFIELD, April 22.—A fair supply of potatoes, sold at from 5s. to 6s. per 18 stons. RICHMOND, April 19: Potatoes, 2s. per bushel. MANCHESTER, April 21: Potatoes, 5s. to 8s. 6d. per 252lbs.

PRICES OF BUTTER, CHEESE, HAMS, &c.

Butter, per cwt.	s.	s.	Cheese, per cwt.	s.	s.
Friesland½ .....	108	112	Cheshire .....	70	84
Kiel .....	112	116	Cheddar .....	74	86
Dorset .....	110	112	Double Gloucester..	66	72
Carlou .....	103	112	Single do. ....	60	70
Waterford ....	—	—	Hams, York, new ...	80	88
Cork, new .....	110	116	Westmoreland ...	80	84
Limerick .....	98	106	Irish .....	76	84
Sligo .....	—	—	Bacon, Wilts., dried..	70	74
Frsh, per doz. 13s. 0d. 15s. 0d.			Irish, green....	66	70

ENGLISH BUTTER MARKET.

APRIL 28.

Our market presents a drooping appearance. Best Butter may be quoted 6s., and inferior 10s. per cwt. less than last week.

Dorset, fine new milk .....	124s. to 126s. per cwt.
Do. middling .....	108s. to 112s.
Fresh .....	10s. to 15s. per doz. lbs.

BELFAST, (Friday last).—Butter: Shipping price, 110s. to 120s. per cwt.; firkins and crocks, 11d. to 12½d. per lb. Bacon, 64s. to 68s.; Hams, prime, 76s. to 80s., second quality, 66s. to 70s. per cwt.; prime mess Pork, 94s. to 95s. per brl.; Pork, 57s. to 60s. 6d.; Beef, 105s. to 140s. per tierce; Irish lard, in bladders, 74s. to 76s.; kegs or firkins, 68s. to 70s. per cwt.

April	Butter.		Bacon.		Dried Hams,		Mess Pork.	
	per cwt.	s. d.	per cwt.	s. d.	per cwt.	s. d.	per brl.	s. d.
25.	74 0	78 0	42 0	46 0	56 0	60 0	67 6	70 0
1852..	93 0	102 0	56 0	58 0	70 0	76 0	87 0	90 0
1854..	95 0	102 0	54 0	60 0	68 0	72 0	87 0	90 0
1855..	96 0	103 0	56 0	60 0	70 0	74 0	92 6	95 0
1856..	110 0	120 0	62 0	66 0	76 0	80 0	94 0	95 0

**CHESTER CHEESE FAIR.**—Business was very brisk. Shortly after the opening of the market every Cheese was sold, and many parties had to return home without a purchase. There was a considerable advance in rates, the prices ranging from 65s. to 72s. per cwt., and in some instances these were exceeded. About 50 tons were pitched, and the improvement in prices over those of four years ago was full 30 per cent.

**GLASGOW,** (Wednesday last.)—There were 2 carts, and there passed through the weigh-house 14 tons of Cheese. Sales dull. First-class Cheese, 64s. per cwt.

**GLOUCESTER CHEESE FAIR.**—Only a small quantity was pitched, which met a ready sale at high rates. The attendance was very good, considering the lateness of the season. Prices may be quoted as follows: Best, 58s. to 65s.; seconds, 50s. to 56s., skims 32s. to 36s. No doubles offered.

**COVENT GARDEN MARKET.**

SATURDAY, APRIL 26.

During the past week there has been a fair supply of most things, and prices have altered but little from former quotations. French Carrots are arriving in good condition. There is a large supply of Peas from the Continent. New Grapes are now tolerably abundant, as are also Strawberries, the latter at from 1s. to 1s. 6d. per ounce. Pears have become scarce, and English Apples are nearly over for this season. Most kinds of Nuts are plentiful. Oranges fetch from 1s. to 1s. 6d. per dozen, or from 3s. to 10s. per hundred; Seville Oranges from 1s. to 3s. per dozen, or from 7s. to 14s. per hundred. The Potato trade is still heavy; the very best samples only realize 90s. a ton. New Lisbon Potatoes fetch 4s. per dozen lbs. Asparagus from Cornwall continues to make its appearance. French salading is still supplied regularly three times a week. Cut flowers consist of Heliotropes, Euphorbias, Camellias, Azaleas, Mignonette, Chinese Primroses, Cyclamens, Heaths, and Roses.

**FRUIT.**

	s.	d.	s.	d.		s.	d.	s.	d.
Pineapples, p. lb.	8	0	@12	0	Pears, per doz.	3	0	6	0
Grapes, per lb.	15	0	20	0	Oranges, per 100.	6	0	12	0
Strawberries, p. oz.	0	9	1	6	Lemons, p. doz.	0	6	1	6
Apples, p. hf. sve.	0	0	3	0	Cobs, p. doz. lbs.	0	0	15	0

**VEGETABLES.**

	s.	d.	s.	d.		s.	d.	s.	d.
Cabbages, p. doz.	1	0	1	6	Celery, per bund.	0	9	1	6
Cauliflowers, p. doz.	1	0	4	0	Onions, p. bush.	2	6	4	0
Broccoli, per bun.	1	0	1	6	Do. green pr bun.	0	3	0	4
F. beans, per 100	2	0	3	0	Leeks, per bunch	0	2	0	3
Peas, per quart	12	0	15	0	Artichokes, each.	0	6	0	8
Potatoes, per ton	60	0	90	0	Shallots, per lb.	0	8	1	0
Do., per cnt.	4	0	6	0	Garlic, per do.	0	6	0	8
Do., per bush.	2	6	4	0	Endive, per dozen	2	0	4	0
Do., frame, p. lb.	1	6	2	0	Lettuce, Cab., do.	0	6	1	0
Carrots, p. bunch	0	6	0	8	Radish, p. doz bun.	0	6	1	0
Turnips, ditto	0	3	0	6	Small Sal. p. pun.	0	2	0	3
Spinach, p. sieve.	2	0	2	6	Horserad. p. bund.	2	0	4	0
Cucumbers, each	1	0	2	6	Mushr'ns, p. pot.	1	0	2	6
Beet, per doz.	1	0	2	0	Parsley, p. bunch	0	4	0	6
Rhubarb, p. bund.	0	4	0	8	Mint, green, ditto.	0	6	0	9
Asparagus, p. 100	4	0	8	0	Marjoram, ditto.	0	2	0	3
Seakale, p. punnet	1	0	2	0	Savory, do.	0	2	0	3

**CHICORY.**

LONDON, SATURDAY, APRIL 26.

About 40 tons of Chicory have arrived from the Continent this week. The supply of English is good, and the demand is very inactive, as follows:—

	Per ton.		Per ton.
Foreign Root (in £ bond) Harlingen	11 0 11 10	Roasted & ground English	14 0 20 0
English Root (free) Guernsey	9 0 9 10	Foreign	30 0 36 0
York	9 10 10 0	Guernsey	26 0 28 10

**HAY MARKETS.**

SATURDAY, APRIL 26.

At per load of 30 trusses.

	Smithfield.	Cumberland.	Whitchapel.
Meadow Hay	75s. 117s.	76s. 120s.	75s. 116s.
Clover	07s. 132s.	96s. 130s.	98s. 132s.
Straw	27s. 31s.	27s. 32s.	26s. 31s.

**FLAX, HEMP, COIR, &c.**

We continue to have a slow sale for Flax, yet there are very few sellers on lower terms. The demand for Baltic Hemp is steady; but Manila parcels are neglected. Clean St. Petersburg is quoted at £31 10s. to £32 10s.; outshot, £29 to £30; half-clean, £27 to £28 per ton. Coir goods and Jute rule about stationary.

**TIMBER.**

LONDON, SATURDAY, APRIL 26.

The wood market is quiet. Business is chiefly limited to public sale for the purpose of working off the stock of 1855, in preparation for this year's importation. Some interest is felt in the opening rates for deals in the ports of Russia, and the prices first named are deemed above the proportion of other countries. Though in all the countries of production opinion prevails that England, and now France, can take unlimited supplies, the results of the trade in wood show that it is only when prices are low our consumption increases. A fleet of ships from Norway has arrived with deals, battens, balks, and firewood, and the sale thereof has commenced at the previous rates. Four or five fresh Baltic cargoes have not yet indicated the strength of the quotations given for the old stock.

	1855.		1856.	
	£ s.	£ s.	£ s.	£ s.
Quebec, red pine . . . . . per load	0 0	0 0	3 15	5 0
yellow pine . . . . .	3 15	4 0	3 0	3 10
St. John's, N.B., red . . . . .	0 0	0 0	0 0	0 0
yel. . . . .	5 0	6 0	0 0	0 0
Quebec, Oak, white. . . . .	7 0	7 10	6 10	7 10
Birch . . . . .	6 0	0 0	5 10	5 0
E'm . . . . .	6 10	7 0	5 0	6 0
Dantzic, Oak . . . . .	7 0	8 0	4 0	4 10
Memel, Fir . . . . .	3 10	4 10	4 0	5 10
Riga . . . . .	0 0	0 0	4 5	4 10
Swedish . . . . .	2 15	3 0	3 10	3 15
Masts, Quebec, red pine . . . . .	6 0	9 0	12 0	12 10
yellow pine . . . . .	5 0	8 0	8 10	10 10
Lathwood, Dantzic fm. . . . .	11 0	12 0	9 0	9 10
Memel . . . . .	10 0	11 0	9 0	9 10
St. Petersburg . . . . .	0 0	0 0	13 0	14 0
Quebec . . . . .	5 0	6 0	5 10	6 10
Deals, per C. 12 feet by 9 inches,				
Quebec, white spruce . . . . .	18 0	22 0	16 0	19 0
red pine . . . . .	17 0	21 0	17 0	20 0
St. John, white spruce . . . . .	17 0	19 0	15 0	18 0
Yellow pine, per reduced C.				
Canada, 1st quality . . . . .	17 10	20 0	16 0	18 0
2nd ditto . . . . .	12 0	13 0	10 10	12 0
Archangel, yellow . . . . .	0 0	0 0	20 0	21 0
St. Petersburg, yellow . . . . .	0 0	0 0	0 0	0 0
Memel . . . . .	15 10	19 0	15 0	19 0
Gefte, yellow, 14 ft. . . . .	21 0	25 0	27 0	28 0
Gothenburg, yellow . . . . .	12 0	15 0	23 0	27 0
white . . . . .	10 0	12 0	20 0	23 0
Christiania, p. C. 12 ft. by 3 in.				
yellow . . . . .	26 0	30 0	24 0	30 0
white . . . . .	22 0	26 0	20 0	25 0
Deck Plank, Dant., p. 40 ft. by 3 in	1 0	1 10	1 5	1 10
Staves, per standard M. . . . .				
Quebec, pipe . . . . .	80 0	90 0	60 0	80 0
punchoon . . . . .	20 0	25 0	18 0	20 0
Baltic, crown pipe . . . . .	135 0	140 0	120 0	160 0

**OIL MARKET.**

	£ s. d.	£ s. d.
Olive, Florence half-chests . . . . .	1 1 0 to	0 0 0
Luca . . . . .	7 10 0	8 0 0
Gallipoli (252 gallons) . . . . .	52 0 0	52 10 0
Spanish . . . . .	53 0 0	53 10 0
Linsced (ent.) . . . . .	1 9 0	1 9 3
Rape, Pale . . . . .	2 9 6	2 10 0
Brown . . . . .	2 7 0	2 7 6
Cod (tun) . . . . .	44 0 0	0 0 0
Seal, Pale . . . . .	51 0 0	55 0 0
Ditto, Brown, Yellow, &c. . . . .	45 0 0	48 0 0
Sperm . . . . .	122 0 0	123 0 0
Head Matter . . . . .	128 0 0	0 0 0
Southern . . . . .	44 0 0	48 0 0
Cocoa Nut (ent.) . . . . .	1 18 6	1 19 6
Palm . . . . .	1 17 0	2 0 0

**WHALEBONE.**

Greenland, full size (per ton) . . . . .	300 0 0	0 0 0
South Sea . . . . .	250 0 0	0 0 0

**PITCH.**

British (per cwt.) . . . . .	0 6 9	0 7 0
Archangel . . . . .	0 10 6	0 0 0
Stockholm . . . . .	0 12 0	0 0 0

**TURPENTINE.**

Spirits (per cwt.) . . . . .	1 13 0	1 13 6
In Punchoons . . . . .	1 12 0	1 12 6
Rough . . . . .	0 9 0	0 9 6

**TAR.**

American (British) . . . . .	1 1 0	0 0 0
Archangel . . . . .	1 18 0	0 0 0
Stockholm . . . . .	0 18 0	0 0 0

**RESIN.**

Yellow (per cwt.) . . . . .	0 7 0	0 10 0
Transparent . . . . .	0 6 0	0 15 0

BARK, &c.

	£	s.	d.	£	s.	d.
English, per ld. of 45 cwt., del. in London.	13	10	0	15	10	0
Coppice.....	14	0	0	16	0	0
Dutch, per ton.....	5	0	0	5	5	0
Hambro'.....	4	10	0	5	5	0
Antwerp—Trce.....	5	0	0	6	0	0
Coppice.....	6	0	0	6	10	0
French.....	4	0	0	6	5	0
Mimosa.....	12	0	0	14	0	0
Ground.....	0	0	0	0	0	0
Cork Trce—Barbary.....	7	0	0	7	10	0
Leghorn.....	6	0	0	7	0	0
Valonia, Smyrna, per ton.....	15	0	0	16	0	0
Camata.....	15	0	0	16	0	0
Morea.....	11	0	0	13	10	0
Terra..... } Gambier.....	17	0	0	17	10	0
Japonica. } Cutch.....	32	0	0	35	0	0
Divi Divi.....	12	0	0	13	0	0
Myrabolams.....	7	10	0	11	0	0
Sumach, Sicily, per cwt.....	0	13	6	0	14	0

MANURES.

PRICES CURRENT OF GUANO.

Peruvian Guano..... per ton	£11	5	0	to	£11	10	0
D. first class (damaged).....	10	5	0		10	10	0
Bolivian Guano..... (none)	0	0	0		0	0	0

ARTIFICIAL MANURES, OIL CAKES, &c.

Nitrate Soda.....	19	10	0	21	0	0
Nitrate Potash or Saltpetre.....	28	0	0	30	0	0
Sulphate Ammonia.....	16	0	0	17	0	0
Muriate ditto.....	22	0	0	23	0	0
Superphosphate of Lime.....	6	0	0	0	0	0
Soda Ash or Alkali.....	0	0	0	8	0	0
Gypsum.....	2	0	0	2	10	0
Coprolite.....	4	5	0	4	10	0
Sulphate of Copper, or Roman Vitriol for Wheat steeping.....	42	0	0	43	0	0
Salt.....	1	5	0	2	0	0
Bones, Dust..... per qr.	1	5	0	1	0	0
½ inch.....	1	4	0	1	5	0
Oil Vitriol, concentrated..... per lb.	0	0	1	0	0	0
Brown.....	0	0	0	0	0	0
Rape Cakes..... per ton	7	0	0	7	10	0
Linseed Cakes—						
Thin American in brls. or bags.....	12	10	0	13	0	0
Thick ditto round.....	11	0	0	11	10	0
Marseilles.....	10	0	0	10	10	0
English.....	12	0	0	0	0	0

PICKFORD and KEEN, 35, Leadenhall-street.

Williams and Co., 24, Mark Lane, Azotic..... £6 10 0

Manufactured by Hodgson and Simpson, Wakefield, and Matthews and Co., Driffield, Ammonia-Phosphate and Nitro-Phosphate, per ton £8 0 0 Superphosphate of Lime..... 7 0 0

Agricultural Chemical Works, Stowmarket, Suffolk.

Prentice's Cereal Manure for Corn Crops, per ton £3 10 0 Prentice's Turnip Manure..... £7 0 0 Prentice's Superphosphate of Lime..... £6 10 0

Lancashire Manure Company.

Widnes, near Warrington, J. Knight and Co.'s Nitrogeniz'd Bone Manures..... per ton £8 15 0

Manure Works, Grovehill, Beverley.

Tigar and Co.'s Celebrated Turnip Manures, per ton £7 10 0

HIDE AND SKIN MARKETS.

SATURDAY, APRIL 26.

	s.	d.	s.	d.
Market Hides, 56 to 64 lbs.....	0	3	0	0
Do. 64 72 lbs.....	0	3	4	0
Do. 72 80 lbs.....	0	4	0	4
Do. 80 88 lbs.....	0	4	4	0
Do. 88 96 lbs.....	0	4	4	0
Horse Hides each.....	6	0	0	0
Calf Skins, light.....	2	0	3	0
Do. full.....	0	0	6	6
Kents.....	8	0	9	0
Half-breeds.....	8	0	9	0
Downs.....	6	0	8	0
Lambs.....	2	4	3	4
Shearlings.....	0	11	1	0

BIRMINGHAM HIDE, SKIN, AND FAT MARKET.

SATURDAY, APRIL 26, 1856.

HIDES.				CALF.			
Per lb.	s.	d.	s.	d.	Per lb.	s.	d.
95 lbs. and upwards.....	0	0	0	5	17 lbs. and upwards.....	0	0
85 lbs. to 94 lbs.....	0	0	0	4	12 lbs. to 16 lbs.....	0	0
75 lbs. to 84 lbs.....	0	0	0	4	9 lbs. to 11 lbs.....	0	0
65 lbs. to 74 lbs.....	0	0	0	3	Light.....	0	0
56 lbs. to 64 lbs.....	0	0	0	3	Flawed and irregular	0	0
55 lbs. and under.....	0	0	0	3			
Cows.....	0	0	0	3			
Horse..... (each)	0	0	5	6	WOOL SKINS, 6s. 3d. to 8s. 5d.		
Bulls.....	0	0	2	3	10s. 4d. to 12s. 5d.		
Flawed and irregular	0	0	0	3	PELTS..... 10d. to 1s. 2½d.		
					FAT—Beef..... 3½d. .. 5d.		

LEADENHALL LEATHER MARKET.

Our market continues to be fairly supplied with Leather, and the demand is steady, as follows:—

CROP HIDES.

ENGLISH.			
lbs.	lbs.	d.	d.
28 to 35.....	13	to	14½
36 40.....	13		15
40 45.....	14		16
46 50.....	14½		16½
50 55.....	15		17½
55 60.....	16		19

BUTTS.

ENGLISH.			
lbs.	lbs.	d.	d.
14 16.....	17		18½
17 20.....	17½		20
21 24.....	19		22
25 28.....	20		23
29 32.....	21		24
33 36.....	22		25

FOREIGN.

14 16.....	16		18
17 20.....	17		18½
21 24.....	17		20
25 28.....	19		21
29 32.....	20		22
33 36.....	20		22
36 45.....	—		—
45 55.....	—		—

OFFAL.

ENGLISH Shoulders.....	13	to	15
Do. Cheeks and Faces.....	6		9
Do. Bellies.....	8½		10½
Do. Middle do.....	10½		12
FOREIGN Shoulders.....	9		10
Do. Necks.....	8		9
Do. Bellies.....	8		9½
Do. Middle do.....	10½		12
Dressing Hide Shoulders.....	10		12
Do. do. Bellies.....	7½		9
Kip Shoulders.....	5		8
Do. Bellies.....	4		5

DRESSING HIDES.

lbs. lbs. d. d.			
Common.....	2 to 24	12½	to 14
Do. ....	25 28	12½	14
Do. ....	30 34	12½	14
Do. ....	35 40	13½	14½
Saddlers.....	30 35	14	15
Do. ....	36 50	14	16
Bulls.....	11		12
Shaved.....	14 16	16½	17½
Do. ....	17 19	16	17
Do. ....	20 23	15	16½
Do. ....	24 28	14½	15½
Scotch do.....	16 24	15	17½
Coach, per Hide.....	24s.	to	28s.

HORSE BUTTS. Shaved.

English.....	10	to	11	12	to	14
Spanish.....	10		11	12		13

HORSE HIDES.

1 lbs. lbs. d. d.				
English.....	1 to 18	8	to	10
Do. without butts.....	9 14	8		10
Spaniards salted, without butts.....			s. d. s. d.	
per hide.....	6 8		7 0	9 6
Do. do. do.....	9 11		9 6	12 0
Do. do. do. inferior.....	4 6		7 0	
Do. dry do. do.....	6 8		6 0	9 0
Do. do. do. do.....	9 11		8 0	11 0
Do. do. do. inferior.....	4 0		6 0	6 0

CALF SKINS.

Av. weight Unrounded, Rounded			
lbs.	lbs.	d.	d.
20 to 28.....	13	to	15
30 35.....	13½		17
35 40.....	14		18
40 45.....	14		18
45 50.....	14½		18
50 55.....	15		19
55 60.....	15		20
60 70.....	15		19
70 83.....	15		18
80 90.....	14		17
90 100.....	14		16
100 120.....	13		15

KIPS.

lbs. lbs. d. d.				
Petersburgh.....	4 to 7	11	to	18
Do. ....	7 9		15	18
Do. ....	9 10		14	17
Do. ....	11 13		14	17
E. India, dry salt.....	5 7		15	18½
Do. do. do.....	7 9		14	18½
Do. seconds.....			14	16
Do. thirds.....			11	12
Do inferior.....			8	10

SUNDRIES.

Hog Skins, best.....	each	10	to	18
Do. seconds.....		8		10
Seal Skins, split.....	per doz	42		56
Do. for binding.....		42		60
Calf Skins, Sunmach.....		30		45
Do. white.....		20		33
Horse Hides, white.....	each	6		12
Sheep Skins—				
Basils, unstrained, per lb.....		7		14
Do. strained.....		9		14
Do. facing.....	per doz.	6		18
Tan Sheep & Lambs.....		10		22
White Sheep.....	per 120	80		110
Do. Lambs.....		60		90
Do. Sheep & Lambs, strained.....	per doz	7		18
Sunmach Roans.....		20		38
Do. Skivers.....		10		16
Bark Skivers.....		12		16
Hide Splits.....	per lb	7d.		to 8d.

WOOL MARKETS.

ENGLISH WOOL MARKET.

APRIL 28.—Since Monday last the transactions in our market have been very moderate, but holders generally, owing to the favourable advices from the manufacturing districts, and the high currencies paid by the combers, are firm at very full prices. For export, no transactions worthy of notice have taken place, yet we learn that the supply of wool in France is very limited. Nearly 50,000 bales of Colonial wool are expected to be offered at the public sales to commence on the 8th proximo.

	s.	d.	s.	d.
Down tegs.....	1	3	to	1 5
Do. ewes.....	1	2	—	1 3½
Half-bred hoggets.....	1	2	—	1 3
Half-bred wethers.....	1	1	—	1 2
Kent fleeces, mixed hog and ewes.....	1	3	—	1 3½
Combing skins.....	1	0	—	1 3
Flannel wools.....	1	0	—	1 3
Blanket wools.....	0	10	—	1 1

LEEDS WOOL MARKET, April 25.—There has been a moderate amount of sales this week, and last week's prices are firmly maintained, with an upward tendency.

BRADFORD WOOL MARKET, April 24.—The transactions in combing wools are not extensive; the prices sought are so thoroughly beyond the reach of the consumers, that they only buy to assort their stocks.

#### LIVERPOOL WOOL MARKET, APRIL 26.

SCOTCH WOOL.—There is a good demand for laid Highland, and late advance fully maintained. White Highland is still rare and wanted. Cheviot and crosbel, of good quality and condition, are still in fair request, and the Scotch manufacturers being in short supply for immediate wants, have been supplying themselves from this market.

	s.	d.	s.	d.
Laid Highland Wool, per 24lbs. . .	13	0 to 14	0	0
White Highland do. . . . .	15	0	16	0
Laid Crossed do. unwashed . . .	14	6	15	6
Do. do. washed . . . . .	15	0	16	6
Laid Cheviot do. unwashed . . .	16	0	18	0
Do. do. washed . . . . .	18	6	21	6
White Cheviot do do . . . . .	30	0	32	0

FOREIGN WOOL.—There has been a series of public sales going on this week: they commenced on the 22nd and finished this day, at which were offered about 6,700 bales East India, about 2,000 ballots Peruvian, and 1,000 other kinds. The attendance was numerous. The East India sold with great spirit; good fine white, also middle fine yellows, about  $\frac{1}{2}$ d. per lb. above our last sale here in January. The other classes much about the same, except rubbish, which were lower. Peruvian were withdrawn.

#### LIVERPOOL WOOL SALES.

LIVERPOOL, April 26.—The public sales of wool, which have been in progress since the 22nd instant, brought together a very large attendance of buyers. The total quantity announced was 12,060 bales, of which 7,807 bales were East India, which alone call for any particular comment. The sales of this description opened with very great spirit, and, in consequence of the unusually long interval since previous sales, stocks being completely reduced, the trade evinced some eagerness at the commencement, which, however, was not fully maintained throughout; still, we are able to report that the general result is satisfactory, prices on the average being somewhat higher than at the previous sales. The greatest advance was on good middling to superior light yellow qualities, which we quote decidedly higher; all well-bred descriptions are also dearer, but for grays and fawns, excepting of superior qualities, prices have ruled in favour of buyers, while burry and other unmarketable kinds have sold at a considerable decline. The quotations are as follows:—White sold from  $8\frac{1}{4}$ d. to  $13\frac{3}{4}$ d., one lot very prime ditto  $14\frac{1}{2}$ d., yellow and tinged white  $7\frac{3}{4}$ d. to  $13\frac{1}{4}$ d., ditto inferior  $6\frac{1}{4}$ d. to  $8\frac{3}{4}$ d., gray and fawn  $4\frac{1}{4}$ d. to  $9\frac{3}{4}$ d., low black  $4\frac{1}{2}$ d. to 5d., low gray  $3\frac{1}{2}$ d. to  $4\frac{1}{2}$ d., Burry and refuse  $1\frac{1}{2}$ d. to  $2\frac{3}{4}$ d. per lb. 1,763 ballots of Peruvian were offered, for which there was a fair inquiry; but, being limited above their market value, they were nearly all withdrawn. Portugal R ("gummy") brought 15d. to  $15\frac{1}{2}$ d., and some rather better 17d. per lb. Cordovan 9d., inferior Smyrna fleece  $8\frac{1}{2}$ d., and white Crimea fleece  $6\frac{3}{4}$ d. per pound. By private contract during the month the demand has been very animated, particularly for Australian wools, which have been eagerly bought up at an advance of 2d. to 3d. per lb. on

the prices of last London sales, and business to some extent has also been done in other descriptions not on the spot, by sample, at proportionate rates. The late arrivals of fine River Plate wools have found eager buyers as soon as landed, and of the whole receipts only a few bales remain undisposed of. Long Egyptian and Oporto are much sought after, in consequence of the advance in English combing wools, but are extremely scarce. English combing wools have been very firm, and there is every prospect of the approaching clip opening with some excitement, the demand being large, and consumers light in stock. Scotch wools have been in good demand; but there being little on the spot, business has been much restricted, and some of the principal sales made having been to return to that quarter, there is little to expect for supplies, even if they had it to send, which seems doubtful under all circumstances. Sheepskins have been a good deal in request, and have found ready sale by private contract at full prices. The next public sales of colonial in London are to commence on the 8th proximo, and the quantity so far announced is 33,000, but will probably reach 50,000 bales.—HUGHES AND RONALD, Wool Brokers.

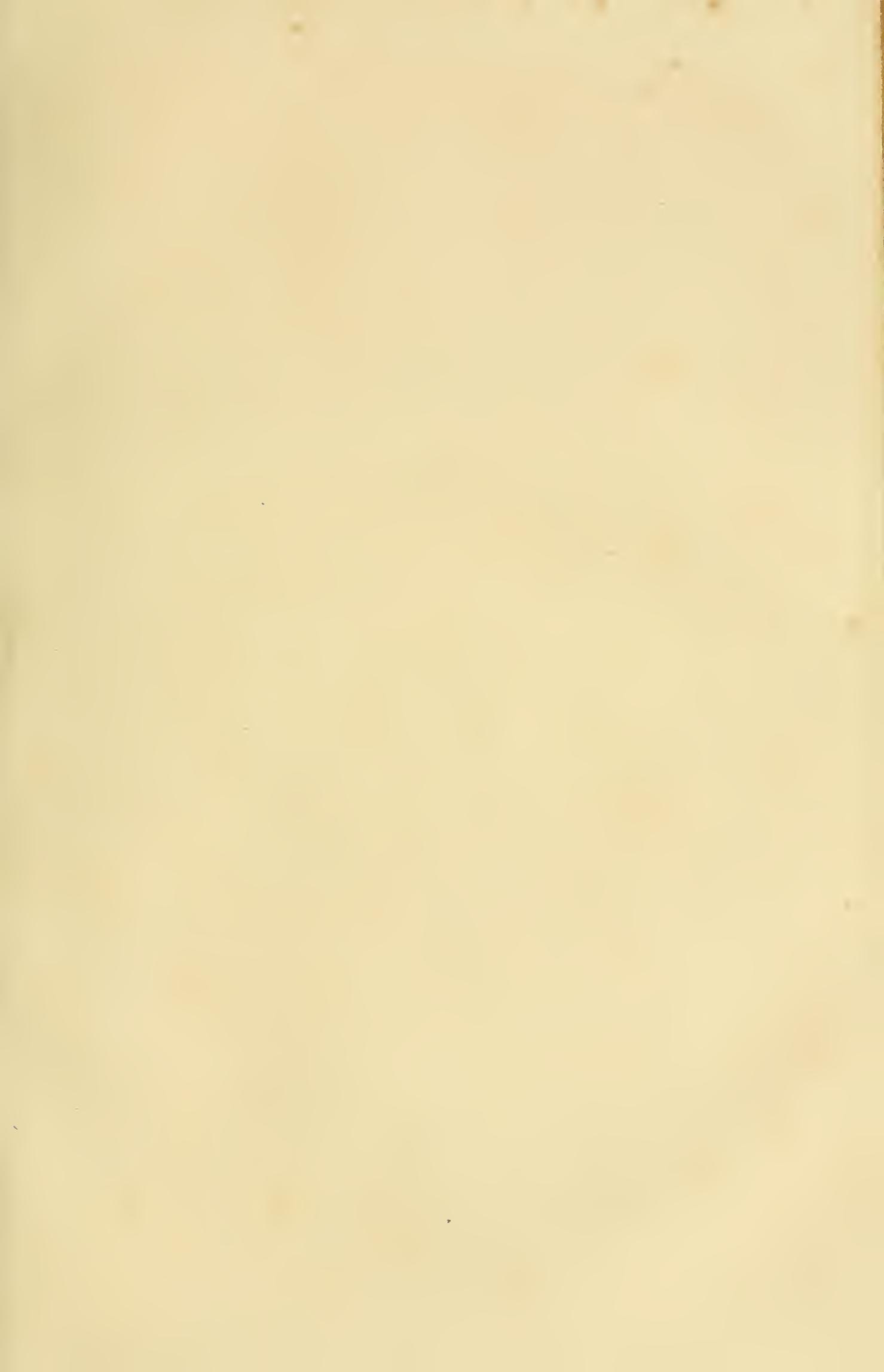
#### FOREIGN WOOL MARKETS.

CITY, MONDAY.—In most of the continental wool markets there appears a deficiency in the supplies to meet the demands of the manufacturers. At Paris a scarcity of wools is experienced, not only in the stocks on hand of indigenous wools, among the merchants and producers, but the arrivals of foreign wools are insignificant. The wool buyers, therefore, look with much impatience for the time when the market is replenished from the approaching sheep-shearing season. This scarcity has caused a further rise in prices, and it is likely to continue until the commencement of the season. Contracts had been closed at 1 f. 35 c. to 1 f. 40 c. per half kilogramme for wools in grease and merino qualities. More than one manufacturer has endeavoured to make sure of his supplies by the anticipated demands after shearing.

From Breslau reports of the sales for the last week are stated to comprise about 800 quintals, with a rise in prices, both for home consumption and export. Contracts entered into for the ensuing clip of Silesian wools have been concluded at 95 to 110 thalers for fine, and 80 to 85 thalers for skin.

LEEDS FOREIGN WOOL MARKET, April 25.—In the absence of any fresh arrivals, there is no new feature to report. The demand is steady, and prices are quite firm. Low wools suitable for combing purposes are in good demand, but the supply is small.

BRESLAU WOOL REPORT, April 21.—Owing to the scarcity of provisions our trade during the last fortnight has been rather quiet, and transactions only amounting to 850 cwts., composed of almost all descriptions. There have been paid for fine Silesian fleeces at from 100 to 110 thalers; ditto Posen ditto at from 90 to 100 thalers; ditto Russian combing and clothing wool 65 to 75 thalers; ditto scoured 95 to 105 thalers; ditto Silesian skin wool in bundles 80 to 85 thalers; ditto ditto slipes ditto 65 to 78 thalers per cwt. The chief purchasers were home and Saxon manufacturers and wholesale dealers, as well as many home Berlin and Austrian commissionaires. Prices generally remained unaltered; only skin wools have been paid comparatively very high, say 12 to 15 per cent. above last year's quotations. Purchases on the future clipping have not been so extensive as hitherto.—GUNSBERG, wool-broker.







E. H. Fisher



*Cambridge*

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# THE FARMER'S MAGAZINE.

JUNE, 1856.

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## PLATE I.

### GLOUCESTER; A PRIZE SHORT-HORN BULL.

THE PROPERTY OF THE RIGHT HONOURABLE LORD FEVERSHAM, OF DUNCOMBE PARK,  
YORKSHIRE.

Gloucester, a red and white bull, bred by the late Earl Ducie, and calved April 3rd, 1853, is by Duke of Gloucester (11382), dam (Beatrice) by Cramer (6907), g. d. (Bessy) by Helicon (2167), gr. g. d. (Beeswing) by Sir Thomas (2636), gr. gr. g. d. (Venilla) by Enchanter (244), gr. gr. gr. g. d. (Venus) by Major (397), gr. gr. gr. gr. g. d. by Mr. Charge's Grey Bull (672), gr. gr. gr. gr. g. d. by Favourite (252), gr. gr. gr. gr. gr. g. d. by the Studley White Bull (627).

Gloucester, then a calf, was knocked down to Lord Feversham for 120 gs., at the great Tortworth sale, on the decease of Earl Ducie in 1853.

PERFORMANCES: In 1854, Gloucester took the second prize of £5 for yearling bulls, at the Ripon Meeting of the Yorkshire Agricultural Society. In the same season he took the first prize of £5 at the Cleveland Show. In 1855, Gloucester took the first prize as the best bull, and the Gold Medal, at the Paris Agricultural Exhibition; the second prize of £15 at the Carlisle Meeting of the Royal Agricultural Society of England; the second prize of £10 at the Malton Meeting of the Yorkshire Agricultural Society; and a prize at the Kirkby Moorside Show.

The following is a description of this famous bull, written by one of our own correspondents on seeing him at the Carlisle Meeting:—"Gloucester is only two years and two months old, but he possesses all the full outline of maturity; his colour is a good red and white; he has a fine head, neck, and horns, girth full, and chest all you can desire. A level broad back, ribs standing well out, broad loin, good hips, but rather prominent; sides deep and full, rump and thighs good; but flank, twist, and tuts rather light; the general form and proportions cylindrical and true."

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## PLATE II.

### RAVENHILL,

A THOROUGH-BRED STALLION, TO WHICH THE PRIZE OF £40 WAS AWARDED AT THE CARLISLE MEETING OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND, AUGUST, 1855.

Ravenhill, Ravenshill, as he is sometimes written, or "Royal" Ravenhill, as they now call him in the North, was bred in Ireland, by Mr. J. More, in 1849, and is by The Ugly Buck, out of Sylph, by Filho da Puta, her dam Twatty by Whalebone—Canopus.

The Ugly Buck, bred by Mr. John Day in 1841, is by Venison, out of Monstrosity, by Plenipotentiary. His stock, which have been out since 1850, include many good horses. The Ugly Buck covered for some seasons in Ireland, but has now returned to England.

Sylph, bred by Mr. R. Wilson in 1832, and put to the stud in 1839, has had a large family, though with nothing so far very distinguished.

Ravenhill is a brown horse, standing hardly fifteen hands three inches high. He has a really beautiful  
OLD SERIES.] K K [VOL. XLIV.—No. 6.

ful small bloodlike head, thin neck, and a good crest, firm and arched. He has some other catching points, but is rather small in the bone, and stands terribly over at knee. He has evidently filled out to advantage since put to the stud; and, what with his blooming coat and rounded form, certainly looked at Carlisle a perfect picture.

Ravenhill was purchased in the autumn of 1853 by Mr. Ferguson, and at once taken to the North. At the local Carlisle Show, 1854, he was entered in the hunter-stallion class, and the first prize awarded to him. The next season he was shown at the same place against all England, and again successful. His opponents on this occasion were, A British Yeoman, St. Bennett, The Cure, Vulcan, Emerystone, The Era, Larristown, Cyclops, Turnus, Burndale, Colsterdale, and Witton. The point of preference was entirely between him and the Yeoman, the latter being highly and very deservedly commended. The stock of both showed to great advantage, and certainly tended to confirm that distinction awarded to their sires by the judges.

Mr. Ferguson, the owner of Ravenhill, has been one of the principal breeders of horses in Cumberland for nearly forty years. He commenced with the Cleveland coaching-horses, of which Candidate was the best known. The first of his thorough-bred stallions was Grey Wiganthorpe, which he bought of Mr. Garforth, and so brought the Comus blood into his neighbourhood. The next was Phoenix, obtained from Mr. Kirby, and infusing the famous Cobweb strain. Galaor, from Mr. Vansittart, followed these, with the Muley blood; and Ravenhill now represents the Venisons.

## THE MOISTURE OF SOILS.

BY CUTHERBERT W. JOHNSON, ESQ., F.R.S.

In this paper I propose to spend with my readers a few minutes in considering the moisture of soils and the sources of its supply. And as we are commencing our enquiry, in the midst of the turnip sowing season, it may be most useful if we regard chiefly that crop in the practical application of our observations.

The origin of moisture in the soils with which we have to do, is either from rain or the insensible vapour of the atmosphere; it is thus deposited on or in the soil, either visibly in rain, or insensibly as dew. It may be well, before we proceed to consider the best mode of securing for our crops the greatest amount of advantage from this marvellously arranged supply, if we pause to inquire into its extent. First then, as to the rain-fall, we find that during the five chief turnip-growing months, its average amount in inches at London, Chatsworth, and Glasgow is as follows:—

	London.	Chatsworth.	Glasgow.
May .....	1·63	2·11	1·64
June .....	1·73	2·28	1·34
July .....	2·44	3·00	2·30
August .....	1·80	2·43	2·74
September .....	1·84	2·28	1·61

Here we find that upon an average (an inch of rain being equal to 100 tons per acre) in the neighbourhood of London about 160 tons of rain per acre falls in May, 170 in June, 244 in July, 180 in August, and 184 tons in September. The way in which this downfall is removed from the soil is another branch of the inquiry, to which Mr. Charles Charnock a little time since devoted considerable

attention. He obtained results from his careful observations in 1845, on a magnesian limestone soil at Holmfield, near Ferrybridge, which will be found in the following table. Column I. gives the month and the rainfall in inches; II., the evaporation from a drained soil; III., the amount of drainage from a drain-pipe placed in that soil, three feet from the surface (*Jour. Roy. Ag. Soc.*, vol. x. p. 516).

	I.	II.	III.
May .....	2·24	1·97	0·27
June .....	3·18	2·93	0·25
July .....	3·49	3·30	0·19
August .....	4·61	4·24	0·37
September .....	1·36	0·95	0·41

The way in which these observations were evidently made, was by subtracting the amount of water discharged by the drain from that collected by the drain gauge, and assigning the difference to evaporation; but let us remember that these valuable observations were made upon soils untenanted with plants. Had a crop been growing on the ground, the amount of the evaporation from the same extent of land would then doubtless have been materially enlarged. This was long since, in fact, shown experimentally by Mr. Geo. Phillips (*Jour. Roy. Ag. Soc.*, vol. vii., p. 307). He employed in the month of March two metallic vessels of equal size, which were used as mould pots. They were so constructed, that no moisture could escape except at the surface. Each pot contained 22·09 square inches of surface at the level of the mould. One pot was filled with mould only, the other with mould containing a polyanthus, and, in another experi-

ment, three plants of the potato. In twelve days the mould evaporated 1,600 grains, or 6.06 grains daily per square inch, while the pot containing the polyanthus had evaporated 5,250 grains, which for the mould and one surface of the leaves is 4.93 grains for every square inch. In the case of the potato plants, in nineteen days the mould evaporated 54,000 grains, the potato plants 3,000 grains. The daily evaporation from one surface of the potato was at the rate of 1.4 grain, and of the polyanthus 2.1 grains, from one square inch. In the experiments of Dr. Hales on a sunflower, the daily mean evaporation was 15 grains for every square inch of the plant's surface.

The loss of moisture by evaporation from a soil varies considerably in amount, according to its composition. Schubler (*ibid*, vol. i., p. 193) exposed equal surfaces and depths of various soils to the action of the air for four days. In the time when

A calcareous sand lost.....	146	grains of water,
A light garden mould lost ..	143	„
A slaty marl .....	131	„
Two clay soils, each .....	123	„

We have hitherto only been contrasting the amount of the evaporation from the earth, and that emitted by the vegetable creation, with the fall of rain which God has provided for them; but another source of supply presents itself—that from the aqueous vapour, which in all seasons abounds in the atmosphere; a source of supply, though invisible to us, is provided for our use, and so essential to the growth of our plants, that the more we reflect upon its presence—the least in amount in the winter months, and most abounding in those of summer, when its presence is the most needed—the more we reflect, I say, upon these things, the more we must admire and reverence the arrangements of their divine Author.

Mr. S. Parkes (*ibid*, vol. v., p. 13) when employed in tracing the causes of the deposition of dew upon and in a soil, thus briefly explained the phenomenon:—He observed “that if a soil be sufficiently permeable to air and not saturated with water, it is in a state to receive accessions of moisture from the atmosphere, which is a constant and inexhaustible vehicle of humidity. And if the temperature of a sufficiently porous subsoil be at or below the dew point, as will frequently be the case during some portion of the day in the summer season, the process of depositing dew will take place in the *interior* parts of the soil during the day, at the same time that the exterior or surface of the soil may be projecting both heat and moisture into the atmosphere. Thus it is apparent that the acquisition of moisture in the form of dew is not limited to the period of the night only, nor to the surface of the earth; and

it has been shown that the precipitation of dew cannot take place without the communication of heat to the recipient substance; hence the importance of sufficient pulverization to permit access and change of air to the interior parts of a soil.” The amount of the dew thus deposited is much larger than is generally believed. It has been calculated by Dr. Dalton that the annual deposit of dew in England (a deposition which is the greatest on the eastern side of the island) is equal to about five inches or five hundred tons per acre.

After thus glancing at the sources of the supply of the moisture of our soils, and at the way in which it escapes either downwards into the drains or rises upwards by evaporation, let us next briefly pause to ask ourselves if we may in any way employ such facts for the more profitable production of our soils—to root crops for instance. It was when engaged in such an inquiry that a Northamptonshire farmer, Mr. Robert Vallentine, of Burcott, in his valuable prize essay, dwelt upon the importance of retaining the moisture in turnip land (*ibid*, vol. xvi., p. 347).

“It has been,” he observed, “our practice to clear all the foul light land in autumn, whenever the season would permit, for the particular reason that when the cleaning has to be done in summer the land actually becomes so dry in the course of working as to be unsuitable for getting a turnip braird without a heavy *accidental* fall of rain. When the season does not permit of autumn cleaning, the successful chance of growing a turnip crop on light land rests upon *early* working in spring. Dry turnip soils should be moved in March, or the beginning of April at the latest; and cleaning, if necessary, should be done as early as the weather and the working of the soil will permit. Clean turnip fallows require very little spring and summer labour, and therefore may remain untouched after their winter fallow till the end of April or beginning of May. One ploughing or two scarifyings should generally prove sufficient for dry clean turnip land; but when the land is foul the case is reversed, and the excess of working necessary—ploughing, dragging, harrowing, &c.—turns the soil so frequently over to a hot sun, that there is no alternative but the moisture must evaporate in the same way as from wet green grass, which is often turned over to expel the water and convert the residue into hay.

“The next point for consideration is, when cleaning has been neglected in autumn, how to manage it in spring without an injurious loss of moisture. Some years ago the practice was general, and in some districts is still continued, of ploughing turnip fallows—even clean land—three or four times in spring and summer, for the purpose of pulverizing the soil and making it work well. Such a prac-

tice on light soils we do not hesitate to denounce as quite against the economy of labour, and the chance of securing a turnip crop by retaining moisture in the soil. We think that one ploughing in spring is amply sufficient for turnips on light soils. This ploughing should be given in April at the latest; after this the plough should give place to the scarifier, which, if good of its kind, not only pulverizes the soil and brings up the weeds to the surface, but also exposes little or no fresh soil to the action of a drying sun. Scarifying certainly causes dry turnip soils to lose much less moisture than ploughing, and, wherever it is practicable to substitute the one for the other, it should be done.

“The evaporation from the earth's surface is greatest usually in March and April, from the circumstance of wind and sun together having a greater drying power than heat alone, which usually obtains in June and July. During the whole of the spring and summer, however, evaporation takes place with great rapidity, and it is important that dry turnip soils should be worked as little as possible during that period, or the chance of obtaining a crop is hazarded.

“Autumn or winter dunging of stubbles has been recommended as tending to retain moisture in soils. We believe from experience that it has that effect; but on light soils, through which rain so readily filters in winter, much of the value of the manure is lost, and other means should be resorted to. On clay and loamy soils, when clean, winter dunging is the best course to pursue in almost every case, taking care, however, not to cart upon the land when wet.”

On the importance of hoeing turnips in dry weather, many of my readers will not entertain a doubt, and Mr. Vallentine is evidently of this opinion, when, towards the conclusion of his essay, he adds the following remarks, in most of which I heartily concur:—

“If any hoeing is injurious in dry weather, I think it is horse-hoeing *high ridges*, when the hoe cuts down the sides of the ridges so much as to leave but a narrow strip of earth containing the

plants exposed to the heat of the sun on all sides, with scarcely any chance of absorbing dew at night, from the smallness of the horizontal surface exposed, and the sides of the ridges imbibe little or no dew. I am confident, practically, that horse-hoeing high ridges in very hot weather is injurious, as the soil in many cases gets quite dry, and the plants for want of moisture turn blue and sickly. With that exception, however, I never saw any injury caused by the use of either horse or hand-hoe in dry weather. When once the high ridges are reduced to a comparatively level state by horse and hand hoeing, hoeing then does good in dry weather. It must, however, be remembered that there is much difference between turning over a soil to the sun, and running a share or other cutting implement below the surface. In ploughing, the land is turned nearly upside-down, a fresh surface is exposed at every ploughing; but in hoeing, the *same soil*, with but little change, remains on the surface. Most people know that the finer a soil is, the more dew does it attract. Gardeners know this well, as they hoe very frequently when there are no weeds to kill. The best farmers know this also. In a word, then, I would say, **HAND-HOE** without intermission in dry weather, to attract *more* moisture by dews, but use the horse-hoe with discretion as long as the ridges remain high and the weather dry.”

The owners of stock farms will need no arguments to convince them of the importance of such practical inquiries. They will remember the natural advantage which the turnip growers of Scotland and other districts possess, and that this chiefly consists in a more copious supply of moisture than that of England. They will not forget to contrast the comparative produce of the root crops of moist and dry seasons. And when they are thus endeavouring to appreciate the mode in which Providence has “rained fatness” over their soils, they will gratefully accept any attempts, however imperfect, to explain, not only the amount of and the mode in which the boon is conferred, but how they can best enhance the value of so marvellous a benefit.

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### THE SWEDISH TURNIP CROP.

The returning period for putting in the turnip-crop being at hand, recalls to our minds most forcibly the immense losses sustained in the past season by the premature decay of this crop, and as a necessary consequence it should lead us to make every enquiry as to the causes of that decay, and the best means to be used for preventing its recurrence, and the best practice should it unfortunately revisit us.

That mildew was the primary cause of the decay of the turnip crop is an undoubted fact; but the origin of the disease, and the nature of the disease itself, are as yet a mystery. Mildew in its many phases is well known to every cultivator, and by sad experience in the destruction of his various crops. Every cultivator dreads the return of this mysterious scourge; but no one has yet ascertained fully its origin, or the nature or mode of its

attacks. One thing is very certain—all know the final result, and have often to deplore the consequences. If it may be so expressed, the attacks of mildew are provoking and greatly disappointing; for assuredly if the farmer has one field of grain or turnips or coleseed more prosperous and splendid-looking than another, that is the very field attacked, and that without remedy, for do what he will he cannot prevent it. What course then is to be pursued in order if possible to avoid the attacks of this so fatal and often unlooked-for enemy? It is impossible to suggest any course for universal adoption: every farmer must be his own judge as to the immediate causes on his own occupation, and he must use every precaution in his power to avoid its attacks. In the immediate locality from which we write every turnip-crop of luxuriant growth *from early sowing* was nearly destroyed, whilst every crop of tardy growth and *late sowing* was preserved. The writer had two crops of Swedes: the-early sown one, intended for competition for a local prize, was woefully injured; the late one nearly escaped. The early-sown had much cultivation, management, and artificial aids bestowed upon it, to make it all productive; the late one but ordinary culture and but little artificial aid; both, however, suffered severely in the winter from the dry frosts: but the losses comparatively were trifling in the latter compared with the early crop. We would suggest that on all rich turnip soils early sowing—that is, before the first of June—should be avoided. The general appearance of this district points to the second and third weeks in June as the safest and best time to put in the Swedish turnip crop. Everything is done that can be devised to prepare the soil for the reception of this almost invaluable root-crop, and when the proper time comes, all the available power of the farm is brought into the most energetic requisition to put it in as quickly and satisfactorily as possible—no working by rule now! On inferior soils the crop may be put in somewhat earlier; but we doubt the propriety of sowing the Swedish crop on land not adapted for it: these soils must be got up to the mark by extra culture—they must be put in with a large deposit of our best artificial aids, and be sown with seed from some of the largest varieties of turnips we have to compensate, or they will not answer well; in such case we demur as to very early sowing. Another suggestion we could again make (and here we fear we stand upon explosive ground), that is, not to hoe them out too thinly. Suppose the crop to be put in on ridges 25 to 27 inches apart, we say that to set out with a nine-inch hoe is in most cases sufficiently wide: if drilled on the flat at 12 inches, we say to set them out with a 12-inch hoe is wide enough; and so on, in such proportion. All good turnip soils, or soils properly prepared for the turnip-crop, will yield large and satisfactory crops under such management. It is very requisite to pay attention to the variety of turnips sown—a large-topped variety should be discarded, except upon the poorest soils; the tops generally decay before consumption—except for early feed; then the more top the better.

The great object in turnip sowing is to get the greatest possible weight or bulk of turnips of good quality per

acre. Can this be done best by cultivating the crop at wide intervals, or not? Has it yet been fully ascertained what is the true prescribed limit for these intervals of an average crop of swedes? Mangel wurzel requires plenty of space; its leaves contribute vastly to its support and progress; their very form and shape denote it. Turnips may be set out more closely; their leaves do not so soon or so seriously intrude or interfere with each other; and the process of bulbing will proceed notwithstanding such close proximity. Mr. Smith (Lois Weedon) would say, drill them in at 5 feet intervals, and set out at 12 inches—swedes cannot be too large! What depth of cultivation is required for this practice, and what space must be lost, to say nothing of injury to such roots by frost, &c.! He has never been eminently successful even at this immense width.

In this country we have so much to contend against, that we must calculate accordingly. It is but seldom that our seasons will allow the Swedish turnip crop to be taken up and grazed with advantage; could we ensure this, we should not object to a large turnip; but having most frequently to permit them to remain in the ground for consumption, we prefer them to be of medium size, and for this purpose much prefer a thicker plant: for swedes on ridges at 25 or 26 inch intervals; for common turnips on the flat, at 12 inches. We try our best to produce a regular pavement of turnips on the flat, and a continuous row without intervals on the ridge, for which purpose we set them out as thickly as named above. We are satisfied we produce them of excellent quality; and as they grow to a rather large size if carefully set out and singled, we have a great weight per acre; besides, in the early consumption of the common turnips, we have abundance of leaves of good food, and plenty of it, which is a decided benefit.

We have said nothing about cultivation of the crop, having so frequently written upon it; but we would remind our readers of the great advantage and economy attending the use of the liquid-manure drill, particularly in dry seasons, or to stimulate the growth of the plant in late sowing: the manure drilled in to aid the plant, being more easily and readily taken up in a liquid than a dry state, is more available as food for it, and consequently urges it “out of harm’s way” speedily. We have at various times been called to account for promulgating such a doubtful doctrine as that of thick turnip-planting. It has not been done hastily, or without actual experiment, and carried on for a series of years, upon a fair turnip soil. The proof has been fully in favour of thickly setting out the crop, and that with great care, every plant being single, otherwise it would fail; and we always sow a good-sized variety, never a small sort of any kind.

We should much like to influence a considerable number of cultivators to try as an experiment several distances in their setting out the turnip crop, and note the result, giving us all the particulars, including the varieties of turnips experimented upon. If such a course could be adopted extensively, we should be most happy to put them into a tabular form upon the various

communications being sent to the office of the *Mark Lane Express*. Our object is to benefit our brethren of the soil, and we hope many will take the trouble to set out some portions of their crops, and report to the

editor. We feel assured that in the majority of good turnip soils it will be found that turnips may with advantage be set out much more thickly than is generally practised.

## ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A WEEKLY COUNCIL was held on Wednesday, the 23rd of April: present, Mr. Raymond Barker, V.P., in the Chair; Mr. Aldam, M.P., Mr. Blount, Mr. Burness, Mr. James Chapman, Mr. Corbet, Dr. Dauenbeny, Mr. Devas, Mr. Fuller, M.P., Mr. Gadesden, Rev. L. Vernon Harcourt, Mr. Lawrence, Mr. Thomas Lea, and Mr. Mainwaring Paine.

The names of 11 candidates, received during the past week for election into the Society at the ensuing monthly Council, were read.

ARACHIDE-NUT CAKE.—Mr. Spooner favoured the Council with the following reply to inquiries made of him in reference to the Arachide-nut Cake:

“Eling, near Southampton, March 31, 1856.

“In reply to your communication requesting me to furnish the Council with information respecting the price and the supply of Arachide-nut cake, a sample of which I had the honour of forwarding a short time since, I beg to state that my firm (Spooner and Bailey) have imported two cargoes from Rouen, in France, since October last, and that the present price is £9 per ton. It appears to be relished more by sheep than by cattle. I think there is likely to be a fair supply of this cake, unless there should be a great depreciation in the value of feeding cakes as well as oil, so as to render the collection of the nuts not sufficiently remunerative. It is scarcely necessary to observe that, whilst Linseed-cake will probably always maintain its supremacy amongst the different feeding materials, yet it must surely be the interest of agriculturists to encourage the introduction of other feeding cakes, such as Nut-cake, Poppy-cake, and Cotton-cake, more particularly when such cakes are rich in their nitrogenous elements. Poppy cake is much relished by cattle as well as sheep, and appears to be very suitable for working oxen. It is rather dearer than Nut-cake.

“W. C. SPOONER.”

Mr. Gadesden was surprised to hear that the Poppy-seed Cake was priced so high, as he obtained his own supplies at the rate of £8 per ton.

BARN-FLOORS.—Mr. Greaves, of Matlock-Bath, Derbyshire, favoured the Council with the following information respecting barn-floors, in reference to an inquiry made by Colonel Chapman, “whether any cheaper and equally durable material had been met with, as a substitute for barn-floors, than the old-fashioned oak-flooring, for which an estimate had been sent in to him at £40?”—

“In reference to your inquiries relative to the laying of barn-floors, I strongly recommend asphalté in preference to wood, for many reasons, a few of which may be mentioned—as (1), the imperviousness of asphalté to moisture; (2), the exclusion it occasions to vermin; and (3), the preservation of the grain in a sweet state from the dryness in which it is kept. I get the asphalté in blocks; and having set up an old boiler near the place, I mix the gravel with it while hot, and run out the mixture on the surface required to the thickness of about two inches. In a few hours the asphalté-floor will bear any weight, and it will be found not only better but cheaper than wood.”

Mr. Devas remarked that there was great economy in

this flooring, its cost being only £7 for an area which, laid down with oak, would be £40. It would not only bear weight, as stated by Mr. Greaves, but was well adapted, from its strength and elasticity, to bear the application of the flail in the operation of thrashing.—Mr. Raymond Barker feared the objection to its use as a thrashing-floor might be the dust he understood it occasioned.—Mr. Devas had not heard of that objection. H.R.H. Prince Albert had adopted it as the material for the flooring of his sheds and piggeries; and it had been found to answer those purposes extremely well.—Mr. Aldam, M.P., inquired respecting the particular kind of asphalté employed.—Mr. Devas stated that he believed it had been supplied by Mr. Prentice, of Stowmarket, who intended to exhibit specimens of asphalté at the Chelmsford Meeting in July next.

Communications were read from Mr. Brown, late of Arniston, on the subject of shut-drains to exclude the entrance of fibrous matter in the neighbourhood of plantations; and from M. Bortier, of Bruges, on the subject of the limestone of Nieuport containing a small proportion of phosphate of lime, and which he thought might possibly be worth importing into England.

Prof. Way (on account of temporary indisposition) was unable to attend for the purpose of delivering his lecture “On the progress of Chemical Science, both at Home and Abroad, in reference to Agriculture.” Its delivery was accordingly postponed till the following Wednesday, April 30, at 12 o'clock.

A WEEKLY COUNCIL was held on Wednesday, the 30th of April: present, Mr. Miles, M.P., Vice-President, in the Chair; Lord Berners, Lord Feversham, Baron George de Cotta, Sir John V. B. Johnstone, Bart., M.P., Sir Archibald Keppel Macdonald, Bart., M. Tisserand, Mr. Amos, Mr. Raymond Barker, Mr. J. G. Blencowe, Mr. R. W. Blencowe, Mr. Burness, Mr. Caird, Colonel Challoner, Mr. Corbet, Mr. Evelyn Denison, M.P., Mr. Devas, Mr. Ffytche, Mr. Brandreth Gibbs, Mr. Gadesden, Rev. L. Vernon Harcourt, Mr. Fisher Hobbs, Mr. Horsfall, Mr. Neill Malcolm, Mr. Paine, Mr. Parkins, Mr. Pococke, Mr. Scott, Prof. Simonds, Mr. R. Trench, and Mr. Wrightson, M.P.

The names of 29 additional candidates for election at the next Monthly Council were received.

CHEMICAL SCIENCE.—Prof. Way, the consulting chemist of the Society, read his first report on the progress of Chemical Science, both at home and abroad, in reference to agriculture, which he was requested to revise for publication in the *Journal*. On the motion of

Lord Berners, seconded by Mr. Evelyn Denison, M.P., the thanks of the meeting were voted to Prof. Way, for the report he had then read to the Council. Mr. Denison added, that it had given him much satisfaction to listen to the reading of that report. As far as his own limited knowledge went, he fully concurred with what Mr. Way had stated, especially in reference to the controversy between Baron Liebig and Mr. Lawes. He was glad to find that we might possibly see ourselves within that term of the discussion at which those two eminent chemists might come into harmony on points respecting which they had hitherto held opposite opinions. He concurred with Mr. Way in his views on the impulse which mechanical progress in the cultivation of land might give to the development and application of chemical science.—Mr. Miles, on putting the motion from the chair, remarked that the great utility of communications such as the one they had then heard from Professor Way, consisted in their bringing at particular times before the minds of the members detailed statements of such facts as had occurred or been communicated, at irregular intervals, during a long course of years. They supplied at once, in connected order, a vast amount of matter for careful consideration. The early attention of the genius of Liebig to the application of chemistry to agriculture, the great experimental research of Mr. Lawes, and the perfect unanimity which appeared likely to take place eventually between them, to the benefit of agriculture, were all of them circumstances of an important and gratifying character.

The Council adjourned to their Monthly Meeting on Wednesday, the 7th of May.

A MONTHLY COUNCIL was held on Wednesday, the 7th of May. The following members of Council and Governors of the Society were present: Mr. MILES, M.P., Vice-President, in the Chair; Lord Berners; Lord Southampton; Lord Bridport; Sir John Villiers Shelley, Bart., M.P.; Sir John V. B. Johnstone, Bart., M.P.; Sir Archibald Keppel Macdonald, Bart.; Sir Edward Kerrison, Bart., M.P.; Mr. Dyke Acland; Mr. Alcock, M.P.; Mr. Raymond Barker; Mr. Barnett; Mr. Barthropp; Mr. Bosanquet; Mr. Bramston, M.P.; Mr. Brandreth; Mr. Bullock; Mr. Cavendish; Mr. Evelyn Denison, M.P.; Mr. Druce; Mr. Foley, M.P.; Mr. Gadesden; Mr. Garrett; Mr. Brandreth Gibbs; Mr. Hamond; Mr. Fisher Hobbs; Mr. Wren Hoskyns; Mr. Hudson, of Castleacre; Mr. S. Jonas; Mr. Kinder; Mr. Lawes; Mr. Laurence; Mr. Sillifant; Prof. Simonds; Mr. Thompson; Mr. Turner, of Barton; Prof. Way; Mr. Jonas Webb; Mr. Western; Mr. Wilson, of Stowlangtoft; and Mr. Woodward.

The following new members were elected:—

Adams, S., Great Waltham, Chelmsford  
 Allen, Edward Ellis, 376, Strand, London  
 Allen, Stephen, Eastwood Bury, Rochford  
 Baillie, Rev. Evan, Lawshall Rectory, near Bury St. Edmunds  
 Barnes, J. S., Colchester  
 Blencowe, Robert A., Chorley, Sussex  
 Board, John, Westerham Vicarage, Kent  
 Boby, Charles, Stutton, near Ipswich  
 Bromley, J. R., Bamsfield Hall

Burlingham, J., Old Buckenham  
 Butcher, John, Bardwell, Ixworth  
 Carter, George, Tyndales, Woodham Mortimer, Chelmsford  
 Cheadle, Rev. T., Dunham, Newark, Notts.  
 Cooke, Joseph, Mayor of Colchester  
 Cooper, William, Barnham, Thetford  
 Edwards, James Latchford, Rochester, Kent  
 Farrow, Charles, Ipswich  
 Fison, Joseph, Ipswich  
 Frost, Edward, West Wrattling Hall, Linton, Cambridge  
 Griffiths, J. Evans, Aberystwith House, Widdington, Bishop's Stortford  
 Grove, James, Great Braddow, Chelmsford  
 Hall, Fredrick, Denham, Bury St. Edmunds  
 Hay, J., Bishopsthorpe, near Great Grimsby  
 Howard, R., Spexhall Road, Halesworth  
 Hilton, C., Dansbury, Chelmsford  
 Hitchcock, Henry, Chittane All-Saints, near Heytesbury  
 Hobson, James, Kilkea Castle, Dermot, County Kildare  
 Kersey, Clement, Whitton, Ipswich  
 Kersey, Thomas, Fakenham Hall  
 Keyworth, Henry Joseph, Cottesford Place, Lincoln  
 Keyworth, John Robert Haldenby, Cottesford Place, Lincoln  
 King, George, Gazeley, near Newmarket  
 King, William, Barton, Bury St. Edmunds  
 King, Edward, Gazeley, near Newmarket  
 Locker, William, Tillington, Stafford  
 Massey, Sampson, Harkstone, near Derby  
 Moss, Henry, Bentley Mill, near Brentwood  
 Munro, Samuel, East Stanley-street, Broughton Road, Salford  
 Nunn, George, Eldo House, Bury St. Edmunds  
 Owen, Robert, Oldport, near Oswestry  
 Partridge, Julius, Birmingham  
 Pawsey, Frederick, Lidgate, Bury St. Edmunds  
 Pryke, John, Wickhambrook, Newmarket  
 Pyc, George, Ipswich  
 Schreiber, T. W., Round Wood, Ipswich  
 Shaw, Alexander Nesbitt, Newhall, Fortrose, Ross-shire  
 Smith, Charles Edward, 84, Eccleston Square  
 Townsend, T. C. Gretton, Berwick Place, Chelmsford  
 Tye, Edmund, Dallinghoo, Woodbridge  
 Verelst, Charles, Claughton, near Birkenhead  
 Waldy, Edward, Bampton, Darlington  
 Wallace, Robert Agnew, Lochryan House, Cairu, near Stranraer  
 Warwick, W. A., Colchester  
 Woodward, Henry, Stanway, Colchester  
 Webb, Henry, jun., —  
 Wilson, Chas. R., Hipsburn, near Alnwick.

FINANCES.—Mr. Raymond Barker, Chairman of the Finance Committee, submitted the monthly report on the accounts of the Society; from which it appeared that the current cash-balance in the hands of the Society's bankers was £3,657. He also laid on the table the several quarterly statements of account in reference to the different branches of income and expenditure.

JOURNAL.—Mr. Thompson, Chairman of the Journal Committee, reported recommendations in reference to the preparation of a complete analytical Index to the Journal of the Society; and to an alteration of the terms in which the grant is at present made to the Royal Veterinary College. He also expressed, on the part of the Journal Committee, a request that the members of the Council would favour them by suggesting, before the 1st of June, subjects for the essay-prizes to be offered for 1857.

CHEMICAL ANALYSIS.—Mr. Wren Hoskyns, Chairman of the Chemical Committee, reported the progress made by the committee, in conference with Professor Way, in preparing the new schedule of reduced charges to be made by the consulting chemist of the Society to its members for chemical analyses, with or without a professional opinion as the applicant may desire.

**GUANO-SUBSTITUTE.**—Mr. Raymond Barker reported communications from the Guano-Substitute Committee, and the Council gave instructions in reference to them.

**CHELMSFORD MEETING.**—Mr. Barnett, Vice-chairman of the Chelmsford Committee, reported the suggestions of that committee, which were adopted. The construction of a dining pavilion to accommodate one thousand guests on Thursday, the 17th of July, the principal day of the show, was finally ordered.

**DYNAMOMETER.**—Colonel Challoner transmitted to the Council the engagement entered into by the Implement Committee with Messrs. Easton and Amos, to complete for use at the Chelmsford meeting the requisite dynamometers for the trial of field-implements on that occasion.

**FOREIGN PRIZE SHEET.**—Mr. Miles, M.P., reported the steps he had taken, in conjunction with Lord Feversham, to carry out the intentions of the Council in reference to the conditions under which foreign cattle were to be shown in competition for prizes at the Chelmsford meeting.

**TRUSTEE.**—On the nomination of Mr. Milward, seconded by Mr. Raymond Barker, Mr. Evelyn Denison, M.P., was unanimously elected one of the Trustees of the Society, in the place of the late Mr. Neeld, M.P.

**THOROUGH-BRED HORSES.**—Mr. Fisher Hobbs presented from the Chelmsford Local Committee a memorial, requesting the Council to accept the following prizes for competition, under the general regulations of the Society, at the ensuing country meeting:—

For the best thorough-bred Stallion . . . . .	£30
For the best weight-carrying Hunter Stallion . . . . .	30
For the best Coaching Stallion . . . . .	25
For the best Hackney Stallion . . . . .	25
For the best weight-carrying Hunter Mare . . . . .	20
For the best Hackney Mare . . . . .	20
For the best Gelding of any age for Hunting purposes	15
For the best Gelding under 4 years old . . . . .	10
For the best Hackney Gelding of any age . . . . .	15
For the best Hackney Gelding under 4 years old . . . . .	10

£200

No Horse being allowed to compete in two Classes.

**HONORARY MEMBER.**—On the motion of Mr. Evelyn Denison, M.P., M. Léonce de Lavergne, author of the excellent work on the Rural Economy of Great Britain and Ireland, was unanimously elected an Honorary Member of the Society.

**POULTRY STEWARD.**—On the motion of Mr. Fisher Hobbs, Mr. Joseph Cooke, mayor of Colchester, was appointed Steward of the Poultry department for the Chelmsford Meeting.

**IMPLEMENT STEWARD-ELECT.**—On the motion of Mr. Cavendish, Mr. Barnett, of Stratton Park, was appointed Steward-Elect of Implements for the Chelmsford Meeting.

**COUNTRY MEETING of 1857.**—Invitations were received from the authorities of Bath, Dorchester, Salisbury, Taunton, and Winchester, requesting the Council to select the place of the country meeting for next year from one of their respective localities. The various memorials, plans, and other documents thus received, were referred to an inspection committee, with a request

that the members of it would personally visit the proposed localities, and report upon them to the Council on the 4th of June.

**HOUSE LIST.**—The balloting list of Council to be recommended for adoption by the general meeting on the 22nd inst. was prepared agreeably with the terms of the bye-laws.

**LECTURE.**—On the motion of Mr. Lawrence, Professor Simonds's second lecture "On Parasites affecting Domesticated Animals," was arranged to be delivered as proposed on the 25th of June, at twelve o'clock.

**FOREIGN CATTLE ENTRIES.**—On the motion of Mr. Brandreth Gibbs, the period for receiving entries from abroad of foreign cattle intended to compete at the Chelmsford meeting was extended from the 1st to the 12th of June, in order that entries might be effected during the Paris Exhibition, intended to take place in the first week of June.

A WEEKLY COUNCIL was held on Wednesday, the 14th of May: present, Mr. RAYMOND BARKER, V.P., in the Chair, Sir Edward Hulse, Bart., Mr. Buller (Dilhorne), Mr. Burness, Mr. Cooke (Mayor of Colchester), Mr. Corbet, Mr. Cotes, Mr. Devas, Mr. Ffytche, Mr. Gadesden, Mr. Glegg, Mr. Gray, Mr. Fisher Hobbs, Rev. C. T. James, Mr. Majendie, Mr. Milward, Mr. Orlebar, Mr. Paine, Mr. Parkins, Mr. Spencer Stanhope, Mr. Purser, Mr. Burch Western, Mr. Sutton Western, and Mr. Wilton (Stowlangtoft).

Prof. Way delivered a lecture on the Composition of Drainage Water, for which, on the motion of Mr. Raymond Barker, seconded by Mr. Fisher Hobbs, received the best thanks of the meeting.

Lord Portman made the following communication:—

"The manure mentioned in the Journal of the Bath and West of England Agricultural Society, published in 1856, p. 314, under the name of the London Manure Company's Superphosphate for Turnips, was bought by Mr. E. Pester, my bailiff, of Mr. J. U. Phillips, of Dorsetshire, and was called and labelled by Mr. Pester, 'The London Manure Company's Manure.' It appears on investigation to-day that the manure delivered by Mr. Pester was sent in bags marked with the name of another company, and that Mr. Phillips is not the agent of the London Manure Company of Mr. Edward Purser.

"All the remarks of Professor Voelcker are therefore wholly inapplicable to the manure sold by the London Manure Company.

"I therefore certify that having been misled by my bailiff, I have most unwillingly and quite unconsciously permitted the publication in the Journal of the analysis of manure under a wrong name, as it was not purchased from the London Manure Company or their agents.

"I authorize Mr. Purser to publish this statement in any way he thinks fit.

"Bryauston, May 8. (Signed) "PORTMAN."

The Half-Yearly AUDIT OF ACCOUNTS was held on the 16th of May: present, Mr. Raymond Barker, chairman, and Mr. Henry Wilson, member of the Finance Committee; Mr. Thomas Knight, Mr. George Raymond Barker, and Mr. George Dyer, auditors on the part of the Society. The accounts were examined, audited, and certified, by the signatures of the parties present, as correct.

A SPECIAL COUNCIL was held on the same day, for taking into consideration the report to be made by the Council to the ensuing general meeting: present, Mr. Raymond Barker, Vice-President in the chair; Earl of Powis, Mr. Milward, and Mr. Wilson of Stowlangtoft.

A WEEKLY COUNCIL was held on the 21st of May: present, Mr. MILES, M.P., Vice-President, in the chair; Lord Berners, Lord Bridport, Mr. Barnett, Mr. Hodgson Barron, M.P., Mr. Blencowe, Mr. Bullock, Mr. Burness, Mr. Bramston, M.P., Mr. Evelyn Denison, M.P., Mr. Brandreth Gibbs, Mr. Jennings, Mr. Paine, Mr. Parkins, Mr. Chandos Pole, Mr. Slaney, Mr. Edward Tull, Professor Way, Mr. Burch Western, Mr. Sutton Western, and Mr. Wilson of Stowlangtoft.

VETERINARY COLLEGE.—The following report was received from the Governors of the Royal Veterinary College:—

Royal Veterinary College, April, 1856.

The Governors of the Royal Veterinary College, in presenting their annual report to the Council of the Royal Agricultural Society, have again the pleasure of congratulating them on the undisturbed harmony which has continued to exist between the two institutions. In a union such as this the Governors find an assurance that Veterinary Science cannot fail in her continuous efforts of investigation into the nature and causes of the diseases affecting the flocks and herds of the agriculturist, and thereby, while contributing to the support of one of the fundamental principles of the Royal Agricultural Society, to lend her not altogether unimportant aid in the conservation of an essential portion of the national wealth. The means which the Governors have given effect to, during the past year, have differed in no important particular from those originally laid down for their guidance and approved of by the Society.

LECTURES.—Under this head they would observe that an average number of four a week were delivered by the Professor of Cattle Pathology during the session commencing in October, 1854, and ending in May, 1855; and that a similar course of lectures is now being delivered, which will be brought to a close at the usual period. These lectures have for their exclusive object the inculcation of the principles of pathology, founded upon a knowledge of the anatomy and physiology of the ox, sheep, and pig, and they therefore embrace the nature and causes, as well as the preventive and curative treatment of the several affections of these animals. These lectures have been regularly attended by all the pupils of the college. The Governors have also called the special attention of the class to their code of laws, which provide that the students, before presenting themselves for examination for the diploma of the Royal College of Veterinary Surgeons, shall pass a preliminary examination to the satisfaction of the Professor of each department of their studies. Provision is thus made, as the Council will perceive, for the more perfect education of the pupils in the several divisions of their studies, and from this much general good must result; for the Governors would remark that very valuable assistance to the advancement of cattle pathology is given by the other Professors of the College, whose instructions are extended to the anatomy, physiology, and pathology of the horse—to chemistry, materia medica, and pharmacy. Since the last annual report to the Council, fifty students have entered at the College; and as the time of their pupilage extends over two sessional years, an average number of eighty has been in daily attendance.

PRACTICE OF THE COLLEGE.—Many interesting and in-

structive cases of disease have been admitted, and each of these has been made available to the general information of the pupils. The governors, however, would be glad to see a more uniform occupancy of the sheds and boxes which they originally erected at considerable expense for the reception of cattle and sheep when the subjects of disease; and they had hoped that after the pointed manner in which they drew the attention of the agricultural body to this subject in their last report, they should now have been enabled to congratulate the Council on the large increase of patients of this class which had taken place. Every member of the Society being entitled to all the privileges of a subscriber to the College, in as far as the admission of cattle, sheep, and pigs is concerned, removes all ground of objection on the score of expense: and the Governors believe that the sole cause of the fewness in number of the patients depends rather on the forgetfulness of the members of these privileges than anything else.

CONSULTATIONS AND COMMUNICATIONS.—If the admission of diseased cattle to the infirmary has not materially differed from former years, the consultations by letter and otherwise have, on the contrary, greatly increased. From all parts of the country communications have been forwarded to the College, detailing the particulars of special cases, and asking advice as to the treatment of the affected animals. Much of the Professor's time has been occupied in replying to these letters, and he has often had the satisfaction of learning that great good had resulted from the instructions which were given relative to the hygienic as well as the medical treatment of the animals in question.

VETERINARY INSPECTION.—During the past year, and probably arising in part from the increased number of communications, the members of the Society have not asked for the personal inspection by Professor Simonds of the animals suffering from disease on their respective farms so frequently as on former occasions. The Governors desire to see this bond of connexion between the two institutions extended and strengthened by a more frequent use; and they would suggest to the Council whether a modification of its rules relating to these inspections might not be advantageously adopted. Next to the admission of patients, these inspections afford the surest means of practically advancing cattle pathology. At the annual meeting of the Society at Carlisle, the general inspection of the animals was made as heretofore, and with much benefit to the interests of the Society, as several cases of illness and accident also occurred during the days of the meeting. Besides these circumstances, some of the animals had to be disqualified, from wrong entries with regard to their age, and others from the existence of hereditary diseases and defects.

EPIZOOTICS.—The chief of these maladies have been pleuro-pneumonia and eczema, both of which have prevailed in several parts of the country, the first-named with its usual severity. As stated in a former report, pleuro-pneumonia belongs to a class of diseases which can be far more easily prevented than cured; and the Governors would remark that the measures they recommended for adoption as prophylactics have stood the test of further experience, and been of essential service in numerous instances of outbreaks of the malady. Inoculation as a preventive has had but few advocates, nor can the Governors believe that those who have refrained from adopting it are acting otherwise than on right principles of science; and, consequently, they have not suffered greater losses than those persons who have not had recourse to the operation. The diminution in the number of cases which in a few isolated instances have seemingly accompanied the introduction of inoculation, have been but singular coincidences,

and are altogether due to the ordinary causes which regulate the outbreak, extension, and departure of this class of diseases.

**PARASITIC AFFECTIONS.**—These maladies, which are more or less the cause of heavy losses to the agriculturist, have been remarkably rife, and during the last summer many hundreds of lambs have fallen victims to the presence of worms in the respiratory organs. These losses have also been continued up to this time, but in somewhat diminished numbers. In too many instances nothing was done by the flock-masters to arrest the progress of the disease; nor, indeed, was its true cause often ascertained by them. The most marked symptoms of the affection are a cough (which becomes increased by exertion, and also by changes of temperature), hurried breathing, fastidious appetite, and a falling away in condition, the animals being in very many instances ultimately carried off by diarrhoea, which supervenes upon the other symptoms. In some cases death takes place more suddenly, arising from active congestion of the lungs. The exhibition of a few doses of oil of turpentine and linseed oil as an anthelmintic, followed up by chalybeate tonics, and the occasional inhalation of diluted chlorine gas, were found to be very effective remedies. To these were added, and with much advantage, the supplying the animals with a generous and varied diet, and protection against the more common changes of the weather by folding them with hurdles stuffed with straw. The Governors have to thank a member of your Council, Mr. Fisher Hobbs, for sending to the infirmary some lambs the subjects of this disease, which enabled the Professor of Cattle Pathology to direct the attention of the pupils to the malady in a far more practical way than he could otherwise have done. Besides lambs, young cattle have likewise suffered to a great extent from the same cause; and the like principles of treatment, but somewhat modified to suit the altered state of things, were found equally efficient with them. The worms which inhabit this part of the organism belong to the class *Filaria*. They exhaust the strength of the animal they attack by drawing largely upon the secretions furnished by the mucous membrane of the respiratory organs, in which also they soon produce diseased action. Besides this, they cause a mechanical impediment to the free entrance of air into the lungs, and thus frequently destroy the animal from asphyxia, or in less numbers interfere with necessary changes of the blood in its passage through these organs. They are both oviparous and viviparous, as many of the young are hatched within the body of the parent worm, while others are only brought to perfection after the ejection of the ova. Further investigations of their development, and the changes which their ova may undergo when expelled from the windpipe by the coughing of the affected animal, may probably lead hereafter to the adoption of means to prevent the frequency of their attack.

**CALCAREOUS CONCRETIONS.**—So many instances of the loss of rams in particular have occurred from calcareous deposits in the urinary organs as to deserve a separate notice in this report. Experience has shown that when sheep are kept too much on a nitrogenised diet, and allowed but a limited range, a perverted state of the digestive and assimilative functions ensues, which leads to the deposit of earthy salts in the urinary system. These deposits take place in all sheep without reference to sex, but they are of more consequence in the male animal, arising from the fact that the urethral canal, much diminished in size, passes through the vermiform appendage of the intromittant generative organ, and the deposit accumulating therein blocks up the passage and leads to inflammation and often rupture of the bladder from a retention of the urine. Preventive means are the most to be advocated, and these should consist in the adoption of a less forcing sys-

tem to bring the animals into condition in so short a space of time; the repeated exhibition of some mild aperient medicine, and also the use of mineral acids in a diluted form, chemistry having demonstrated that these urinary deposits in herbivorous animals are mostly composed of the earthy carbonates with some traces of the phosphates.

**CONCLUDING REMARKS.**—In bringing this report to a close, the Governors would express a hope that agriculturists as a body are beginning to find that through the efforts which have been put forth by the College in common with the Council of the Society, many young men, whose scientific education is based upon the fundamental principles of anatomy and physiology of cattle, are being located in their several districts; and that in carrying out these principles they are no less practical in their every-day proceedings than those individuals who profess to possess hereditary knowledge, and who put forth this figment as a claim for their being consulted in cases of disease affecting our flocks and herds in particular. Such the College labours to attain, and such it hopes it has in a great measure succeeded in accomplishing.

(Signed) THOMAS CATOR, Chairman.

Lord Berners remarked, that in all cases of disease among the farmer's live stock, means of prevention would be found better than subsequent attempts at cure. He referred to several districts where disease prevailed to a great extent. In his own neighbourhood the remedies prescribed by Prof. Simonds, and received from the Veterinary College, had been attended with almost uniform success.—Mr. Slaney objected to the growing tendency among professional men to use technical words in describing symptoms and remedies. He thought that in addressing farmers plain English should at least be given as well as words heterogeneously compounded from the Greek and Latin.—Mr. Miles remarked that his own flock of lambs, as well as that of his brother, had suffered loss to the amount of 20 per cent. from a sort of consumption. It commenced about the latter end of September, by the animal's sneezing and wasting away; but invariably disappeared, even in the worst cases, as soon as the warm weather came. The heads of the sheep were found, after death, to contain two grubs in the upper part of the nostrils.—Lord Berners had lost some of his best lambs by worms.

The Council adjourned over the Derby-day to their monthly meeting on the 4th of June.

The Half-Yearly GENERAL MEETING of the Society was held on the 22nd of May: present, Lord PORTMAN, President, in the chair, Lord Feversham, Lord Denman, Sir Robert Price, Bart., M.P., Mr. Raymond Barker, Mr. Bramston, M.P., Mr. Bullock, Rev. Thomas Cator, Mr. Devas, Mr. Flytche, Mr. Girtwood, Mr. Fisher Hobbs, Rev. C. T. James, Mr. Jennings, Mr. Fuller Maitland, Mr. Pickin, Mr. Thomas Scott, Mr. Strafford, Mr. Burch Western, Mr. Sutton Western, Mr. Wilson, of Stowlangtoft.

The CHAIRMAN having informed the meeting that its first duty was to elect a President,

Mr. R. BARKER moved that Mr. J. E. Denison, M.P., should be president for the ensuing year, dwelling on his devotion to the cause of agriculture, and

referring to his exertions during the past year at Paris as entitling him to the confidence and support of the members.

Mr. BRAMSTON, M.P., in seconding the motion, expressed his concurrence in what had fallen from Mr. Barker with regard to the services rendered by Mr. Denison at the Paris Exhibition.

The motion having been adopted unanimously,

The CHAIRMAN said, now that the motion had been agreed to, he must say he should be exceedingly happy to hand over the chair to so old a friend of his own as Mr. Denison. He believed they were born in the same year—they had certainly passed nearly the whole of their lives together; and he ventured to say there was no individual who felt greater interest in that Society than Mr. Denison. He thoroughly deserved the compliment which had just been paid him.

On the motion of Mr. W. J. PICKIN, seconded by Mr. H. WILSON, the trustees were re-elected.

On the motion of the Rev. C. JAMES, seconded by Lord FEVERSHAM, the vice-presidents were also re-elected.

The meeting then proceeded to the election of the members of the Council. After the lapse of a few minutes, it was announced by the scrutineers that the house list had been adopted unanimously.

The Secretary, Mr. Hudson, then read the following

#### REPORT.

The Society consists at the present time of—

- 85 Life-Governors,
- 139 Annual Governors,
- 839 Life-Members,
- 3,896 Annual Members, and
- 20 Honorary Members:

forming a total of 4,979 Members, or 97 more names on the list than at the previous anniversary. Mr. Evelyn Denison, M.P., has been appointed a Trustee of the Society, in the place of the late Mr. Neeld, M.P.

His Imperial Majesty the Emperor of the French having been graciously pleased to permit his name to be placed on the list of Honorary Members of the Society, in compliance with a request made on the part of the Council, His Imperial Majesty has been unanimously elected accordingly, in grateful recognition of the deep interest which His Imperial Majesty has so effectively taken in the promotion of inter-national agriculture.

The Council have also elected M. Léonce de Lavergne an Honorary Member of the Society, in testimony of the high estimation in which they hold his remarkable work on the Rural Economy of this country.

The Finances of the Society have on no former occasion been in so favourable a condition. The funded property consists of £9,264 in the New Three per Cents. Stock, and the current cash-balance in the hands of the bankers is £3,657.

A complete analytical index to the volumes of the Journal already published is in the press, and a new catalogue of the Library is in preparation.

Prof. Way, the Consulting-Chemist of the Society, has read before the Members a report on the progress of Chemical Science both at home and abroad in reference

to agriculture, and has delivered a lecture on the composition of Drainage-water. He has also devised a mode by which the amount of nitric acid and ammonia in the atmosphere may be ascertained with approximate exactness. This discovery will at once give interest and importance to the prosecution of agricultural meteorology, a branch of inquiry which has hitherto either entirely lain dormant, or been pursued only with results of an indefinite character. The chemical investigation of water flowing over the surface of cultivated land, or through its substance into drains, will eventually prove of great importance, as showing the excess of manuring matter which may have been in any case applied; at present, however, the results obtained by Prof. Way are confined to a limited body of facts occurring under certain given conditions; but these are sufficient to indicate the great loss which is probably sustained by an injudicious manuring of particular soils. The controversial publications of Baron Liebig and Mr. Lawes have had the effect of calling the attention of scientific men to the chemical principles of agriculture, and of practical men to the application of those principles in a farming and economical point of view. The great questions however involved in this controversy have still to be dispassionately considered, when the controversial spirit shall have passed away, and the facts be made subservient only to the progress of philosophic inquiry. The Council strongly advise the members of the Society to take advantage of their privileges relating to the analysis of artificial manures, as they can thus only obtain security against fraud from adulteration. The Council have decided that at the end of the current year the offer of the £1,000 Prize for a substitute for Peruvian guano shall be withdrawn. Prof. Simonds, the Veterinary Inspector of the Society, has delivered before the Members a lecture on the Skin Diseases of Domestic Animals, and the Royal Veterinary College have transmitted to the Council their annual report.

One of the original objects for which the Society was founded, the last in the order of enumeration, though by no means the least in importance, is that which proposes "to promote the comfort and welfare of labourers, and to encourage the improved management of their cottages and gardens." This great and humane object has been constantly the subject of consideration, both officially by the Council and individually by the members of the Society. Various ameliorating measures have been proposed, which as far as they have gone have been useful, but they fall far short of that extended system which the importance of the subject demands. The Society has distributed at less than prime cost upwards of 30,000 copies of cottage tracts, containing practical suggestions for the management of labourers' gardens, and for cottage economy and cookery; it has also published in its Journal Sir George Nichols's Prize Essay on the best means for improving the condition of the agricultural labourer, as well as Mr. Goddard's and Mr. Macvicar's Prize Essays on the construction of cottages. Last year the Prize for the best essay on labourers' cottages was renewed, and several essays on that subject are at the present moment under the con-

sideration of the judges. The Council, however, regard all these efforts as too limited and temporary in their character. The intelligent mind of the labourer, who performs the operations on the farm, and the high moral principle within him, which is the surest guarantee to his employer, are best sustained and cultivated by making every effort to render the labourer happy and comfortable.

The Chelmsford Meeting, to be held in the middle of July, promises to be equal, in every respect, to the most successful of former Country Meetings of the Society in other parts of the kingdom. The entry of agricultural implements and machinery is large beyond precedent; and as a great number of these, instead of lying inactive, as hitherto, in the yard, will be at ordinary work during certain hours of the Show, they will present a new and instructive feature in the exhibition. The Council have been induced, on the representation of a very large proportion of the Implement Manufacturers who exhibited last year at Carlisle, to apportion the Society's prizes and trials in the implement department over three years, instead of including them all in single successive years. The implements for prizes and trials have, accordingly, been divided into classes for this three-years' rotation under the following heads: (1.) Implements and machinery for the tillage and drainage of land. (2.) Implements and machinery for the cultivation and harvesting of crops. (3.) Implements and machinery for the preparation of crops for market and cattle-food. Those under the first of these heads will form the Prize and Trial Implements for the Chelmsford Meeting, in addition to the Special Prizes of £500 for the best Steam-Cultivator, first and second Prizes for Reaping Machines, and Prizes for new and miscellaneous implements. The Consulting Engineer of the Society has constructed for the Chelmsford Meeting new Dynamometers, as the measures of forces required to overcome the resistance offered by the soil to the different classes of field-implements. This amount of resistance, compared with the work actually done, will enable the judges more accurately to estimate the relative economic value of competing implements intended for the cultivation of the soil. The Live Stock portion of the exhibition will include foreign cattle and sheep belonging to foreigners and bred abroad. For the purpose of making entries for foreign animals during the approaching Great International Show at Paris, in the first week of June, the Council have extended the date of entry, in their case, from the 1st to the 12th of that month. The Local Chelmsford Committee have liberally placed at the disposal of the Council the sum of £200 to be awarded as extra prizes for thorough-bred, hunting, and roadster horses. These prizes will, no doubt, attract a large amount of competition, and greatly increase the interest of the show.

Agreeably with a request from the French Government, the Council have appointed Mr. Evelyn Denison, M.P., Chairman of the International Implement Jury at the ensuing Paris Meeting, and ten English Jurors to represent this country in the different departments of live stock and implements on that occasion.

The Council, in conclusion, have again the satisfac-

tion of congratulating the members on the gradual fulfilment of the objects for which the Society was originally established. If practice is slow in its development, the application of science for its improvement requires the greatest caution. In reviewing the active exertions of the Society from its commencement, it could hardly have been expected that so much real advantage, both indirectly as well as directly, could have been obtained in so brief a period. By means of scientific aid a clue is gradually being gained to the operations of the natural influences on the soil, and to the processes by which vegetable life is modified and maintained. The ordinary operations of farming will no doubt eventually derive full benefit from the discoveries of science, and become more economical in their accomplishment, and more certain in their results.

By order of the Council,

JAMES HUDSON,  
Secretary.

Mr. R. BARKER, as Chairman of the Finance Committee, read the balance-sheet, to which was appended the report of the auditors, testifying to its accuracy. It appeared that the receipts of the half-year ending December 31, 1855, amounted to £6,847 2s. 11d.; and that the balance at the bank at the end of the year was £884 3s. 10d., besides £43 9s. 9d. in the hands of the secretary.

Mr. BARKER said he was gratified at being enabled to repeat the statement in the report that the finances of the Society were now in a very satisfactory condition. The members did not now take amiss the being reminded that their subscriptions were due, and in numerous instances they not only paid what was due, but also transmitted the subscription for the ensuing year. If the nominal list of members was not so large as formerly, the paying list was in a more satisfactory state, and the members generally manifested increased interest in the proceedings of the Society. (Hear, hear.)

The Rev. T. CATOR proposed a vote of thanks to the auditors.

Mr. T. SCOTT seconded the motion. It might, he observed, be supposed that as so much confidence was reposed in the Finance Committee, the auditors gave themselves very little trouble. Last year, however, happening to attend a meeting of the Society for the first time, he made a point of investigating the accounts for himself; and he must say that, though accustomed to such matters, he never saw accounts which entered more into detail, or with regard to which there had been a more careful and business-like audit. (Hear, hear.) The services thus rendered were, it must be recollected, gratuitous.

The motion having been adopted,

Mr. R. BARKER said, in the absence of the auditors, he had to thank the meeting, on their behalf, for this recognition of their services; and he must add, that he had never met with gentlemen who were more conscientious in the discharge of their duties. As Chairman of the Finance Committee, he felt much obliged to Mr. Scott for the testimony which he had borne to the accuracy of the accounts. The committee challenged inves-

tigation, and would be happy to show their books to any one who might be disposed to examine them.

The CHAIRMAN said it now became his duty to enquire whether any gentleman had any suggestion to offer which might be referred to the committee for their consideration.

Mr. GIRDWOOD could not help expressing his gratification at the readiness with which members were stated to have recently paid their subscriptions. Six or eight years ago he suggested to the Secretary, Mr. Hudson, that members should be reminded when their subscriptions were due, in order that they might be prevented from getting into arrear, and gave him the printed form of the Highland Agricultural Society, of which he was a member, to show what was the course which it pursued in reference to that subject. He was glad that the suggestion had at length been acted upon, and that the result was so beneficial to the Society. It was of vital importance to the Society that the subscriptions should be collected early, and he trusted that this appeal of the Council would always be responded to as it had been during the past year.

The CHAIRMAN said Mr. Hudson had informed him that amongst 1,600 persons who were applied to for their subscriptions, there was only one gentleman who took the application amiss (Hear, hear). The members had now acquired the habit of paying in the early part of the year, so as to be rather in advance than in arrear.

The Rev. C. JAMES said he wished to give notice of his intention to move at a future week a resolution to the effect that if prizes were given for horses, they should always be given by the Society itself, and not by local committees; the present arrangement being, in his opinion, derogatory to the character of so great an institution. He was of opinion, too, that the prizes should include thorough-bred animals, and not be confined, as they were at present, to agricultural horses.

The CHAIRMAN thought it would be more convenient if, instead of giving a notice on the subject, the reverend gentleman were to leave it to the Council to consider what he desired to have done.

The Rev. C. JAMES intimated his concurrence in this view; and the subject dropped, with the understanding that it would be taken into consideration by the Council.

Mr. H. WILSON hoped what he was about to preface would not be regarded as a mere formal matter. It was, that the thanks of the meeting should be given to their noble President (cheers). Whether they considered the share which his Lordship took in the formation of the Society, or whether they considered his conduct subsequently, including his manner of filling the presidential chair, they must all feel that the services rendered to the Society by Lord Portman entitled him to their warmest gratitude; and it was therefore with very great pleasure that he proposed that a vote of thanks should be given to him on that occasion.

Mr. T. SCOTT, in seconding the resolution, said there was one point on which he wished to make a suggestion to the Council; it related to the practice of giving premiums for draining. At present, as they were wel-

aware, almost every local agricultural society in the kingdom was in the habit of giving prizes for draining, the premiums being awarded sometimes on account of the manner in which the work was executed, and sometimes on account of the soundness of the principles which were adopted. Now he was quite sure that all present would admit that, while on the one hand the greatest expenditure which agriculturists had to look forward to was connected with drainage, on the other hand there was no question which was left so completely unsettled as the question what were the true principles of drainage in reference to land generally; and it struck him that if that Society were to take up the matter, and adopt some principle which could be referred to hereafter, it would do a good deal towards settling this question, and enabling agriculturists generally to spend their money on drainage in the most advantageous manner. He was quite aware that the Chairman had executed drainage in different modes; that he had drained 30 inches, 3 feet, 4 feet, with the plough, by hand, and in a variety of ways. Whether these were feelers, by means of which his Lordship was trying to ascertain which system was most economical, or whether he purposely adopted different methods in different localities, his Lordship had never informed the public. The meeting was aware, too, that Lord Berners promulgated a theory on this subject, which was the result of experiments made on his own estate, and that in many cases he had been met in anything but an encouraging manner. Under these circumstances he would suggest, for the consideration of the Council, whether it would not be practicable for them to adopt some means of ascertaining what were the soundest principles of draining, irrespective altogether of names; and he thought that if they did so, the result would be to direct expenditure for drainage into the best channel. It had long been a maxim that green crops were the foundation of husbandry. He thought it might with equal truth be said, that drainage was the foundation of it. (Hear, hear.) In conclusion, he thought it might be well for the Council to take into consideration the expediency of giving a series of premiums for the execution of drainage on the best principles in different parts of England.

Mr. GIRDWOOD said he felt great pleasure in seconding the motion of thanks to the Chairman. There were few persons connected with agriculture who were not aware of the great services which his Lordship had rendered to agriculture in every department. As regarded the subject introduced by the last speaker—namely, drainage—they all knew that his Lordship had devoted a great deal of attention to that question, and had made many experiments, and they would all rejoice if he would favour the public with the results of his experience. (Hear, hear.)

Mr. R. BARKER, in putting the motion, said, that although unavoidable circumstances had prevented his Lordship, during the past year, from attending the meetings of the Council as frequently as he desired, he had always shown himself desirous of assisting the Council with his valuable advice, and of co-operating with them in all their efforts for the improvement of agriculture.

(Cheers.) He was sure the meeting must feel that his Lordship was entitled to their most cordial thanks.

The motion having been carried by acclamation,

The CHAIRMAN, in replying, said he felt deeply indebted to the meeting for the kindness it had manifested towards him. He had all along felt it to be a great honour to have been elected a second time the President of that Society. When he formerly filled the office, he was enabled to devote himself entirely to the service of the Society, and he believed there was scarcely a single meeting of the Council during the whole year that he did not attend. Unhappily, circumstances of anxiety at home had rendered it impossible for him to attend during the past year as frequently as he could have wished to do; but, though absent in body, he had taken care to make himself acquainted with all that was going on, and he could truly declare that he had been anxious to make himself useful as far as possible (cheers). He might venture to call himself the original member of the Society (laughter), for while many other persons took an active part in the formation of the Society, he was the first person who paid a life subscription (Hear, hear). The great work to be attended to, by the Council, during the remainder of his presidency, was that of preparing for the Chelmsford Meeting. He looked forward to that meeting with great delight— anxiety on the subject he had none—and had no doubt that the exhibition would be worthy of British agriculturists, and of the Society. He hoped that all present would take pains to induce their friends to attend the meeting, and certain he was that the Council would endeavour to make such arrangements as would be most conducive to the convenience of all parties. With regard to the subject of drainage in connection with farming operations, which was introduced by Mr. Scott, he must observe that he held that there was no uniform system of drainage, and he did not believe there could be one. He thought every man must adopt the system which was best suited to his locality. The quality of the soil and the nature of the water were such important elements in draining operations, that until these had been ascertained by experiments in each case, it was impossible to tell what system would answer best in any particular instance. Last year, being a member of the committee of the House of Lords which investigated this subject, he asked an enclosure commissioner whether he would pass turf-drainage. The commissioner replied that he would not pass turf-drainage anywhere. On his asking him what drainage he would pass, he replied that he would pass tile-drainage; and when he (the Chairman) told him that he could show him a case in which tile-drainage had lasted for only three or four years, and turf-drainage for forty years, he still adhered to his previous declaration. In reference to that opinion, he must say that he would warn the heirs of

entailed estates to do their utmost to prevent commissioners from spending their money uselessly (Hear, hear). As to a system which was applicable universally, he must repeat his conviction that no such system had yet been discovered, but that different systems had been found to answer exceedingly well in different localities. None of them, he feared, would live long enough to see the difficulties of this question entirely removed. All that any of them could do was to obtain the best information they could, and apply it to the best of their ability in their several localities. As regarded the duty of members of that Society in relation to the discussion of agricultural topics, he had always felt that it was no disgrace for a man to acknowledge that he had been wrong; indeed, one of the great objects of the Council of that Society was to induce farmers to state where they had failed, as well as where they had succeeded. He had not been slow to set an example in that respect. In an original paper which he published in the Society's Journal, upon his experiments in breaking up rough land, he showed how ill-advised he had been as regarded some of those experiments, and how useless was much of the expenditure which he had incurred; and he had reason to believe that that paper had proved a very useful guide to some of his neighbours. With respect to the analyses and testing of some manures which came under his notice, he had to express his regret that in one instance he gave a wrong name to those who supplied a particular manure, which was included in the investigation; but, as to general results, he believed the declarations of the chemist had been supported by the experience of the farmer, to an extent which was not usually admitted to be the case. He trusted that what he alluded to had convinced many farmers that analyses were of great practical utility in reference to the cultivation of the soil. (Hear, hear.) In all matters connected with the improvement of agriculture, they must look for good results through the medium of slow processes, and not jump to conclusions before they had had sufficient experience. He remembered having observed to Lord Althorp, at the commencement of the Society's career, that nothing was more important than that landowners should endeavour to find out whether particular work would pay before they recommended farmers to execute it; and that landowners might render great service to the cause of agriculture by making experiments with the view of assisting tenants who could not afford to waste any of their capital in ascertaining whether or not certain processes of cultivation would prove remunerative. He was still of opinion that that was a mode of proceeding by which landowners might confer great benefit on agriculture. In conclusion, he must again thank the meeting for the manner in which they had acknowledged his services.

The meeting then separated.

## THE EDUCATION OF FARMERS' SONS.

Among the questions of slow progress to which we have often referred as requiring at least half a century for their development, we enumerated on a recent occasion the question of education in general, and that of agricultural education in particular. In the general education of the labouring classes some attempt at progress has again been made, but with not much success. It is to be wished that churchmen and dissenters would lay aside their differences on this subject, and not condemn another generation to grow up in brutal and heathen ignorance, from the fear that the one may kidnap the children of the other, for the purpose of making converts by means of education. The only solution of the question appears to lie in the separation of the secular and religious education; the former to be given in common, the latter to be communicated separately by the spiritual pastors of each denomination into which the Christian world is so unhappily divided—the State merely insisting that those who attend the school for secular, shall attend also some school for religious instruction.

In the education of the middle classes, again, if much has not been done, the necessity for progress has at any rate been proved by the recent examinations of candidates for appointments in the civil service. We are not among those who expect the new system will have the effect of causing merit to supersede influence, parliamentary, aristocratic, or bureaucratic. It will, however, direct influence into better channels, and enforce a larger amount of knowledge among those who are candidates for such appointments.

Again, in the matter of special education, designed to qualify men for particular employments, there are symptoms of a movement; but we cannot help thinking that in this matter serious mistakes are being committed, and that much money is likely to be wasted from the idea that each of our principal industrial employments requires a peculiar school. These reflections have been suggested by the failure of the attempt to found a college of civil engineers, and by the scheme now in progress for founding a mining school for the coal district of Newcastle, which has been so warmly espoused and so liberally patronized by the Duke of Northumberland. The district in which it is proposed to establish this school is mining, agricultural, and maritime. Why then should the school be exclusively a mining school? Up to a certain point the education which the engineer, civil or mechanical, the superintendent of mines and collieries, the master of a vessel, and the farmer require, is such as they might receive in common.

It is a mistake to suppose that an agricultural school or college need have land attached to it, and that the practice of farming is to be taught at school. Lord Ebrington has well put the case in a paper read at the Council of the Bath and West of England Society, when

he drew a distinction between general education as distinguished from business training; and, in offering a prize to be competed for by farmers' sons, for the present limited the qualifications to a knowledge of the English language, the history and geography of the British Empire, and practical mathematics—some acquaintance with all of which, he very justly remarks, is required of every Englishman of the middle class, who can be considered educated up to the standard of his position. There is no reason why a more extended course of education than that proposed by his Lordship—a course including chemistry, botany, geology, and mechanics—should not be learned by the son of the farmer, side by side with the youth who is to superintend the underground operations of the colliery or the mine, or to navigate a rich argosy across the Atlantic, or even a steamer from the Tyne to the Thames. Why have separate educational establishments for them, when one will suffice? Nor is this mistake confined to Northumberland. We have lately heard that it is in contemplation to establish an agricultural school in another coal district, where a more general or polytechnic school would be far better.

One ground on which we advocate, and have long advocated, the education of the sons of farmers in the same school with the rest of our middle-class youth, is that such an education as the above would extend the field of profitable employment for them. Farmers are, at any rate, as prolific a race as the rest of the community; and the present state of our agricultural and social relations is to diminish the number of farms, and to increase the number of competitors for them. If all the sons of farmers are to be farmers, it is very clear that they must seek their farms elsewhere than in the British Isles—either in our own colonies, or in the United States. That kind of education which we are advocating for farmers' sons would open new fields of employment for them at home, and render them not quite so dependent on the land as their only resource. As an example, we may cite the case of a young man of our acquaintance, the son of a farmer, who paid £100 for instruction in the laboratory, intending to apply the knowledge gained there on the farm of his father; "and I found it," he added, "the best money I ever laid out; for it led me to take up chemistry as a profession, from which I derive a better income than I should ever have obtained by cultivating the land." In various other occupations in which there is an opening and a demand for applied science, similar cases will be constantly occurring. Such a course of education as we propose might very easily be finished by the time the farmer's son had reached his eighteenth or twentieth year; there would be yet some years before the time when it would be practicable or desirable for him to enter on a farm of his own. The interval might be employed in the practice of farming,

either with his father, or, better still, on some other farm in our best-cultivated districts.

We would, therefore, urge upon the agricultural interest the great benefit which they would derive from the establishment of schools, in which our middle-class youth may, without going far from home, receive such a sound education as will qualify them for the after-business of life; and we would point to the remodel-

ling of well-endowed grammar-schools as affording in many localities a suitable nucleus for such institutions. It is absurd to talk of founders' wills as an obstacle. They have been departed from without Act of Parliament to make public schools for the aristocracy—why not, by Act of Parliament, to make public schools for the middle class?

## DRAINING WOODLANDS.

The letter on "shut drains" to the Secretary of the Royal Agricultural Society by Mr. Brown, forester, alluded to in the Society's report of last week, merits special notice; for, generally speaking, there is not a field upon a landlord's estate the drainage of which gives him more concern than that of his woods. This arises from a threefold cause; *firstly*, as to the intrinsic and commercial values of the timber itself; *secondly*, as to the dry bed and cover which it affords to game; and *thirdly*, as to the shelter and ornament it gives to his property. We shall, therefore, wait with extreme interest the result of Mr. Brown's experiments; meantime let us briefly draw attention to their importance.

Stagnant water in the soil is ruinous to oak, and all our more valuable forest trees. We have met with numberless examples of this kind, one of which will better illustrate our subject than any amount of ratiocination which could be given. The demesne of a noble duke whom we served for many years contained some large specimens of oak, partly rather thickly but openly growing in the park, and partly in the game preserves and pleasure grounds, among underwood and young timber. The former, in front of the castle, were highly ornamental, though their tops were beginning to decay rather seriously, the tap-root in most of them being rotten from stagnant water. Many of the latter were equally old, others of various ages, and all suffering from the same cause—growing in wet, undrained land. Some twelve acres of young wood, only planted about six or seven years, were stubbed up, and the ground drained, trenched, and planted. In carrying out this work, we had an opportunity of examining the roots of the young trees, and recording the damage they had sustained, which, to those not acquainted with the like, was incredible. As the roots decay they hold water like a sponge: open spaces too, being eventually formed, and of such a size when the taproot of the large trees are once fairly rotten, as to be capable of containing large quantities of water, as the operation of draining proved; for, in order to remove this water, we opened a drain directly up to every large tree as close to it as possible, and when the open spaces were fairly tapped a flood of water, black, like that of a tan-pit, flowed forth, sufficiently large in some cases to fill a water-cart! The injury sustained under these circumstances will readily be conceived, as also the benefits which would have been gained, had the land been properly drained before it was planted.

The proper drainage of such a soil, however, is a very comprehensive question; more especially for oak, whose roots sink to a great depth. The demesne furnished numerous examples in proof of this; several fine trees growing on the edge of open ditches from 3 to 8 feet in depth, being as much decayed as those at a distance from them. This arose from the nature of the soil—a sour shale clay—incumbent on shale and grawacke, accompanied with the influence of the moist climate of Ireland, and a superfluity of bottom water. In some places the rock rose to the surface, forming gentle eminences, while in hollows it lay many feet below it, often forming natural basins, holding in the soil pools of stagnant water, out of which it could not be drained without cutting the rock forming the edges of these natural cups. Here it would have been as ineffective to drain 4 feet as 2½ feet, for the surface soil required parallel drains, not more than 12 feet asunder, where the clay was very tenacious, to remove surface water, while the subsoil had to be drained as far as possible to the rock or gravel beds where such intervened, as they did in several places, to remove bottom water. But, unfortunately, the rock in some of the hollows could not be reached, while on higher ground the expense of cutting to it proved an equally insurmountable barrier.

It will thus be seen that draining in such a case requires the exercise of judgment of the highest order. We are obliged, for the want of space, to omit many details necessary to be known; but what we have said is enough to give a general idea of the example. We recommended the whole to be drained, draining the hollow basins with the main drains where practicable, and the surface soil with the parallel ones, then to be trenched, and those grounds only planted with oak and ornamental timber which were both bottom and surface drained, leaving the lands not bottom drained for permanent pasture. How far we were right we must leave our readers to judge; but we at once came to the conclusion that spring water, as well as rain water, must be removed before any hopes can be entertained of healthy permanent ornamental trees in a nobleman's park.

We now, in the last place, have to notice the permanency of the drains put into such a soil: these were made of broken stones, principally gathered from the trenched land. That they (the drains) are by this time affected by roots cannot be doubted, and that they will eventually be choked up, so as neither to remove surface nor bottom water, is equally plain. This was a state of things which we contemplated, and accordingly the drains were laid off in a direction that they could be crossed by others, to relieve them from stagnant water occasioned by roots. Now, if Mr. Brown's pipes let in water and keep out roots, the sooner they are placed in these cross drains the better: hence, we repeat, the value of the question at issue.

VARIATIONS IN THE COMPOSITION OF MILK.

There are many points connected with the composition of milk and the circumstances whereby its quality is modified, which are highly important in a practical point of view, and peculiarly deserve the attention of those interested in dairy farming. That it does vary, and that very materially, at different times, is a fact forced by daily experience on the attention of the most careless and superficial observer, and it is easy to see that in the majority of instances these differences are traceable to the breed of the cow, the nature of its food, the season of the year, the distance from the time of calving, or some other equally obvious circumstance. But there are other and far less conspicuous causes, which produce variations in its composition not merely from week to week or from day to day, but even from hour to hour, which have practical bearings as important as those which present themselves more immediately to our notice. In illustration of this position we propose to direct attention to two series of experiments, one of which has just been published, and the other though several years old, is still comparatively unknown to practical men.

It is a fact, originally, we believe, made known by Parmentier and Deyeux, in their *Traite sur le Lait*, that during the first part of the milking the milk is inferior to that drawn at the end, and their statement, which by some persons was looked upon with considerable distrust, has been so far substantiated by Peligot in his analyses of ass's milk, three specimens of which, taken at the beginning, middle, and end of the milking, he found composed as follows:—

	Beginning.	Middle.	End.
Butter. . . .	0.96	1.02	1.52
Milk sugar	6.50	6.48	6.45
Curd . . . .	1.76	1.95	2.95
Water . . . .	90.78	90.55	89.08
	100.00	100.00	100.00

Indicating a very material increase in the quantity of both butter and curd. These results were therefore confirmatory of the statement, but they were far from being sufficient to show the extent of this difference at different periods, and an elaborate series of experiments was undertaken for this purpose by Reiset,\* which have brought out some very remarkable and rather unexpected facts. His experiments were made upon two cows which were

at grass during the day, and in the house at night, when they did not receive any food. Milk was collected at the beginning and end of each milking, and the dry residue yielded by the evaporation carefully determined. His results are contained in the following table—WHITE Cow (No. 1):—

Date.	Hour of Milking.	Time elapsed since last milking	Solids in 100 parts of milk at the		Mean.
			beg. of milking	end of milking	
1843.	h. m.	h. m.			
Oct. 16	6 0morn.	12 0	9.33	16.04	12.68
" 27	7 0 ..	12 0	9.90	15.85	12.87
" 31	7 0 ..	12 0	9.90	17.85	13.86
" 29	6 30 even.	11 30	10.41	21.30	15.85
" 31	6 30 ..	11 30	9.62	19.07	14.34
" 28	6 30 ..	6 0	13.30	16.30	14.80
" 26	6 30 ..	6 0	12.80	16.06	14.43
" 25	12 0 noon.	5 0	11.49	17.70	14.60
" 27	12 0 ..	5 0	12.00	21.20	16.60
Nov. 1	12 0 ..	5 0	13.60	18.50	16.05
Oct. 30	4 0 even.	4 0	17.19	16.93	17.06
Nov. 1	4 0 ..	4 0	15.28	14.73	15.00
Oct. 30	6 30 ..	2 30	14.60	13.33	13.86
Nov. 1	6 30 ..	2 30	12.84	13.08	12.86
1844.					
Sept. 20	2 15 ..	1 15	13.65	13.89	13.77
Do.	3 30 ..	1 15	11.65	11.89	11.77
Do.	5 0 ..	1 30	10.96	—	—
Do.	6 0 ..	1 30	10.88	13.33	12.10

1843. RED Cow (No. 2).

Nov. 3	7 0morn.	12 30	11.02	17.63	14.32
" 2	6 30 even.	6 30	13.15	17.29	15.22
" 3	12 0 noon.	5 0	14.37	18.93	16.65
" 3	6 30 even.	5 0	13.20	17.50	15.35
" 3	1 30 do.	1 30	18.34	16.33	17.33

The experiments, therefore, leave no doubt as to the fact that the milk is richest in solid matters at the end of the milking, but it is to be observed that this difference occurs only when it has remained for some hours in the udder, and is most conspicuous when a long period has elapsed since the last milking. By extending his experiments Reiset has shown that the difference in the per-centage of solid matters is entirely due to variations in the quantity of butter, all the other constituents remaining sensibly the same, and the following table gives the results of his experiments on the quantity of butter in different specimens, the dry residues being those contained in the previous table:—

\* Annales de Chimie et de Physique, 3rd series, vol. xxv., p. 82.

Dry residue in 100 parts of milk.	Butter.	Dry residue in 100 parts of milk.	Butter.
9.90	1.8	13.20	4.40
15.85	6.6	17.50	9.10
9.90	0.8	13.15	4.30
17.82	9.6	17.29	8.80
10.41	1.07	14.60	7.20
21.30	13.20	13.33	7.10
12.00	3.30	15.28	4.90
21.20	13.10	14.73	5.10
13.60	5.23	12.84	4.90
18.50	10.70	13.08	4.30
17.19	9.70	9.62	1.22
16.93	8.60	19.07	11.20
11.01	2.20	14.37	5.90
17.63	9.70	18.93	10.50

A moment's inspection of this table suffices to show that if in each case we subtract the quantity of butter from the total solids, the residual milk sugar and curd are almost perfectly constant. This fact would seem to indicate that, by remaining in the udder, a separation of the cream had taken place, exactly as it does in the milk pan in the dairy; for we see that the longer the period that has elapsed since the last milking, the larger is the proportion of butter contained in the last collected portion of milk, which we may fairly consider to have been that at the highest part of the udder, and greatest distance from the teats. But it is very questionable whether this can be accepted as the true explanation of the phenomenon, for the same thing is found to occur in human milk, where the relative position of the breast and nipple is incompatible with the idea that the milk contained in its upper portion should be the last drawn.

Whatever be the true cause of the phenomenon, it can scarcely be doubted that it may be turned to good account in practice, for it is obvious that if the latter part of every milking were collected apart, and used for churning, a smaller quantity of milk would be required to produce a given quantity of butter than if the whole were used indiscriminately. The importance of this point has not escaped Reiset, and he has made some further experiments which bear very forcibly on it. He found that when the whole milk of the white cow was collected and churned together, it gave 4.5 per cent. of butter. From the 27th September to the 3rd October 79,025 grammes of milk were yielded by the same cow, and the last part of each of the milkings being collected apart, weighed 18,765 grammes, and yielded 6.63 per cent. of butter. From the 4th to the 7th October, 42,835 grammes of milk were obtained, of which 8565 grammes of the last portion of each milking gave 7.53 per cent. of butter; and from the 8th to

the 15th October, 85,850 grammes being obtained, and only 12,495 of the very last portions being churned, gave 8.4 per cent. of butter. It appears, therefore, that the last seventh of each milking gives nearly twice as much butter as the whole milk overhead, and is obvious that in a dairy farm considerable economy would result if in every case the last portions of the milking were reserved for the churn; for in this way a smaller quantity of milk would be required, and a larger proportion of the whole produce might be sold.

Objections may be taken to the trouble and inconvenience which would be occasioned by the necessity for keeping apart the first and last portions of each milking; but it is not even necessary to do this, for Struckmann\* has ascertained that the evening milk is richer in butter than that collected in the morning, and consequently by keeping them separate, the same advantage would be gained.

The cows on which his experiments were made were fed twice a day. The first feeding is from six to ten o'clock a.m., the food being given during that period in small successive portions until the animals are perfectly satisfied. They are then left till five o'clock, when the second feeding begins, but continues only till eight o'clock, as the animals are sooner satisfied. Each cow gets, on the average, a quantity of food equivalent to 35 lbs. of hay, and as the live weight is from 900 to 1000 lbs., the quantity of food amounts to from 3 to 3½ lbs. of hay to every 100 lbs. of live weight. The daily food and its equivalent in hay were—†

8 lbs.	Meadow hay	..	8 lbs.	Hay.
10 "	Oat straw	..	9 "	"
30 "	Turnips	..	10 "	"
1½ "	Oilcake	..	3 "	"
1 "	Beanmeal	..	3 "	"
2 "	Clover	..	2 "	"

Together equivalent to 35 lbs. hay.

The cows thrive remarkably well on this food, and give from seven to eight quarts of milk per day. They are milked three times a day—early in the morning before being fed, at mid-day, and between six and seven in the evening. The first milk examined was from a young East Friesian cow which had calved fourteen days before. The morning and mid-day milk only were analyzed, and the means of two experiments with each gave—

\* Journal für Landwirtschaft für den Königreich Hanover, 1855, p. 417.

† Exception may be taken to the accuracy of the equivalents assumed by Struckmann, but we have thought right to give them as indicating the views of German agriculturists on this point.

	Morning milk.	Mid-day milk.
Solid matters ..	10.25	11.78
Water ..	89.75	88.22
Butter ..	2.43	3.64
Milk sugar ..	4.10	4.41
Salts ..	0.75	0.81
Albumen ..	0.44	0.62
Caseine ..	2.53	2.30
	100.00	100.00

These analyses having shown so decided a difference in the quantity of butter, were repeated on the milk of another cow of the same breed, which had also calved fourteen days before, and were extended to that obtained in the evening. The milk in this case did not reach the author immediately, and the weather at the time being warm, the morning and mid-day portions had become slightly sour.

	Morning.	Mid-day.	Evening.
Solid matters ..	10.03	10.80	13.40
Water ..	89.97	89.20	86.60
Butter ..	2.17	2.63	5.42
Milk sugar ..	4.30	4.72	4.19
Free lactic acid ..	0.05	0.05	0.00
Salts ..	0.83	0.72	0.78
Albumen ..	0.44	0.32	0.31
Caseine ..	2.24	2.36	2.70
	100.00	100.00	100.00

The difference between the morning and evening milk brought out by these analyses is highly remarkable and important, for they show that the latter is nearly two and a-half times richer in butter than the former, and it is obvious that the use of the latter for the manufacture of butter ought to be adopted by farmers. We should not, however, advise this being done without further experiments, which any one might make for himself, as it is possible that the somewhat peculiar mode of feeding may have some influence on the result. At the same time, it is worthy of notice that Reiset's experiments point in the same direction, for on inspection of his first table, it will be found that the milk collected in the evening was generally, though not always, richer in butter than that of the morning milking. It seems also that the milk is richest when the interval between the milkings is not too long: and it is deserving of inquiry whether more frequent milking might not give a superior milk.

## ON THE GROWTH OF RED CLOVER.

BY MR. WALKER, OF KILPUNT.

(Read at a recent meeting of the Western District Midlothian Agricultural Association.)

It will be seen from the designation of this subject that I have to speak of the best method of reviving and increasing in our soils the growth of the above named plant. Few subjects in the present day have been more discussed among practical men than this—the seeming capricious habits of the clover plant, whereby it often grows well or ill, without any explainable reason. Its likings and its hatings, so to speak, are very difficult to understand; thus the jarring opinions of scientific as well as practical investigators into the causes of its growth and failure, have thrown but little light on the obscurity in which this subject is enveloped. The main reason of this seems to be that, frequently against all the rules of good husbandry, accidental heavy crops of clover are obtained; while after the best farming, its growth is often very unsuccessful.

I am of opinion, however, that although appearances look a little contrary, there are general rules to be observed in farming different kinds of land, whereby a crop of red clover may be *made tolerably certain*. In setting out, I shall, as well as I can, state shortly what are the characteristics of the plant in question; what the kinds of soil where it thrives, which may be styled clover soils; and lastly, and principally, what the character of those soils are in which this most useful forage plant refuses to grow—endeavouring to trace the causes of failure, and to try and point out how this failure may be partly, would I could say wholly, remedied.

1st. As to its characteristics. The species of red clover which we cultivate (*Trefoil pratense*) is, strictly speaking, an exotic; it is biennial, but under certain methods of cultivation, may be partially made perennial. In the warmer climate of Southern England, especially on fertile argillaceous soils, we may almost pronounce the plant as indigenous; while with us in Scotland, even in the most favoured districts as to soil and climate, we must surely class it as an exotic. Our native variety is perennial, and grows wild on moorish as well as fertile soils, and may be seen in great abundance by the way and hedge sides.

Its most distinctive feature, compared with that which forms the subject of present remark, may be observed by the most casual observer in having narrower and darker-coloured leaflets, a more fibrous stem, and having, when chewed, a bitter acid taste. The cultivated red clover is, when green, soft, succulent, and sweet; the wild indige-

nous variety is hard, fibrous, and bitter. And, again, comparing red clover with all other varieties of forage plants now in cultivation, it has beyond them all, Italian ryegrass excepted, exuberance of growth, rich nutritive qualities, and its presence or absence, whether for pasture or hay, makes the crop luxuriant or light, while for the purposes of soiling, it is invaluable, and is for this reckoned superior even to Italian ryegrass.

2d. The kinds of soil in which this plant thrives are of a class distinguished by several qualities, all of which conduce to the preservation, development, and growth of the clover plant. Red clover, as we all know, belongs to the family of lime plants; hence those soils that are calcareous, and contain lime in abundance, are suitable in part. But while all suitable clover soils exhibit the presence of both lime and potash, as also other chemical ingredients of lesser note, it is not less necessary that they should possess a large proportion of clay, the particular use of which I shall by-and-by describe.

Speaking of leading constituents to make a perfect clover soil, we must have lime, clay, and humus; these again, for the sake of brevity, may be condensed, and those soils having these as their leading characteristics, may simply be designated argillaceous soils—and such we know are very different from those soils styled loamy or silicious. These argillaceous lands are interspersed throughout the kingdom, but occur chiefly in genuine richness in the carses of this country. On the banks of rivers, and in the low-lying valleys, there are likewise light-coloured tenacious clays, of less value for agricultural purposes, upon which clover grows and thrives; but these seem to depend greatly upon a course of bare fallowing or heavy manuring, for the necessary fertility in which clover likes to luxuriate.

3rd. I shall now advert to the character of those lands upon which this most useful forage plant refuses to grow.

Most plants grow and thrive on very different kinds of soil; the cereals, ryegrass, leguminous and bulbous plants generally; and although certainly there are lands in which all don't thrive alike, yet in few instances in the record of good farming does it happen that any of the above-named plants have been sown on lands farmed according to the rules of good husbandry and refused to vegetate, or after having vegetated for a while, have sickened and died; thus these appear, although belonging to different and distinct families, to find enough of nutriment in all ordinary fertile soils as serve for the purposes of developing their growth, and bringing them to maturity. Far different is the case with red clover; on all light soils, as a rule, its growth is uncertain; and this appears to prove that

this plant adheres to certain kinds of soils, as before described, these having certain constituent parts in their composition, as likewise before mentioned.

As the ashes of clover contain lime, potash, and silica, so, according to ordinary reasoning, we infer that these substances require to be present in a clover-growing soil. As I said before, clay and humus (or decayed animal and vegetable remains) are likewise necessary, and many are the soils that seem not to possess these in sufficient quantity. Those lands, therefore, that have not sufficiency of the above-named substances, or, in other words, are easily exhausted of them, are moorish, chalky, silicious sand or gravel, and often light and deep loams; and such require auxiliary applications of vegetable or mineral manures, to make them capable of growing this plant.

But while the cause of failure may be attributed to the want of a proper constitution of soil, or rather to the land having become exhausted of the food required for the clover plant, yet other causes are at work which render the successful culture of this uncertain plant even more uncertain. The sowing out of grasses along with a white crop has, no doubt, a tendency to militate against a luxuriant forage crop; and when liberal applications of guano or top-dressings are applied to the white crop, along with which the grasses are sown, a rankness of growth is induced so as to exclude light and air from the germinating grasses, and it is impossible in nature but that the clover plants must be wholly or partially choked, or at the least so sickly that the succeeding winter's frost kills the delicate shoot.

But while I say that it appears many soils do not possess sufficiency of mineral ingredients for the nourishment of the clover plant, yet I am of opinion that failure often happens even in soils when most, if not all, of the necessary mineral substances are present. Our system of improved farming is greatly a cause of this: first, draining has the effect of rendering the soil less compact, its cohesive nature is much lessened; as a consequence, air gains admission more freely, and makes the land lighter and more open, so that its texture is considerably changed; and many of us have proved that openness of the soil is inimical to the preservation of clover. How frequently have we seen a capital braird, strong healthy plants at the cutting of the white crop, and when March and April came round, the goodly appearance had vanished, the red clover especially having died out during the winter and spring months!

Now, we may be apt to blame the constitution of the soil for this; while the truth is, the young plants have been destroyed by the frosts. And as a proof

of this, how often do we find that ill-planted grass lands usually succeed frosty winters! If we take the severity of last winter and spring as an instance fresh in our remembrance, and note how barren the land was last summer of clover plants on all moderately light soils, I think we must come to the conclusion that the action of frost, especially if it happens late in spring, has a very disastrous effect in killing young clover, and on very shaly soils it kills ryegrass too. The kinds of crops we cultivate in our rotation, which have the effect of loosening the soil, exercise great influence in hurting red clover. The growth of beans, especially, seems antagonistic to its successful culture when sown immediately after them; and this antagonism seems to arise from this deep-rooted plant rendering the land open, and easily penetrable by frost, and likewise because the bean takes lime largely from the soil, thus using up the most essential mineral manure for the growth of clover.

Its frequency as a crop in our rotation is perhaps the most universal of all the causes that I have attempted to enumerate for rendering land clover-sick. Many practise the 5-shift course, sowing red clover, grow or not grow, once every four or five years; while it should be sown only once every second shift, that is, once in ten years, provided it cannot be made to grow oftener. The most important part of this subject is now reached—viz, how may clover failure be partly or wholly remedied?

Hitherto, my task has been comparatively easy with the facts before us in our every-day practice, that clover grows well on soils of a certain texture, while on other soils it grows rarely, or not at all. It is therefore easy to say what are the characteristics of good clover soils, and what are bad; and at first sight we may be led to say that it may be possible to take a good clover-growing soil as our specimen, and make a non-growing-clover soil like it, but that is no easy matter. The constituent parts of soils being multiform and various, it would be impossible to make one the same as the other; the substances required may be difficult and expensive to obtain, and after application their effect might be neutralized by coming into contact with other salts and substances. Such, it appears, has been the difficulty with which chemists have had to contend, in endeavouring to point out a remedy for clover-sick land. In corroboration of which, Dr. Shier, says:—"The great difficulty attendant on the whole question of the organic matters of soils is, that we can never be sure that the substances separated existed as such in the soils." And he asks, "Who shall surmount this difficulty, much less annihilate it?"

But while it is difficult to get at a specific remedy, it is possible by remarking general and known

characteristics of clover-growing lands, and by practical trials, to acquire a pretty good idea what application may be necessary for the several cases with which we are or may be connected. At a former part of this subject I said that those lands which appeared not to have sufficiency of lime, clay, and humus, were light moorish, chalky, silicious sand and gravel, and often light and deep loams; these may therefore be reckoned non-growing-clover soils, and the proper way will be to glance at each, and note from practical experience what applications are most successful in restoring the growth of this plant. In moorish soils, whether peat, clay, or bog, the application of lime has been found most beneficial as a fertilizer; and although on moorish soils of high altitude red clover is rare, yet, of all known mineral manures, there is none that causes the land to produce such an abundance of sweet herbage, and, if broken up, so improves its capability for growing cereals, as well as root crops. Such soils, however, are incapable of keeping succulent vegetation alive during a severe winter, and are therefore especially unsuited for the growth of the plant in question. Much better to sow white clover alone with the natural grasses, than to force the growth of a plant which the soil and often the climate forbids. Regarding chalky soils, what I have seen did not grow red clover; well, unlike large straths of this district, it cannot be for want of lime; and I would not have introduced this description of land into this discussion at all, had it not been that very many entertain the opinion that the application of lime is a specific remedy for clover sickness in lands of every texture. Now, on many of the chalky soils of England, red clover will not grow, and of course chalk is the carbonate of lime; I am told, however, that claying such lands has had the best effects.

Of sandy and gravelly soils, there is considerable diversity; and although especially suited for turnip husbandry, they have in the usual course of farming proved very precarious in the growth of red clover. Of restoratives applied to this description of soils, I have seen lime do well, when applied as composts. But as the application of composts is more costly than many farmers think, I am of opinion that the better way is to apply a moderate quantity of caustic lime before the turnips are sown, and to consume one-third or a half of the turnip crop on the ground with sheep, and this management of light soils will, next to certainty, restore the growth of the clover plant. I have seen this treatment when the turnips were grown upon courtyard manure, on a soil of nearly pure sand, send up a most luxuriant crop of red clover. I need scarcely remark that on such soils, whether sand or gravelly, eating on turnips has the best possible effect, in not only enriching, but consolidating the

land; and, indeed, it appears to me from observation that this course on such soils is the most remunerative that can be followed, even in an economical point of view.

Such lands might profitably be laid to grass one year in the rotation, and the six-shift practised instead of the four or five. On very light gravelly soil I have witnessed the process of claying. This was performed by the late Mr. Drew, farmer, Carmyle, near Glasgow, in a most extensive way. The effect was very satisfactory, and although the cost was heavy, yet unlike other applications, it will not need to be repeated, the result being permanent.

The following communication is from the present occupant, the late Mr. Drew's son:—

*"Carmyle, Tollcross, Nov. 3, 1855.*

"DEAR SIR,—In reply to your note of the 29th ult., regarding the application of clay upon a light or gravelly soil;

"1st. I have found the texture of the soil altered quite perceptibly.

"2nd. A very marked increase of all succeeding crops, and none more so than grass and clover seeds. I think it very beneficial for the growth of clover, both red and white.

"3rd. The cost per Scotch acre would be from £12 to £15; but it depends on the quantity applied. We gave a much greater quantity than you mention, I think about 500 carts per acre, and the last field that was done got even more. I am not sure as to the exact cost per acre, as the landlord employed the men to fill the carts, and we did all the horse work and spread it. In my opinion, however, it can only be done when clay is got in or quite near the field intended to be done, as a long cartage would cost too much money, and to do it to any extent would require a good winter's frost, or do it in summer. I am, dear Sir, yours sincerely,

"PETER DREW."

"James Walker, Esq., *Kilpunt.*"

Now, we naturally ask, in what way did this clay operate upon the light soil so as to produce the effect mentioned in this letter? Mr. Drew most intelligently says, "I found the texture of the land altered quite perceptibly;" and without going into the chemical combinations of clay and gravel, I will just remark that the incorporation of strong clay with the light soil made the land of a stronger texture, capable of retaining in store, and not losing by evaporation from heat or filtration from rain, the food of plants which was put into it in the application of manures, and likewise, by this stronger texture, being made better able to resist the severity of frosts, and the sudden alternations of heat and cold, which are so prejudicial to the winter life of the clover plant.

This, in my humble opinion, is the part that clay performed here; and how pleasing is it to witness from the happy combination of two extremes (strong adhesive clay and light porous gravel) such a

satisfactory result! A much less quantity per acre might have good effect. Indeed, for a tenant farmer alone, such applications as that given at Carmyle would be out of the question. I should say 150 to 200 cubic yards per acre would be a good dressing.

I have now reached the last description of land that frequently, sometimes altogether, refuses to grow clover. Of all the foregoing this is the most eminently fertile, and in all cases of clover-sick loamy land, treatment of this is best repaid. On my own farm I have a considerable breadth of this description, which, I am told, grew red clover well 20 years ago; long since it has continuously failed, and it is only of late years that I have been tolerably successful in restoring this plant, by applying courtyard manure to the white crop along with which the clover is sown. And in my experience, both from practice and observation, I have found, where lime was very expensive and difficult to obtain, or where the lease was wearing to a close, when the expense of liming could not be expected to be repaid, that this method has proved satisfactory. But while I have proved to my own satisfaction that the application of courtyard manure in the way just stated is a tolerably sure method of restoring the growth of red clover, I have also proved that consolidation of soils of this description is also highly necessary. Last autumn I had a field in young grass; the clover seeds were sown along with a crop of barley, after turnips; in this case I gave guano to the barley, not courtyard manure. When it was removed, I had a fair appearance of clover throughout the field. Having occasion to cart home grain from a distant part of my farm, I used as most convenient for a road one of the ridges of this field; this ridge so used was beaten and trod in consequence; and when winter had passed away, and along with it almost the whole of the clover plants of my field, I remarked that this roaded ridge, lying in the middle of the park, retained its original thickness both of clover and ryegrass; and more, when the growth of spring came, this solitary ridge shot away, and the ryegrass, as well as clover, was far enough advanced to afford a bite for stock ten days before the rest of the field; and this is nothing new, for how invariably are the tramped and kneaded head-ridges of our fields the best planted with red clover! going to prove where such occurs that the land needs consolidation as much as re-invigorating treatment.

I shall now conclude these observations, by mentioning a few general rules which I think may be tried in the management of land that refuses to grow red clover; and *first*, that on all non-growing clover lands try the six-shift, instead of the five, and let courtyard manure be applied to the white

crop along with which the clover seeds are sown. If by this application the clover comes up thick enough, but dies out during the winter, then I would say, press or roll the land in autumn, after the removal of the white crops; or, better, if the climate is early enough, sow spring wheat after turnips, instead of barley, giving courtyard manure; of course selecting a damp enough tid in early spring to cause the land to knead together, by which consolidation both the wheat and clover crops will be greatly benefited. The most successful crop of red clover that I ever had was in this way, viz., manure applied to spring wheat after turnips, and sown with grasses. If the application of manure fails to revive its growth, I would, on moorish and loamy soils, apply lime; while on sand and graelv

it would be right to apply clay. Nevertheless, I again state that the judicious application of courtyard manure, along with proper consolidation of soil and the recurrence of the clover crop less frequently in our rotation, will have a satisfactory effect. I need not trespass longer upon your patience by going into the more minute details of clover management, such as the proper selection of healthy seed, the quantity to be allowed per acre, and this sown upon a firm smooth surface, to be slightly harrowed in, and well rolled afterwards—all these are important; but to the practical audience which I now address, they are well known; I therefore with pleasure leave the farther discussion of the subject to those of you who may be kind enough to give us your opinions and experience.

### ON THE USES OF GORSE.

On Saturday, the members of the Newcastle Farmers' club met in their room, at the Literary and Philosophical Society of this town, G. H. Ramsay, Esq., presiding, when the following subject was brought forward by Nicholas Burnett, Esq.—“On the uses of gorse.”

Mr. BURNETT, in opening the subject, observed that it had often been to him a matter of great surprise that a plant like the gorse, which was one of the most useful, should be so neglected by agriculturists generally. About 40 years ago, he was led to ride from Black Hedley to Mr. Thomas White, of Woodlands, who, he was informed, used gorse for food for his stock; and soon afterwards, on a visit to that gentleman, he saw the whole process of cutting and grinding whins to prepare them for food for the cattle, &c. Mr. White also detailed to him the advantages to be obtained from the use of this plant; but, notwithstanding, he left Woodlands under the same impression as most of his neighbours, that Mr. W. was an enthusiast; and, for a long time afterwards, he (Mr. B.) thought no more about the matter. Some years elapsed, when his attention was again drawn to the subject by reading an excellent article on the Crushing and Value of Whins, in “British Agriculture,” Vol. i., and he was induced to make some experiments. He first requested a servant to cut him a quantity of last year's shoots, and put them into the thrashing machine, but in this he was not successful. He next tried them through a powerful straw cutter, but he found the process so slow, that it would not do; and then, afterwards, he attempted to boil them, but he found that the thorny part was so strong as to make them uneatable. After these failures, he still persevered, and, as an experiment, he sent two

sacksful to Newcastle to a friend who had a pair of edge stones; but the motion was so slow that he abandoned this method also. In the year 1847, he found another article on gorse in “British Agriculture,” and after carefully perusing the article, he took one of his men, with a pair of garden shears, into the lanes on the highway, and set him to cut some of the last year's shoots. From the time the man was employed, he (Mr. B.) found that if he could get the plant manufactured as he wanted it, the expense would be trifling; and having a bone mill on his premises, which was worked by a small steam engine, he procured two horizontal fluted rollers, and introduced them into the mill; but, after working a short time, the rollers were clogged up. He then sent the rollers to Newcastle, and had them fluted perpendicular to the axis instead of horizontally; and he also contrived to make one roller revolve twice as quick as the other. On trying this experiment, he found that it answered remarkably well, and the following is the result of his labours:—In the first year, viz., 1847, he used eight tons, which were given to the horses and cows for food. In 1848 he increased the quantity to 21 tons, and fed the sheep with it, in addition to the horses and cows. In 1849 he used 30 tons, and in the winter of 1850, forty tons, and with the latter supply he fed 283 ewes with gorse from the beginning of November to the latter end of February, besides his horses and cows. During the time he used the gorse he never had a single complaint regarding his stock, and they never were more healthy. They ate it greedily, and throve well; and he was firmly persuaded that gorse thus supplied to cattle was equal in value to the best hay that could be given; besides, he calculated that the

plant did not cost him more than 2d. per stone, 14lbs. to the stone, after cutting, carting and grinding. He, however, found that the gorse, after being ground, soon lost its freshness, and fermented and turned sour; therefore, the sooner it was given to the cattle the better; and it would be as well to grind it every day. In some instances, after being ground, and it had lain some time, he turned it over, and applied hot water to it, which revived it, and made it fit for use. The gorse generally was fit for food from November to the first of May. After the plant flowered the cattle did not relish it. At the Royal Agricultural Society's Show held at York some years ago, a premium was offered for the best mill for crushing gorse; but after examining it minutely, he thought it so deficient, that he would not have had it as a gift, as he felt convinced that nothing was equal to the stone and edge system. As an example, Mr. Moody, of Millshield, near Minsteracres, has a stone for crushing gorse, which is worked by the water-wheel, and it has been used with success for several years, and any party paying a visit to the farm may see and judge for themselves. In addition to this mill, there are five others at work in the vicinity of Black Hedley. With respect to his friend Mr. White, whom he once considered an enthusiast, he had completely changed his opinion of him, and thought that gentleman had displayed great ingenuity by affixing his stones for crushing gorse to a wheel of his horse thrashing machine. After the experience he had had, he considered gorse was one of the most valuable plants the farmer could use, if it was cultivated as it ought to be. Nature presented the plant to view almost at every place, and it only required a little of man's skill to make it a most excellent and profitable means of food for his stock of all kinds. It was remarkable, but it seemed only one of those wise provisions which Nature always makes, that the thorny part of the plant cannot be used in summer, and it was thus permitted to grow until winter, when it became serviceable at the time other kinds of food were becoming scarce. It also appeared indigenous to this country; for wherever he had travelled he had seen it growing, and especially on poor land. Its limits were extensive, as it grew even from the sea to the height of a thousand feet beyond its level; and its latitude reached from the far north even into Spain. He knew that at different times the attention of agriculturists had been drawn to the fiorin and tussac grasses for food; but was it not a surprising thing, when Nature presented the farmer daily with such a valuable plant as gorse, that it should be comparatively neglected? He did not wish that they should receive what he said without searching into the matter for themselves; and in

order to enable them to do so, and get some valuable information, he referred them to the following authorities, where they would find some excellent papers on the subject. The first was the Annual Register for 1762, where an account was given of cattle being prevented starving by the use of gorse; also in the same register, they would find articles written in 1763, 1771, and in 1787. In vol. v. of the Highland Society's Transactions of 1820, and in vol. xv. of 1841 there were two excellent papers. There was also another paper in the Quarterly Journal of Agriculture of 1831, and in vol. viii. of the same work, they would find another paper. In the Royal Agricultural Society's Proceedings of 1846, there was also a very excellent paper. Mr. Burnett then concluded by stating that it was his belief that on poor land, if each farmer had five acres of it devoted to gorse, it would be found in reality the most valuable part of his land, as it would yield him the most profit.

Mr. WEEKS thought they ought to feel much obliged to Mr. Burnett for bringing the present subject forward. It was of considerable importance; and he had always had an idea that gorse was a valuable thing for cattle; but, what was a great difficulty, was the crushing of the plant, as many farmers had not stones to do it. If a suitable machine could be constructed, it would be of great service to the profession.

Mr. BELL testified to the experiment of Mr. Burnett, and stated that the plan had succeeded well.

The CHAIRMAN said that, as usual, they always got something of value from Mr. Burnett. He must confess that he never thought that gorse could be applied to the extent it had, until he heard the statements of Mr. Burnett, and that too at only 2d. per stone. With respect to Mr. White, he could bear out all that was said as to that gentleman feeding his cattle on gorse and as to their thriving on it. For himself he could not doubt the nutritive qualities of the gorse, but he doubted the practicability of crushing it, as it would not do to crush great quantities at once. The subject certainly had not made much progress; but, on the face of it, there appeared something worthy of the attention of the farmer, as a time might come when the ordinary supplies of food might become remarkably scarce, and when gorse could be resorted to in the emergency. It was necessary at present that the farmer should look into every thing with great care, as every thing touching pounds, shillings, and pence was of the greatest importance to him, seeing that, notwithstanding all his exertions, he had much difficulty to get on.

Mr. GLOVER, the secretary, thought there could be no question of the nutritious qualities of the gorse, and as a proof, instanced how the late Gen.

Napier contrived to feed his cavalry horses, when other food was scarce. In the Royal Agricultural Society's proceedings there was a prize given to Mr. Roberts, of Bangor, for a paper showing how gorse could be grown as a regular crop, and with great profit. If that were so, he did not see why it could not be produced either in Northumberland or Durham.

Mr. STEPHENSON said that, although he had no experience in the matter, yet he thought the subject worthy of consideration; and as Mr. Burnett had brought it forward, he moved that a vote of thanks be given to him.

The motion having been seconded, it was put and carried.

The CHAIRMAN, after requesting the secretary to retire for a few moments, called attention to a matter which had been recently mooted regarding

the propriety of presenting Mr. Glover with a suitable testimonial, for his long and valuable services to that society ever since its establishment. The subject had been named to Sir M. W. Ridley, the president, and he not only spoke highly of Mr. Glover's services, but, as a proof that he appreciated them, he consented to head the subscription with the sum of £20. (Applause.) He therefore suggested that a committee be appointed to receive the subscriptions of the members, and to carry the object fully out.

After some conversation, a circular was agreed to be sent to the members on the subject, and the committee of the club authorised to receive subscriptions in aid of the testimonial, which would be presented at the annual dinner in January next.

The meeting then broke up.—Newcastle Courant.

## ON THE USE OF A SOLUTION OF CHLORIDE OF LIME AS A STEEP FOR WHEAT.

BY DR. STEELE, OF DUBLIN.

The stimulus which British agriculture, from various causes, has of late years received, and the marked improvement that has taken place in its practice, render apologies, I trust, unnecessary in urging upon the consideration of our farmers any subject calculated to promote the success of their art, and to render their returns more certain.

Although the diligence of our practical agriculturists is in general a subject of well-deserved praise, yet it is, for the most part, unaccompanied by a knowledge of those principles upon which its successful prosecution depends. Many, even at the present day, believe incessant toil, which knowledge can neither materially diminish nor affect, to be the lot of the husbandman, and regard all scientific inquiries relating to the fattening of cattle, the theory of manures and fertilizers, the natural history and growth of plants, as problems with which they have nothing to do; persuaded that questions such as those are either unworthy their regard or above their comprehension.

That such opinions are ill founded a little reflection on the vast services that science has rendered in advancing the social condition of man will serve to show; and upon the fact that from the closets and laboratories of abstract science have emanated many of those inventions which have contributed to raise the manufacturing industry of England to its present eminence. When it is remembered that to investigations purely scientific the discovery of the electric telegraph is to be traced; that to abstract

enquiries into the expansive force of steam, too, we owe the steam engine; that the illumination of our streets with gas; the various improvements in the art of dyeing; the comparatively recent application of the discovery of the deposition of metals from their solutions, of so much importance to the arts and manufactures—inventions which are the offspring of abstract science, and now almost essential to our social existence; the agriculturist should be encouraged to look to similar means for advancing his pursuit, which, while they would tend to elevate his mind and improve his understanding, would, at the same time, have the effect of improving the practice of his art, and the consequent enlargement of his profits.

The subject of the present communication may be adduced as an example of the value which inquiries of an abstract nature may be to the practical farmer. Few of those to whom the subject must necessarily be of the highest interest will be found really to know anything whatever about the matter; and if even enlightened and otherwise well educated agriculturists are asked the causes of the various kinds of blight which attack their corn crops, their origin, or how they may be prevented, answers are returned of so vague, unsatisfactory, and impossible a nature, as to show the complete ignorance which prevails amongst them on a subject, the importance of which none of them undervalue; and yet, when once the natures of these blights are known, every difficulty as to the mitigation or prevention of some

of the most destructive of these pests vanishes, and we are enabled to apply rational remedies for the cure or mitigation of the disease.

Among the numerous diseases to which flesh is heir, there are some of so extraordinary a character as to induce us to doubt in their existence, were it not that their frequent occurrence has made the fact familiar. I allude to the production and development of one class of living animals within the bodies and organs of others, which are, on this account, named entozoa. Thus, we meet with, not only the various species of worms, as they are called, in the intestinal canal, but less commonly the *Echinococcus* in the liver and spleen, the *cœnurus cerebralis* in the brain of sheep, the distoma in the gall bladder of the sheep, *nistoma* in the gills of fish, the *trichiera spiralis* in the substance of the muscles, the *filariæ* in the blood of some animals, and the *cysticucus* in the human eye. Have we any analogous to this wonderful fact in the vegetable kingdom? Do we ever find the internal parts of plants infested with other minute plants—*Entopleyta*—produced, growing, and propagating their kind within their living habitation? The investigations of abstract science enable us to answer this in the affirmative, and teach us that, like animals, plants are subject to be attacked with diseases, which, when investigated, are found to be caused by the presence of other plants which had established themselves in their interiors.

As these disease-plants, for the most part, all belong to the tribe of fungi or mushrooms, it will be necessary to say a few words respecting their peculiar habits.

Most of the members of the vegetable kingdom derive their nutriment from the inorganic kingdom, having the power of assimilating the elements with which they are surrounded so as to form the substance of which they consist. Fungi, on the other hand, require a supply of organic matter for their nutriment: hence it is that wherever animal or vegetable substances are undergoing decomposition, there we find these plants growing in luxuriance; and frequently anticipating death, they fasten upon individuals weakened or prostrated by disease, and by their presence hasten final dissolution.

The tribe of mushrooms or fungi has been arranged by botanists in five classes, formed upon characters derived from the nature of the coverings that invest the fine seed-dust or sporules. These appear but as a vapoury cloud under a microscope magnifying 1,000 diameters; and floating in myriads through the air, are ever ready, when an appropriate soil offers, to start into life and fulfil their important destiny. It is not necessary here to describe botanically the classes into which mushrooms or

fungi are divided. I must premise, however, that the fungus-plant or mushroom is not that which we commonly understand as such; the common mushroom which is so extensively used as an article of food being the seed-bearing receptacle which at certain periods of the year rises into the air, bearing upon its gills the microscopically minute spores, or cases, containing the fine dust before mentioned, called the sporules, the plant itself consisting of that which horticulturists call the spawn, or botanists the mycelium. The blights which infest our corn crops are known to farmers by the names of bunt, smut-balls, pepper-brand, dust-brand, rust, red-gum, mildew, and others. These various kinds of blights have long been known to botanists to be caused by the presence of certain fungi of a definite size, figure, and organization, possessing characters which serve to distinguish them from each other or from many of their class to which they may be nearly allied. One important circumstance respecting them, however, is, while some exclusively attack the leaves, the straw, and the chaff, others as exclusively prey upon the grain. To the latter the present communication must be limited.

Two distinct species only are found which prey upon the grain or seed of the various kind of corn; to these botanists have given scientific names; they both, however, belong to the same genus—*UREDIO*, the species of which are characterized as growing within another plant, consisting of an extremely delicate mycelum, to which a dense number of little balls or spores are attached, each spore consisting of a single undivided cell, and not having any perceptible stalk by which it is attached to the spawn.

As I said before, two species of fungi confine their attacks to the grain of our corn crops. One of these is found to prey exclusively upon the grain of the wheat; is called *uredo caries*, known to farmers as bunt, pepper-brand, and smut balls; the other rarely attacks the wheat, but is extremely destructive to the barley, bere, and oat crop. This has been named *uredo segetum*, and is called by farmers smut, dust-brand, chimney sweeper. We shall first describe the *uredo caries*, one of those forms of fungus which is found only within the grain of the wheat.

To the unassisted senses this blight is easily recognised. On breaking a smut ball in the fungus, it is found to consist wholly of a dark brown powder, having a most disgusting odour, almost undistinguishable from stinking fish. If a little of this dust be examined with a microscope, we shall find it to consist of a number of minute balls, having a mottled appearance; an attentive observer may likewise detect the slender threads of the spawn or mycelium, to fragments of which a few of the spores may be seen to be still attached.

This fungus may be detected in the young grain many days before the appearance of the ear. At this early period the spores are white, and the mycelium may be seen branching in the semi-fluid contents of the young grain. It is not, however, until the ear has fully grown that the diseased grains and their contents assume the appearance first described.

The grains attacked by this fungus are seldom shed, and rarely burst spontaneously; they are even capable of resisting a considerable amount of pressure, and consequently may escape being ruptured in the operation of thrashing, and along with the sound grains be sent to the mill, a very few of which, if ground with the latter, would be sufficient to injure the flour, by imparting to it its disgusting smell, and injuring its colour, so as to render it unsaleable.

The affected grains being lighter than the sound, may, however, be easily separated from the latter by immersing the sample in water, to the surface of which the former will immediately rise; not so, however, should the grains be broken. In this case, the liberated spores, being heavier than water, sink with the sound grains to the bottom of the vessel.

The other species of blight which preys upon our cereal grains, viz., the *uredo segetum*, may be easily distinguished from that which I have just described. Instead of being, like the *uredo caries*, confined within the grain or ear, its work of destruction is completed, and the spores dissipated, long before the ripening of the crop, previously reducing the ear to the sooty condition quite characteristic of its presence. Its presence, therefore, need be apprehended as affecting, not the quality of the flour, but the amount of the produce, which it often most seriously reduces.

Nor is it in external characters alone that this fungus may be distinguished from the *uredo caries*. It is not only devoid of the disagreeable odour of the former; but when examined with the microscope the spores are found to be not half the diameter of those of the *uredo caries*—to exhibit no mottling appearance presented by the spores of that fungus. By a careful examination, we may be able to detect the spawn or mycelium of this fungus also. The spores are likewise of a very oily nature, and much lighter than water, and if kept moist for a few days, under favourable circumstances, may be found to emit germinating shoots. It is important to observe that I did not succeed in causing the spores of this fungus to germinate unless they were obtained from recent specimens.

Such being the chief characteristics of these two forms of blight, I shall proceed to consider the precautions that may be adopted for averting their attacks.

Before doing so, however, it will be necessary to notice the means by which these blights are propagated.

No circumstance in their history is so well established as the fact that if healthy seed be sown, which had been mixed with the spores of either bunt or smut, the ears of the future plants will be found to be affected with these blights respectively, and also that if (what we may call) infected seed be either carefully cleaned from the adhering spores of the blight, or steeped in some chemical solution which will kill the spores, but not the seed, the plants will in due time bear healthy ears. The latter of these processes is what farmers call pickling or dressing the seed, and the solution employed is generally known by the name of the wheat-steep. As the *uredo segetum*, or dust-brand (that which is most prevalent in oats, barley, and bere) is, for the most part, dispersed before the crop ripens, steeps are for the most part useless. The *uredo caries*, or bunt, on the other hand, remains in the ear, and will, if it exists in the field and be thrashed with the general crop, most surely contaminate the grain. It is, therefore, for the purpose of preventing this form of the blight that these steeps are most generally employed.

I before mentioned that some of the grains may escape being broken in the operation of thrashing. These may readily be removed by simply steeping the seed in water, when the affected grains will be found to rise to the surface. Many of the blighted grains must have been broken and their contents mixed with the seed. It then becomes necessary to destroy their vitality. This has been done by various means. In Kent, the practice has prevailed of immersing the seed for a short time in very hot water, a method found to answer the purpose admirably in the hands of an experienced person. Lime, blue-stone, or corrosive sublimate dissolved in water, stale urine, and white arsenic, have been all used, to which may be added sulphate of soda and quick-lime—a dressing highly recommended by a French commission which inquired and reported on the subject.

Whatever may be the efficacy of the other dressings enumerated, there ought to be but one opinion as to the inadvisability of employing for this purpose so active a poison as arsenic. The French commission to which I before alluded found it to be by no means so efficacious as other substances of a more innocent nature; while it has been ascertained that the flesh of birds destroyed by picking the grain out of the ground has been rendered poisonous, and if eaten would certainly produce serious effects.

In the course of my examination, some years since, of this subject, it occurred to me to apply a solution of chloride of lime to the spores of the bunt fungus,

and watch the effect produced. The offensive smell, so characteristic of the fungus, was immediately destroyed, and after a few hours the spores were ruptured and disorganised.

These facts encouraged me to try the effect of the chloride of lime solution, when applied as a wheat-steep, and at the same time to compare it with that which had been so much praised by the French commission before alluded to—namely, sulphate of soda and quick-lime. I instituted with the consent of the council of this Society,\* at their Botanic Garden, the experiment which I shall now describe.

I procured 4 lbs. of the finest and cleanest wheat seed, 1 lb. of which I set apart without any preparation: the remaining three parts I mixed equally with a large quantity of the spores of the bunt fungus, until the whole was rendered a uniform brown colour. 1 lb. of this infected seed I then steeped for two hours in a solution of chloride of lime (made by mixing for two hours 1 lb. of the chloride to one gallon of water), and dried it by sifting fine sand over it. Another pound of the infected seed I steeped for two hours in a saturated solution of Glauber's salts, when it was removed from the solution and dried by sifting over it a little fresh-slaked quick-lime. The fourth pound of seed (which was infected by the bunt) was not subjected to any treatment. These four parcels of seed were then sown in four separate, but contiguous, plots of ground. No difference was observable in the period of sprouting or germination of the seed, but the result of the experiment, which was most striking while the crop was standing, may be thus stated:—

Plot 1.	Plot 2.	Plot 3.	Plot 4.
Sown with one pound of clean undressed seed.	Sown with one pound of same seed infected with bunt fungus, and steeped in saturated solution of chloride of lime.	Sown with one pound of same seed infected with bunt, and steeped in saturated solution of sulphate of soda, and dried with quicklime sprinkled over it.	Sown with one pound of same seed infected with bunt and undressed.

The number of ears contained in the produce of each plot were counted, and the number of sound and smutted ears ascertained. In the same manner the number of straws deprived of the ears in 1 lb. weight was ascertained. The following was the result:—

Plot.	Total No. of Ears in 1 lb. weight.	Number of sound Ears in 1 lb. weight.	Number of smutted Ears in 1 lb. weight.	Number of Straws in 1 lb. weight.
1	336	336	None.	231
2	364	362	2	263
3	632	352]	320	273
4	700	360	340	339

\* The above paper was read before the sectional meeting of the Royal Dublin Society, on the evening of the 30th of November last.

The result of this experiment warrants us in drawing the following conclusions:—

1. That wheat seed infected with bunt fungus, and sown, produces plants the grain of which is filled with a similar fungus.
2. That the presence of the fungus is injurious to the straw as well as destructive to the grain.
3. That the steeping seed infected with the bunt fungus in certain chemical solutions more or less prevents the production of the fungus in the seed of the future plants.
4. That steeping the infected seed in a saturated solution of Glauber's salts, and afterwards drying it with quicklime, has but little effect in preventing the production of the fungus in the future plants.
5. That steeping the infected seed in a solution of chloride of lime is nearly a specific in preventing the production of the bunt fungus in the future plants, and very much more effectual for this purpose than the solution of Glauber's salts and drying with quick-lime.

Since the date of this experiment, the chloride of lime solution has been used as a wheat steep by several agriculturists in different parts of the country, with the same satisfactory results; and in confirmation of this statement, I take the present opportunity of reading to the meeting a few communications I have received upon the subject.

The method of using the chloride of lime as a wheat steep is as follows:—Make a solution by mixing one pound of fresh chloride of lime in one gallon of water, frequently stirring them with a *stick* in a *wooden* vessel for two hours. Throw the seed intended to be steeped in a large quantity of water, frequently stirring it, and removing all the swimming grains. Shere off the water, and then pour over the seed a sufficient quantity of the chloride of lime solution to cover it, allowing it to remain for two hours. Then pour off the solution, which may be again used, and dry the seed with fine dry sand, peat mould, lime, or any drying powdery substance; it is then fit for sowing.

With regard to the prevention of the true smut, the *uredo segetum*, unfortunately we know of no method so efficacious as those used for the prevention of the bunt fungus. This arises from its early dispersion, and the consequent contamination of the ground. In cases where there is reason to suspect that the soil is infected by the spores of the smut, the only practical method of proceeding is to treat it largely with stale urine or quick-lime, and to avoid cropping the land with grain for two or three years, as I have observed that the spores lose their power of germinating if long kept.

As some of this fungus may be found in a perfectly ripe crop of corn, especially of barley, it is desirable that the seed should be steeped similarly to that of the wheat. This will undoubtedly destroy any of the spores that may adhere to the seed.

## TILLAGE IN THE FIFTEENTH CENTURY.

It was enacted by Parliament in 1426, and again in 1457, that every man tilling with a plough of eight oxen should every year sow at least a firlo of wheat, half a firlo of peas, and forty of beans. The culture of these grains could not have been very general previously. Even so late as 1727 the culture of wheat was so very limited in the Lothians, that a gentleman relates in 1795, that when he cultivated it to the extent of eight bolls, sowing on a farm of about 90 acres of arable land, within a mile of Edinburgh, it was esteemed to be so extraordinary an exertion as to attract the attention of the whole neighbourhood.

## SHORT BRIDLING.

It is difficult to imagine, in a country where the management and breeding of the horse are better understood than anywhere else in Europe, what could have given rise to, and continued so long, a practice so cruel, unnecessary, and ignorant, as that of bridling so short the head of the horse. It is well known that the strength of this animal cannot be exerted to its utmost without he has the free motion of the head and neck; for in calling the muscular powers into full action, the head acts as a kind of balance to the body, and enables him, particularly in traversing rough roads, over ice, or on making a stumble, to recover himself. What, then, can be less scientific, or more cruel, than to see this animal struggling to his utmost in dragging a waggon up a steep acclivity? Observe his head bound back like a fixture, with the intention apparently of neutralizing the most willing efforts of the dumb animal, while the only assistance he receives from the ignorant biped, his driver, is a merciless allowance of the whip. It should be remembered that although England surpasses all the world for certain breeds of horses, viz., the London dray-horse, the coach-horse, and the race-horse; yet it is more to the crossing of the breed, and to the grooming, to which we are indebted for their superiority, than to the race or the climate. In proof of this, it was a common practice, in the time of Henry VIII., to import horses from France to this country, for the improvement of the breed, and there is still a large proportion of horses in England of a very inferior breed—we allude more particularly to the common farm-horse, and the country waggon-horse. They are defective in form, consequently slower in action, and deficient in power. Indeed, it is observed by Mr. Lawrence that this race of horses is formed on the very worst anatomical principles, either for

strength, beauty, or activity, and that they are behind the Flemish, French, Scotch, or Canadian horses.

## PHENOMENA OF NATURE.

Among all the phenomena of nature few are more curiously interesting than those of the vegetable world. Whilst the embryo of the pea is enclosed within a most delicate folding, protected as it were by a thatch formed around it, and enabled, by a kind of mechanical power given to the blossom that contains it, to turn its back to the wind, we see the black thorn in the hedge revelling in the northern blast, and finding life and vigour in the blighting mists of an easterly wind, but nipped in the bud by the genial warmth of a mild spring. From hence is the term "black-thorn winter" given to a cold and backward season. The black thorn is a native of the northern countries; but, though superior for agricultural purposes as a fence against cattle, is not so generally cultivated as the white thorn, being more uncertain of growth, no doubt in consequence of feeling the effect of the season.

## EXPERIMENTAL FARMS.

The erudite Dr. Watson, Bishop of Llandaff, in a letter to Sir John Sinclair, relative to the plan set on foot in 1799, for establishing, by a company of subscribers, experimental farms in the different counties, says, "Most of the great improvements that have taken place in British agriculture within the last fifty years have been introduced by the nobility, gentry, and clergy of the country, under their superintendence and that of their immediate agents. I am of opinion that such men as the Duke of Bedford, Lord Egremont, and others of similar dispositions and abilities, if such can be found, in the different counties, will do more towards perfecting the agriculture of the kingdom, by trying experiments on their own estates, than by any experimental farmers, however numerous, under the direction of any society, however enlightened." In the sequel of the same letter the Doctor justly and practically remarks, "that there are many problems respecting the cultivation of land which cannot admit a solution, because the success or the failure of the experiment which should be made in order to solve the problem depends more on the nature of the weather, which cannot be foreseen, than upon the quality of the soil or mode of management." Thus, from one experiment it may appear that drilling of wheat is the most profitable mode of culture; from another,

that dibbling it is preferable; and from a third, that sowing it broadcast is the best, according as the season happens to be hot or cold, wet or dry.

#### THE ORIGINAL STANDARDS OF WEIGHTS AND MEASURES.

Every farmer perhaps may not know that the grains of wheat and barley were the original standards to adjust the weights and measures of the kingdom. Though it was ordained in Magna Charta that there should be but one weight and one measure, yet we do not find how or from whence the standard was to be made or adjusted till the thirty-first year of the reign of Edward I., when it was ordained "that three grains of barley, dry and round, do make an inch, twelve inches make a foot, three feet make a yard, five yards and a-half make a perch, and forty perches in length, and four in breadth, make an acre." Again, by consent of the whole realm of England, the King's measure was made, viz., "That an English penny, which is called the sterling, round without clipping, shall weigh two-and-thirty grains of wheat, dry in the midst of the ear; and twenty pence make an ounce, and twelve ounces make a pound, Troy weight; and eight pounds make a gallon of wine; and eight gallons of wine make a bushel of London, which is the eighth part of a quarter." How is it that we now use only twenty-four grains for a penny-weight?

#### PARKS IN THE SIXTEENTH CENTURY.

The vast number of parks in the kingdom in Elizabeth's reign was much complained of. "There are not less," says a writer of that age, "than one hundred in Essex alone, where almost nothing is kept but a sorte of wilde and savage beasts, cherished for pleasure and delight." And, pursuing the same subject, he says, "that if the world last a while after this rate, wheat and rie will be no graine for poore men to feed on."

#### PAROCHIAL TITHES.

Parochial tithes were not established for the clergy in England till about the end of the eighth

or middle of the ninth century. The reason assigned by an old author for this, is "because the division of England into parishes was not made before the time of Honorius, Archbishop of Canterbury, 636." In the answer to the petitions which were exhibited to Parliament and to Cromwell for the taking away of tithes, in 1652, it is said, "There are in England and Wales 9725 parishes, and though one half of these rectories were not appropriated as to the number, yet certainly as to the yearly values, the ministers at this day have not one-half of the profits of the tithes of corn and grain."

#### EXHAUSTING PROPERTIES OF VEGETABLES.

The power of vegetables to exhaust the soil of the principles necessary to their growth is remarkably exemplified in certain fungi. Mushrooms are said never to rise in two successive seasons on the same spot; and the production of the phenomena called "fairy rings" has been ascribed by Dr. Wollaston to the power of the peculiar fungus which forms it to exhaust the soil of the nutriment necessary for the growth of the species. The consequence is, that the ring annually extends, for no seeds will grow where their parents grew before them, and the interior part of the circle has been exhausted by preceding crops; but where the fungus has died, nourishment is supplied for grass, which usually rises within the circle, coarse in quality, and of a dark-green colour.

#### WEIGHT OF SHEEP.

The following example of a slaughtered sheep, weighing 116 lbs., gives the proportions of the parts, viz. :—

Flesh and tallow .....	54 lbs.
Fat taken from the intestines....	7½ „
Liver and lungs .....	5 „
Blood .....	3 „
Head, stomach, and intestines ..	42½ „
	<hr/>
	112 lbs.
Waste .....	4 „
	<hr/>
	116 lbs.

## ON THE BARKS, &c., USED IN TANNING.

### CHAP. II.

Having touched in the former chapter on the statistics of the leather trade, the annual consumption of tanning materials, and the value of oak-bark, we now come to speak of the other barks and extraneous foreign substances used by the tanner.

Another product of the oak, very rich in tannin, and of great use in the tannery, is the acorn-cup of the *Balonia* oak (the *Quercus agrilops*) and its varieties, known

in commerce as Valonia. Our supplies are derived chiefly from the Morea and the Levant; and the consumption is yearly increasing, while the supply is stated to be unlimited. It is much more portable and concentrated in its tanning properties than bark; and is, therefore, equal in price to the best coppice-bark. The two varieties, Morea and Smyrna, stand respectively, at present, at £10 10s. to £13 per ton for the former, and £13 to £16 10s. for the latter. Camata—a younger

variety of valonia—being more valuable in some processes of tanning, fetches rather a higher price.

The proportion of tannin in similar barks will be found to vary considerably with the age and size of the tree, and the season when it has been barked. Tannin most abounds in the spring, when the buds are opening; and least in the winter. 480lb. of the white cortical layers of oak-bark will yield 72lb. of tannin, or in the proportion of about one-sixth to one-seventh of the weight. The same quantity of coppice-oak would yield about 32lb. of tannin; of middle-sized oak, cut in spring, 29lb.; and if cut in autumn, 21lb. Hence we find, in the London market, coppice bark will fetch £1 per load more than the bark of larger trees.

Next to the oak, among our indigenous English trees, the bark of the Bedford and Leicester willow, when of a good size, yields the greatest proportion of tannin—nearly one-half that furnished by oak-bark. The common variety of the willow will be found, however, to contain but a very small quantity of tannin.

In Scotland, larch-bark comes into very general use for some purposes of the tanner, not only from its abundance and cheapness, but also from its valuable properties, competing well with oak-bark, although not so rich in the tannin principle. The bark is obtainable during the greater part of the year, and is stripped with very little trouble. It was first brought into use by Mr. T. L. White, of Durham, who received a gold medal from the London Society of Arts for its introduction as a tanning substance. It is difficult to obtain any reliable estimate of the quantity used, which, however, has greatly increased of late years.

The barks of the spruce and Scotch fir and Weymouth pine will tan; but they act very slowly on the hide. The Scotch fir only affords half the quantity of bark, is more troublesome in planting, and is much less effective as a tanning agent than larch-bark.

The barks of the willow and the birch were formerly considered very valuable for the tanners, the latter bark in the close of the last century bearing a price nearly equal to that of oak-bark in Ireland.

The Rev. Mr. Swayne, many years ago, made some experiments as to the value of the leaves of the oak-tree for tanning, naturally presuming that, like the bark, the acorn, the twigs, and other parts of the tree, the leaves must contain considerable portions of tannin. The difficulty of drying them, and the bulk, were serious objections to their use. He found, on analysis, that they contained much astringent matter, and suggested that it might prove useful to make a concentrated extract from them. The present abundance of oak-bark and other tanning materials, however, renders this labour unnecessary.

Until 1807, tanners were restricted by act of Parliament, particularly the act of 1 James I., and subsequent confirmatory acts, to the use of oak-bark for tanning, probably to encourage the planting and rearing of those valuable timber-trees. In that year, however, on the report of a Parliamentary committee, these obnoxious clauses were repealed; and the tanner, being thus at liberty to select the most effi-

cient tanning substances, home or foreign, began to use valonia, elm, alder, birch, chestnut, and larch-barks. But even for some years subsequently, the trade was shackled with fiscal and other restrictions. For instance, the Excise prohibited curriers from using sumach for any other purpose than for colouring leather.

In 1798 a parliamentary report was issued on the use of that bark in tanning leather, and the committee which then sat reported that good, durable, and firm leather might be made from elm-bark alone. A ton of elm-bark would produce nearly the same amount of leather as a ton of oak-bark. In that year the consumption of oak-bark was about 70,000 or 80,000 tons; and in the early part of the present century, Mr. George Biggin and Sir Humphrey Davy experimentalised on the astringent qualities of the barks of various trees, and their efficiency as tanning substances. The results of these investigations were given to the world in the Transactions of the Royal Society; but are scarcely sufficiently practical or important to be quoted in the present day.

Professor Fehling estimates the relative value of the several tanning substances as follows, and these data will indicate with tolerable accuracy their comparative commercial importance, as respects the proportion of tannin:—

Pine bark contains from	5 to 7	per cent. of tannin.
Old oak bark	9	"
Best oak bark	19 to 21	"
Gall nuts	30 to 33	"
Aleppo galls	60 to 66	"
Chinese galls	70	"

Galls come into commerce to a considerable extent; but are much too high in price to be used as a tanning agent.

Different tanning substances have different effects in their extractive or colouring principle, and hence the tanner who wishes to produce a peculiar kind of leather selects that material which answers his purpose best. Ground oak-bark produces a lightish brown or fawn-coloured leather, valonia a grey colour, fine-galls would produce a very pale colour, and catechu gives it a reddish tinge. The proportionate value of the tanning materials is shown by the quantities required to produce a ton of leather. These would be either 7 tons of oak bark, 3 tons of sumach or valonia, one ton of terra japonica or gambier, and  $\frac{1}{2}$  a ton of catechu. Other authorities state that 4 or 5 pounds of oak-bark are required to prepare a pound of leather: half a pound of catechu would answer the same purpose.

The bark and leaves of the alder were formerly employed for tanning purposes, the whole tree being very astringent, and fishermen dyed their nets with it; it is found that the tannin principle serves to strengthen cordage, as well as to preserve it when immersed in water. For the use of tanners, dyers, and leather dressers, these petty supplies of indigenous barks have been almost entirely superseded by more plentiful and efficient foreign substitutes, which commerce and science have brought into notice.

The bark of the ash is still used occasionally for tanning calf-skins, and for dyeing. It contains hardly

one-fifth of the proportion of tannin that oak-bark yields; but the fisherman finds it useful to tan his nets, and dry his herrings with, in some localities. The silvery bark of the beech and of the birch contain but little tannin. In Russia the empyreumatic oil of the birch-bark is said to give that peculiar odour to Russian leather, and this bark also gives a yellow tinge to wool. The bark of the Spanish chestnut contains as much tannin as oak-bark cut in autumn; but the horse chestnut furnishes scarcely any tannin worth mentioning.

The barks of the elm, the hazel, the blackthorn, and the Lombardy poplar contain small quantities of tannin; but not in sufficient quantity to render them of any commercial importance. Of the poplars, the black and the Lombardy species contain most tannin. The old corky bark of the black poplar also furnishes floats for fishermen's nets.

*Hemlock Bark.*—In North America, owing to the natural supply of barks suitable for tanning being abundant, foreign substitutes are little employed. The bark of the hemlock spruce (*Abies Canadensis*) is that chiefly used in Canada, in New Brunswick, and in the North-eastern States, a small proportion of ash-bark being employed to finish off and colour the goods. Half the epidermis is shaved off before it is thrown into the mill for grinding. Hemlock-bark is inferior to oak-bark; but American tanners say, that both united are better than either alone. Small consignments of hemlock bark have been made to London, but the tanners here have not been induced to adopt it.

As the oak flourishes in the South-Western States, its bark is chiefly used for tanning sole leather, and this from its quality always commands a higher price at Baltimore and Philadelphia than the leather made in the Northern States.

The bark of the yellow birch (*Betula lutea*) is sometimes employed in America for tanning, but only for what the carriers call "fair leather."

The inner bark of the black birch (*B. lenta*) is also full of tannin, but its useful properties in this respect have been much neglected.

In Ohio, the bark of the white beech (*Fagus sylvestris*) is used for tanning, and the leather made with it is white and serviceable, and inferior only to that prepared with oak bark.

The roots of the Palmetta palm are stated to be valuable for the purposes of the tanner, as containing a large proportion of tannin. It abounds in the Southern States of America, and in the Bahamas.

The bark and leaves of the mangrove, which contains nearly as much tannin as the oak, are used in the East and West Indies for tanning, and serve to complete the operation in one-third the time required with the oak bark; the sole leather so tanned is also said to be much more durable. The Chinese use mangrove bark, and also collect and ship it.

In the Madras Presidency, the bark of *Cassia auriculata*, known as Turwan bark in some parts of India, is one of the best of the indigenous astringents for the purposes of the tanner, who can obtain a large quantity

of the bark at a low rate, and with it a soft and durable leather can be made.

The *Cathocarpus*, or *Cassia fistula*, is an equally common shrub, but is not in general repute with the curriers, the proportion of astringent extract being smaller, and it is said to thicken the leather. It would, however, be well suited to the tanning of hides and belts. Other species of cassia may be found suitable to the purposes of the tanner, but the two last named are the most astringent and most abundant.

The bark of the *Casuarina equisetifolia* resembles larch, and contains tannin. A brown dye has also lately been extracted from it.

**BABOOL BARK**, from the *Acacia arabica*, is extensively used in India as a tanning material. It makes a good leather, under proper management; but in native hands the leather is porous, brittle, and of a bad colour. The tree is found throughout almost every district of India and Africa, and in parts of Australia. It is useful for its gum and its timber. Its seeds are also a favourite food for sheep, and being of rapid growth, and requiring no water, it flourishes in the most arid plains. In India the bark is considered a powerful tonic. The various species of acacia are known in Australia and Van Diemen's Land as MIMOSA or wattle bark.

*Acacia decurrens* is a very powerful tanning agent, and the bark of *A. dealbata* also furnishes a very large per-centage of tannin. Professor Brandt found that, compared with young English oak bark, mimosa bark contained in the proportion of 57 to 39 of tannin.

Mimosa bark has recently come forward in very limited supplies from Australia, which, in the present circumstances of the colony, is not to be wondered at, although it could be obtained in any quantity. In 1854 we received but 18 tons—against 258 tons in 1853; 1,720 in 1852; and 1,480 tons in 1851. Last year there was a reaction, the imports in London having reached 616 tons, which sent down the price 50s. per ton.

*Logwood Bark* is astringent in a considerable degree. The American bark quercitron, imported for dyers' use, contains but as 3 to 5 of the tannin principle compared with English oak bark.

*Parkia biglobosa*, a large tree, a native of Africa, has an astringent bark, from which a watery extract has been prepared, the value of which for tanning purposes has yet to be determined.

Imports are occasionally made of **CORK-TREE BARK**, for tanning purposes, from Rabat and Lamcha, ports of Fez, in Barbary; and it has fetched from £6 to £7 10s. per ton. That from Leghorn is not considered so good, being less astringent than oak-bark. The inner bark of the cork-tree has long been used by the tanners of Marseilles, being imported from Corsica and other parts of the Mediterranean. A cargo of cork-tree bark was recently imported from Sardinia, which excited some attention; for although the price asked was nearly double that for ordinary oak bark, yet as it was nearly all tan, and free from waste, it might not be found, upon use, to be dearer than English bark.

Cork-bark for tanning is chiefly used in Ireland, and

cargoes go direct from the Mediterranean to Cork. The outer bark is often stripped, to improve the texture of the commercial cork, and this bark would prove a useful tanning material.

The French province of Algeria abounds in barks suited for the purposes of the tanner—oaks, pines, chestnuts, willows, elms, alders, pomegranate, &c., many of which were shown at the Paris Universal Exhibition; but as the export is prohibited to any other quarter than France, it is useless touching upon them.

### CHAP. III.

#### TANNING MATERIALS USED IN THE COLONIES, &c.

In Ceylon the tanning substances in use are the bark of the *Cassia fistula*, which is used generally throughout India for tanning, the bark of an undescribed tree imported at Colombo from Trincomalie, the bark of *Cassia auriculata*, the milky juice of *Calotropis gigantea*, and the fruit of *Terminalia chebula* (Myrabolams), which are very rich in tannin.

A variety of kino, indigenous to Ceylon, which exudes during hot weather from natural fissures and wounds in the bark of the *Butea frondosa*, is known in commerce by the name of Bengal kino, or Gum butea, being closely allied to the kino of *Pterocarpus* in its chemical properties. It yields about 74 per cent. of tannin. Although used by the natives, it is considered objectionable by the European tanners, because it imparts a red colour to the leather.

In Demerara the courida bark (*Avicenna nitida*, Linn.), the bark of the hog plum tree (*Spondius lutea*, Linn.), and the bark of the red mora (*Mora excelsa*, Benth.), which are very plentiful, are used as tanning substances. The following barks are also employed—the crabwood (*Carapa guianensis*, Aubl.), the mangrove, the kakaralli, the white silver balli, the wallabi (*Eperna falcata*, Aubl.), and several others, which, from the local names only being given, it is impossible to identify.

The bark of the sea-side grape is excessively astringent, and a decoction from the leaves, wood, and bark, by evaporation, forms Jamaica kino. The wild cashew bark, called locally ubidi (*Anacardium occidentale*), is also successfully used for tanning.

Tanning substances abound in Jamaica, and during a residence of several years there, I found much tannin in the mahoe bark, the black olive, the button tree, the white bully tree, the red and black mangrove, the dogwood, and the divi-divi. The seeds of the avocado pear yield a large quantity of tannin. Mr. Nethersole of Kingston, Jamaica, sent some very fine specimens of leather to the Paris Exhibition, tanned solely, or partly with mangrove, divi-divi, and American oak-bark.

New Zealand is rich in tanning barks as well as in dyes. The principal used for tanning leather in the colony are—the Tanahaka (*Phylloidalus trichomanoides*, Don), the Hinau (*Dicora dentata*, Forster), the Pohutu

kawa (*Metrosideros tomentosa*, Richard), the Towai (*Wienmannia racemosa*, Decand.), and the Rimu or red pine (*Dacrydium cupressinum*, Solander). Their comparative values may be judged by the following proportions of extractive matter and tannin in one pound:—

Towai . . . . .	104 grains.
Rimu . . . . .	85 „
Tanahaka . . . . .	63 „
Pohutu kawa . . . . .	60 „

*Sumach.*—The ground wood and leaves are used for tanning in Spain and Portugal, Russia, the Danubian Provinces, and Turkey. We receive supplies from Sicily, Trieste, and the ports of the Ottoman empire, the imports being 12,000 to 13,000 tons per annum.

*Divi-Divi.*—Twelve or fourteen years ago, attention was prominently drawn to the curved or wrinkled pods of the *Cesalpinia coriaria*, which was then termed American sumach. These have since been imported to some extent for tanners' use, under the commercial name of divi-divi. It compares as follows with other tanning substances, according to the analysis of Mr. Samuel Rootsey, of Bristol:—

	Per centage	
	of Soluble or Extractive Matter.	of Tannin.
Divi-divi . . . . .	76.25	51.16
Galls . . . . .	59.16	35.45
Sumach . . . . .	40.00	0.95
Kino . . . . .	40.41	—
Catechu . . . . .	67.08	—
British oak-bark . . . . .	30.00	13.41

My friend, Dr. Hamilton, of Plymouth, also found by analysis that it contained fully 50 per cent. of tannin, whilst nutgalls only yielded 30 to 40 per cent.

According to practical trials, one pound of divi-divi appears to be equal to 4lbs. of oak bark, and it tans the leather in two-thirds the time.

The average produce of a full-grown tree being 80 to 100 pounds of pods, and these containing 50 per cent. of tannin, it appears to be superior to any other material for the tannery. Leather tanned throughout with it closely resembles that prepared with oak bark. The main question for consideration is that of price and supply. Divi-divi fetches about the same price per ton as oak bark does per load of 2½ tons. The average imports lately have been about 3,000 tons per annum. It comes to us chiefly from New Granada and Venezuela, although some reaches us indirectly through other channels. In Jamaica, divi-divi has long been employed most successfully by the currier. It would yield there a far better profit to the planter than any other staple in the colony. The late Doctors Arnold and Bancroft, of Kingston, Jamaica, wrote on the qualities of this tree, and urged its cultivation as a most important and profitable acquisition to the staple products of the island. During a residence of several years there, and subsequently, I have endeavoured to draw attention to the product. Being the most concentrated in tannin of any vegetable, the extended cultivation of the plant, at the present price and demand for it in the tannery, would be found highly lucrative to small landholders in Jamaica.

A few hundred tons of the seed-pods and bark of the *Prosopis pallida* were imported into Liverpool from

Chili in 1849, as a substitute for divi-divi. The pods bear the local name of Algaroba, although a different species of tree to the carob of the south of Europe (*Ceratonia siliqua*). The pods of the *Prosopis* might be useful for tanners, if brought in cheap; but, in proportion to the tannin contained, they are one-fifth less valuable than oak-bark.

The Myrobolams of commerce (sometimes locally called gall-nuts) are the dried fruit of several species of *Terminalia* (as *T. chebula*, *belerica*, and *Citrina*). They are of a dingy yellow, oval, and about the size of an olive. Although commonly used for tanning purposes in India from time immemorial, it is only within the last eight or ten years that they have come extensively into use in this country. The imports fluctuate, and as many as 2,000 tons have been received in some years. In 1853 a sudden demand arose for them to ship from Madras, and large profits were made by the persons who collected them in the jungles; as much as 700 tons being exported during the season from that quarter alone, being four times the quantity shipped in the two previous years. The price ranges from £8 to £12 the ton.

In the early part of the century concentrated extracts of tan began to be tried, but were slow to come into use; not only from the limited supply, but from a prejudice which existed against all novel innovations. The Society of Arts stimulated inquiry in this field of investigation by liberal premiums, and in 1804 Dr. James Howison received the Society's gold medal for his preparation of tan from the bark of the mangrove in the East Indies. He also made a similar extract from myrobolams, which was found to be useful both for tanning and dyeing. A few years after, Sir Joseph Banks drew attention to terra japonica, as containing 7 or 8 times as much of the tannin principle as any of the existing barks. In 1815 extracts of barks first began to be imported commercially—78 cwt. being received in that year. In 1824, Messrs. Pitehey and Wood were awarded the gold Ceres medal of the Society of Arts, for 15 hogsheads of extract of mimosa bark, shipped to England. It was readily purchased by the tanners at £50 per ton. The extract was of the consistency of tar—one ton of bark furnishing four cwt. of extract.

Two astringent extracts come into commerce now to some extent, although not used solely by the tanner. These are GAMBIE and CUTCH, often mis-named Terra japonica, although the misnomer is usually given to the former. These extracts form a good leather of a red or orange colour, and are said to hasten the process, although at the expense of the leather; for Dr. Ure well observes, "that the saturated infusions of astringent barks contain much less extractive matter, in proportion to their tannin, than the weak infusions; and when skin is quickly tanned, common experience shows that it produces leather less durable than leather slowly formed."

The watery extract, Kut or Cutch, from *Acacia catechu*, is largely manufactured in the East, by boiling the heart of the wood for a few hours, when it assumes the consistency of tar—hardening when cool. It is

chiefly imported from Bombay, the Burmese territories, and a large province on the Malabar coast, called the "Concan." The Pegu cutch is considered the best; the disturbances in Burmah, however, lessened the supply lately from that quarter, and the price is now nearly treble what it was some years ago, being about £25 to £27 per ton. In 1853 it stood as high as £55 to £56 per ton. The imports in 1855 reached nearly 3000 tons.

The Bombay cutch is of a uniform appearance and dark red colour. That of the Concan and other parts of India, of a more chocolate tint, and marked inside with red streaks. It is not unlike aloes, except that it is of a darker hue. The analysis of Sir Humphrey Davy gave the following per-centage:—

	Bombay.	Concan.
Tannin .....	54.5	48.5
Extractive .....	34.0	36.5
Mucilage .....	6.5	8.0
Insoluble matter .....	5.0	7.0

An astringent extract is also made from the nuts of the areca palm, of a better quality, called "Coony;" but this does not come into commerce. Catechu has been found a good substitute for madder in calico printing.

GAMBIE, or terra japonica, is the inspissated extract of the juice from the leaves and branches of the *Nauclea Gambir* of Hunter, the *Unicaria Gambir* of Roxburgh. We derive all our supplies from Singapore, where the production is largely carried on by the Chinese. Owing to a fall in the price, which rendered the cultivation unprofitable, the imports from Singapore declined a few years ago, from about 9,000 tons in 1849 to half that quantity in 1852; but an advance in price since has again brought in large imports, the quantity received last year being nearly 5000 tons.

Small quantities of other astringent extracts called "Kinos" are occasionally received. Australian kino is obtained from the iron bark tree, a species of *Eucalyptus*, and East Indian kino, from several varieties of *Pterocarpus*.

The other commercial purposes of bark are varied, but not at present of very great importance. With many aboriginal tribes, stripping the bark for canoes was an easy mode of obtaining a navigable vessel; and even in the present day the birch bark canoes of the British American provinces, and the "wood-skins" of British Guiana, form useful boats, from their lightness; which enables them to be easily carried over the *portages* which interrupt river navigation. The various uses of cork bark are well known, and the import considerable. Several barks are useful for their fibres, for cordage and for mats. The cascarilla, the cassia, the canella alba, and the cinnamon, furnish well-known spices. The medicinal and febrifugal barks now come largely into commerce: the cinchona for quinine, the green-heart for beberine, the willow for salicine, the bitter wood (*quassia amara*), &c. Many barks are very valuable for the colouring substances they yield to the dyer, such as the quercitron; and a large field for experimental research still remains open in this wide branch of investigation.

The exhausted bark from tan-pits comes also into use for manure, although a substance too much neglected, since it would be found beneficial either as a top-

dressing for grass lands or as a compost with animal and farm-yard manure. Tan bark, to be of value as a manure, requires decomposition, when it has the same effect as any other vegetable matter. Like fine chips from the wood-yard, its influence at first can be only mechanical. But as decay commences, its value as a manure is felt; and as the decomposition is gradual, its beneficial effects will remain for years. There is usually more or less acid in the bark or wood of trees; and the addition of lime would doubtless be beneficial, though the quantity to be used, if thoroughly mixed with the bark, need not be great. Ashes would answer as well as lime, or indeed any other alkaline substance. The best way of using the lime would be to make a compost, or place the bark and lime in layers, which, when stirred, would effectually incorporate both. As a litter for the hog-pen, cattle-yard, or stables, bark would be valuable; acting as an absorbent of fluids and salts that might otherwise be lost, and having its decomposition hastened, and its properties corrected at the same time. On the Continent tan-cakes are used to a considerable extent as fuel, after the manner of peat.

The following are the various export duties charged on barks and tanning substances in the countries named:

- Algeria—tanner's bark prohibited, except to France.
- Corsica—export of oak bark prohibited.
- Denmark—duty of 9d. the centner.
- Belgium—11½d. the ton; but if the barks are powdered, 4s. 9d. the ton.
- Bremen—free, except powdered.
- Holland—merely nominal duty.
- Austria—2 3-5d. the centner of 123½lbs. avoirdupois.
- France—barks ½d., and acorn cups 1¼d. the 100 kilogrammes, equal to 220lbs.
- Greece—6 per cent. ad valorem.
- Hanover—4½d. the centner.
- Norway—6¾d. per 320lb.
- Portugal—cork bark 5s. 5d. the 100lbs.
- Prussia—3d. the pound.
- Russia—prohibited.
- Sardinia—3 l-5d. the 100 kilogrammes.
- Sweden—free.
- Switzerland—barks 9½d. the centner, tan of oak 7 3-5d. do.
- Turkey—valonia 5d. the quintal and 9 per cent. ad valorem.
- Tuscany—1d. for ten cantari, equal to 750lbs. avoirdupois.
- Zollverein—3d. the pound.

P. L. S.

5, Barge Yard, City, Feb. 20th, 1856.

## ON PERUVIAN GUANO:

ITS HISTORY, COMPOSITION, AND FERTILIZING QUALITIES; WITH THE BEST MODE OF ITS APPLICATION TO THE SOIL.

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In reviewing the history and condition of agriculture for the last twenty years, it is impossible to avoid being struck by the remarkable progress, scientific and practical, which the latter half of that period has witnessed.

The genius of our mechanics has been shown by the invention of a wonderful variety of new and interesting instruments adapted for an improved culture of the soil. The steam-engine also, hitherto almost exclusively used by the manufacturer, now lends its powerful aid to the farmer. The art of the drainer has brought into successful cultivation thousands of acres of wet and almost worthless soil; and a vast breadth of land, previously only partially drained, has been permanently and effectually ameliorated.

But perhaps the most remarkable feature of the whole is, the introduction of the so-called "Artificial Manures," and the vast advantage derived by agriculture therefrom.

Previous to 1840, with the exception of local manufacturing refuse, the only artificial manures were bones, salt, and gypsum.

The introduction of bones, many years back, was of great importance to the farmer, and enabled him to grow, with comparative ease, that mainstay of the four-course shift—the turnip.

To the impoverished soils of Cheshire, and other cheese-exporting counties, bones were also an immense boon, and were duly appreciated.

The publication of the first edition of "Liebig's Agricultural Chemistry," in 1840, forms an important era in agriculture. Since that period, the chemist has more generally

directed his experiments to the investigation of the true principles of fertility, the merchant has sought for foreign sources of valuable manure, and the farmer has reaped the benefits of the labours of them both.

That an increase of solubility in bones and other phosphates would be attended by an increased productive power in the crop, was the idea of Liebig. This great chemist, in 1840, recommended, in lieu of bones, the use of the substance long well-known to chemists as the acid or superphosphate of lime, which is producible from bones and other phosphates by the action of sulphuric acid. Practice has since shown the great advantage of Liebig's suggestion.

The introduction of the dung of birds and other animals, under the name of "Guano," and the discovery, in Suffolk and other counties, of immense quantities of fossil bones and other animal remains, known as "Coprolites," have followed quickly upon each other; and there can be no doubt that, by their means, an entire revolution will be made in the practice of agriculture.

The concentrated character of most of the genuine artificial manures particularly adapts them for use in the mountainous and hilly districts of our country, where the carriage of ordinary manure is both difficult and expensive. One waggon may now easily carry enough manure for fifteen or twenty acres of turnips. Formerly, fifteen or twenty loads were required for a single acre.

Of all the artificial manures, Peruvian Guano is perhaps not only the most concentrated, but is, from its composition, adapted to the greatest variety of crops. The chief mineral

constituents of plants—lime, magnesia, potash, soda, chlorine, sulphuric acid, and phosphoric acid (the latter the most important)—are found in Guano. Nitrogen, the most valuable constituent of manures, is found in Peruvian Guano in great abundance, and in a condition adapted for vegetation.

The use of this manure in Peru is of very ancient date; and for its preservation, and that of the birds by which it was deposited, the most stringent precautions were made use of by the native Incas and their Spanish successors. At one period the punishment of death was inflicted upon any one disturbing the birds in the breeding season.

The Chincha Islands, which contain the great Guano deposits, are situated in the Pacific Ocean, off the coast of Peru, at the distance of about twelve miles.

They lie between lat. 13 deg. and 14 deg. S.—a zone within which no rain falls, where the air is dry, and the sun shines with vehement power. The waters of the surrounding ocean contain innumerable shoals of fish; and myriads of birds, after daily satisfying their voracious appetites upon the finny tenants of the deep, have for ages made the islands their nightly abode, and the receptacle of their fecal offerings. From the arid nature of the climate, the excess of humidity has speedily evaporated from their ordure, decomposition has been arrested; and, by gradual accumulation from time immemorial, these extraordinary deposits have attained the depth, in many parts, of one hundred feet.

The Guano, as found on the islands, is subject to slight variations in composition. Towards the S.W., the deposits are more exposed to the action of the spray of the sea, brought by the prevailing winds. Some of these Guanos have lost by this means a large amount of ammonia, and are not brought to this country: in others, the deterioration is trifling; and many are simply discoloured, without having suffered any other change, and are equal in value to paler samples.\*

That the excrementitious matter of birds, fed upon an unlimited supply of animal food, would of itself have powerful fertilizing properties, might almost have been taken for granted, without either calling for the opinion of the chemist, or the experimental proofs of the farmer. But both chemist and farmer alike bear testimony to the high position assumed by Guano in the catalogue of manures—the former, by comparing its composition with that of other known fertilizing bodies; the latter, by actual trial in the field.

It has long been a growing opinion with chemists, that ammonia and phosphate of lime are the two most important and valuable elements of plants, and, consequently, of any manure which is to aid in the development of vegetable life. This opinion has been founded, in the first place, upon numerous analyses of various manures; and, secondly, upon practical experiment.

It has been proved, for example, that, in two samples of farm-yard dung, the one which gives the best crop in practice contains, on analysis, the largest amount of ammonia and bone-earth. It is a well-known fact that the seeds of a vegetable contain more nitrogen (ammonia) and phosphate of lime than any other portion of the plant; and it is also well known that the dung of animals fed upon seeds is more valuable than that of others fed only upon hay, straw, or roots. Hence the practice of feeding animals upon oilcake (crushed linseed), to obtain a better quality of dung. That ammonia and bone-dust are the most valuable of manuring principles, may also be inferred from the fact that the artificial manures most used by the farmer are those which con-

\* Messrs. Ant. Gibba and Sons, as agents in this country of the Peruvian Government, are the sole channel through which the Peruvian Guano finds its way into commerce.

tain the greatest quantities of these elements, and that these manures are precisely those which fetch the highest price in the market.

A comparison, therefore, of the composition of various excrements of animals, and of farm-yard dung, with that of an average sample of guano, will afford a very fair means of ascertaining their relative fertilizing powers.

The following table contains analyses of various manures, made by Boussingault and other well-known chemists, and also the analysis of an ordinary sample of Peruvian guano.

ANALYSES OF FARM-YARD DUNG, &c.

	Farm-yard Dung.	Horse Dung.	Cow Dung.	Pig Dung.	Mixed liquid and solid Excrement of Man*.	Peruvian Guano.*
Moisture.....	79.30	76.17	86.44	82.00	94.24	18.35
Organic matter.....	14.03	19.70	11.20	14.29	4.72	51.25
Inorganic matter....	6.67	4.13	2.36	3.71	1.04	30.40
	100.00	100.00	100.00	100.00	100.00	100.00
Nitrogen (equal to) ..	0.41	0.65	0.36	0.61	0.94	13.88
Ammonia .....	0.49	0.78	0.43	0.74	1.14	16.85

\* These analyses were made in the laboratories of the College.

Boussingault, Payen, and many others of our first practical agricultural chemists, have come to the conclusion that the value of different manures varies nearly in proportion to the amount of nitrogen they contain. There may be cases to which this rule is not exactly applicable; but in many natural manures, an increase of nitrogen is accompanied by an increase in the phosphate of lime, and every other valuable manuring element. In the above table, for instance, the 13.88 of nitrogen in the guano is accompanied by 30.40 parts of inorganic matter, of which 23.60 parts (or more than two-thirds) are phosphate of lime.

If we take the per-centage of nitrogen, then, as a correct indication of manuring value, we shall find that one ton of ordinary Peruvian guano is equal to—

- 33½ tons of farm-yard dung,
- 21 tons of horse dung,
- 38½ tons of cow dung,
- 22½ tons of pig dung, and
- 14½ tons of mixed human excrements.

Let those who farm in hilly countries, and other places where carriage is expensive, ponder well the above facts.

Though a good farmer will produce as much manure as he conveniently can, yet even farm-yard dung may be bought too dear; and it is certain that on numbers of farms the cartage of dung is so expensive an item of management, that the introduction of guano, for those parts at the greatest distance from the homestead, would be productive of the same fertility, at a considerable saving of expense.

A question now arises whether the fertilizing properties of guano will be expended in the first year of its application, or whether its operations will be discernible in after-periods. If we examine the chemical constitution of guano, we shall find it to occupy the medium position between those manures, which, being altogether soluble, are somewhat transient in their effects; and that other class, which, like bones, are only slowly decomposed in the land, and yield their manuring principles with a certain degree of difficulty. Guano, in fact, possesses every advantage of both. From analyses which have been made, it is found that about one-half of the fertilizing properties of guano are soluble in water, and therefore adapted for the instant nourishment of plants. The other half continues long in the soil, eliminating nourishment

for vegetables by slow decomposition. The soluble phosphoric acid, which it has been found necessary to produce artificially from bones by sulphuric acid, exists naturally in guano. If a guano contain in the whole, say 12 per cent. of phosphoric acid, and 17 per cent. of ammonia, we shall find that water will dissolve about 6 per cent. of phosphoric acid, equal to about 13 per cent. of phosphate of lime in a soluble state, and at least 8 per cent. of the ammonia. Guano is thus adapted, by its insoluble matter, for the lighter soils, where infiltration might too rapidly carry away the soluble matter; and by its soluble constituents it is fitted for heavier lands, where decomposition being slower, a supply of soluble manure is required at once.

The fact of so considerable a portion of soluble phosphates existing in guano is of great importance, as we have in a natural form that which we are obliged to produce artificially in other manures, by the action of acids upon bones and other insoluble phosphates.

In fact, good guano partakes of the nature of superphosphate of lime, as it contains both soluble and insoluble phosphates. These together generally amount to the average quantity found in commercial superphosphate of lime.

At the present price of Peruvian guano, it is more than questionable whether the ordinary plan of increasing the available manure on a farm by the importation of oilcake and the feeding of stock is at all economical. If the oilcake owes its fertilising properties to the nitrogen and phosphate of lime it contains, it is certain, from the analysis of various chemists, that Peruvian guano is a much cheaper source of these substances. In a lecture delivered by the author before the farmers of Dorchester, this subject was alluded to as follows:—

“It may here be necessary to notice another question of great importance, viz.: Is the use of artificial food (such as oilcake) for stock the *cheapest* mode of introducing bone-earth and ammonia into the land? Many farmers are content if their fat stock produce as much money as will pay for the oilcake used, together with the price of the lean animals bought; thus sinking altogether the turnips, mangold, and hay, likewise consumed by the stock. It appears to be clear that, unless the oilcake affords a profit by the beef or mutton, a more expensive system of *manuring* could not well be pursued. The following table, comparing the manuring values of oil and rape-cake with guano, may be of some service in determining the practice of the intelligent farmer:—

*Table of the Manuring Values of Oilcake and Rapecake, compared with Peruvian Guano, from Analyses made in the Laboratory of the Agricultural and Chemical College, Kennington.*

	Oilcake from Liverpool.	Oilcake from London.	Oilcake from Marseilles.	Rapecake.	Peruvian Guano.
	lbs.	lbs.	lbs.	lbs.	lbs.
Moisture .....	263.8	300.7	274.4	195.8	268.8
Organic matter .....	1739.6	1699.3	1718.3	1654.2	892.2
Nitrogen .....	109.1	118.5	118.2	115.4	295.0
Ammonia .....	130.6	143.8	143.4	140.0	358.4
Inorganic matter.....	122.5	121.5	129.1	274.6	784.0
Containing—					
Phosphoric acid .....	47.1	30.9	39.4	43.7	224.0
Potash .....	29.1	19.1	23.7	27.1	67.2
	2240.0	2240.0	2240.0	2240.0	2240.0

“From the foregoing table, it appears that one ton, or 2,240 lbs. of Peruvian guano, containing 16 per cent. of ammonia, would introduce into the farm six times the phosphate of lime, two-and-a-quarter times the potash, and more than two-and-a-half times the ammonia that would be furnished by one ton of the best oil or rape-cake. To pass oilcake through the bodies of animals, without some attendant benefit, is both expensive and wasteful; and unless you can find your profit in the increase of the beef and mutton, it is an improper expenditure of money.”

These observations are amply supported by the opinion of the members of one of the most intelligent farmers' clubs in England. The Botley Farmers' Club have *unanimously* resolved, “That where there is not sufficient dung for the wheat crop, it is more profitable to apply concentrated manures than to purchase dung; and that an equal amount of money expended in the purchase of concentrated manures will raise more wheat than the same amount expended in the purchase of oilcake or corn, and converted into dung by feeding cattle.” And the Rev. L. Vernon Harcourt, speaking of this decision of the club, says, “All my experiments tend to corroborate the view taken by the Botley Club on this subject.”

Leaving these facts and opinions to the consideration of those farmers who seek to combine good farming with economy of manuring, we shall now offer some suggestions as to the best mode, and the proper time, of applying guano to different varieties of crops.

#### ON THE MODE OF APPLYING GUANO TO THE SOIL.

It requires but a short consideration of this subject to perceive that before any useful practical rules can be obtained for the application of guano, we must carefully compare the properties of the soil with those of the manure to be applied. Reference must also be made to the different conditions of the atmosphere at different seasons, particularly as respects moisture, dew, or rain. The nature of the crop will also materially influence the quantity of guano to be used, and the time of its application.

Practical men have long been aware of the great difference existing in soils, as regards their retentive power for manure. On certain lands, the result of the application of a given quantity of farm-yard dung may be seen for a number of years. On others, the effect of the same quantity ceases to be visible in a very much shorter period. The former class includes the loams, clays, and in general the heavier descriptions of land; the latter comprises the sands, gravels, chalks, and other lighter qualities, not inaptly termed by the farmer “*hungry soils*.”

These varieties of soil differ both in chemical composition and mechanical properties. The heavier in general contain more alumina and oxide of iron than the lighter ones. They are also less porous, even when drained; their particles are finer, and their absorptive power is greater. The want of great porosity prevents the too rapid action of the atmosphere on the

manures they may contain, and their absorptive power enables them to retain, to a considerable extent, the liquid and volatile elements of the manure, and at the same time to obtain a certain quantity at the expense of the atmosphere.

The case is, however, different with gravels, sands, and the lighter soils; upon which, in consequence of their greater porosity, the atmosphere acts freely, and to a considerable depth.

When manure is applied to them it is rapidly decomposed, and unless there be a growing crop ready to absorb the fertilizing particles as they become soluble, they will be washed away; or, if they become volatile, will, to some extent, be absorbed by the atmosphere. These soils, therefore, require different treatment. We may apply to heavier lands a strong dressing of manure at once, and little loss will ensue, for some time at least, from any other source than the action of the growing crops. On the lighter soils, we must use, even of farm-yard dung, a less amount at a time, but it must be applied more frequently. We thus see that light lands have the advantage of more rapidly decomposing the dung, and consequently of preparing it more quickly for the use of the plant. For this reason, among others, light soils are preferred by the market gardeners, who, by their repeated manurings and repeated croppings, practically show how these soils may be most efficiently managed.

It may not be uninteresting here to introduce some experiments made at Kennington, with the view of obtaining a further insight into the properties of guano, and the action of light soils upon it.

EXPERIMENT I.—A small quantity of Peruvian guano was placed in a saucer, and the whole covered with a bell glass containing a slip of red litmus paper, moistened with distilled water. In the course of an hour or two the slip became distinctly blue.\* This proves the escape of a small amount of ammonia from the guano simply by exposure to air.

EXPERIMENT II.—A quantity of guano was mixed with four or five times its weight of ordinary light garden mould, and slightly moistened. It was covered, as before, with a bell glass. The strip of litmus paper became blue in two or three hours. This experiment proves that a small amount of light soil mixed with guano will not prevent the escape of ammonia.

EXPERIMENT III.—Two grains of guano were intimately mixed with two thousand grains of light soil, and covered with a bell glass as before. The mixture was slightly damp, but not wet. After the lapse of twenty-four hours, the litmus was very faintly tinged with blue. A little pure distilled water was now added to the mixture. After the lapse of another day, the tinge became much deeper. From this it is apparent that even a large excess of soil will not prevent the escape of a certain amount of ammonia. From another experiment, it was evident that even the soil itself exhaled a minute trace of ammonia.

EXPERIMENTS IV., V., AND VI.—These were made upon a piece of meadow attached to the College at Kennington. Two portions of land about two months before had been dressed with guano, at the rate of two and a-half cwt. and five cwt. per acre, respectively. Another portion received no dressing at all. A bell glass, with moistened red litmus, was deposited carefully, mouth downwards, upon each of the three portions of meadow. After the lapse of a couple of days, it was found that the colour of the litmus had perceptibly changed in each of the bell glasses, but most on the guanoed portions of the land. At the time of making these experiments the wind was

N.E., and the temperature very low. The grass exhibited little or no signs of growth. We infer from these experiments that there is generally a slight escape of ammonia into the air from grass land, *manured* or *unmanured*, in those seasons of the year when there is no great activity in vegetable life.\*

EXPERIMENT VII.—A portion of the mixture of soil and guano in the third experiment was placed in a filter paper, and a quantity of pure distilled water was added. The liquid which filtered through was neutral to litmus paper. On being tested, however, in the usual way with hydrate of lime, every precaution being taken, the litmus paper was readily turned blue. From this experiment it is apparent that from a mixture of light soil and guano, in the proportion of 1,000 to 1, water is able to dissolve and remove a portion of the ammonia of the guano.

The difference of soils is not the only consideration; the climate of different localities in the British Islands is exceedingly various. In Ireland, in Scotland, and in the western districts of England, from Cornwall to Cumberland, the quantity of rain which falls in the year is probably nearly double that which descends in Suffolk, Norfolk, and on the east coast generally. The air also is constantly more humid, and for this reason those parts of our Isles are well adapted for the growth of root and green crops, and are not so well adapted for wheat. Guano may, consequently, at any time of the year, be there used in larger quantities, without the same danger of burning the crop which would occur in our Eastern Counties. In these latter districts, the guano should never be applied as a top-dressing in dry weather, but during a wet or showery day. Where wheat is grown in humid climates, it is liable to lodge before harvest; and therefore guano, if used, should be applied with caution to this crop. Two or three cwt. per acre, mixed with four cwt. of salt, is quite sufficient, one-half at sowing, and the other in the spring. From these and various other ascertained facts, we may deduce the following general rules for regulating the application of guano:—

GENERAL RULES FOR USING GUANO.—1st. That guano is best applied in damp or showery weather. 2nd. That guano should not generally be put on grass land in the spring later than April. 3rd. That when guano is applied to arable land, it should immediately be mixed with the soil, either by harrowing or otherwise. 4th. That when wheat is sown very early in the autumn, a less than usual amount of guano must at that time be applied, and the rest in the spring. The wheat, otherwise, might become too luxuriant, and be injured by subsequent frosts. 5th. That guano, and artificial manures in general, should be put on the land only in quantities sufficient for the particular crop intended to be grown, and not with the intention of assisting the succeeding one. Each crop should be separately manured. 6th. That guano, before application, should be mixed with at least from five to six times its weight of ashes, charcoal, salt, or fine soil. 7th. That guano should on no account be allowed to come in direct contact with the seed.

The preceding rules, if duly attended to, will prevent the recurrence of most of those vexatious losses of time and capital, which many, even of our best farmers, have experienced from want of a due acquaintance with the properties of concentrated manures.

In order still further to guard against disappointment arising from the misapplication of guano, we shall now describe the best practical modes of its application to the principal crops which are grown in this country.

\* Red litmus paper is rendered blue by the action of ammonia and other alkalis. The red colour is restored by acids.

\* These experiments require to be repeated on various soils, to enable us to draw from them more general truths.

## MODE OF APPLYING GUANO TO VARIOUS CROPS.

PREPARATION OF GUANO FOR SOWING OR DRILLING.—For drilling, it must first be mixed with four to six times its weight of the ashes\* of wood, turf, or coal, or with the same quantity of well-sifted mould or salt. Charcoal, in powder, either from peat or wood, is also a most excellent article to be mixed with the guano, in the proportions indicated. Its great porosity allows it to retain the volatile ammonia, and in dry weather to absorb considerable moisture from the air. This is of material benefit to plants in their early growth. Before mixing, the guano must be finely pulverised, which may easily be done with a common garden roller, upon the floor of a barn or shed, or even by blows from a common shovel. A layer of the ashes, &c. is then spread evenly upon the floor, and a quantity of the fine guano sifted over it. This is followed by another layer of mould or ashes, and another of guano, until the requisite quantity of both is used. The whole must then be repeatedly turned with the shovel until thoroughly mixed. If time will permit, it is now preferable to leave the mixture for eight or ten days. It must then be again sifted, when it will be ready for use. In using guano with the drill, care must be taken that the mixture falls below the seed, and that an inch or so of soil intervenes between them, otherwise the strength of the guano will kill the seed. Garrett's, Hornsby's, and other modern drills, are well adapted for depositing guano and other concentrated manures. The above mixture is generally sufficiently damp to fall exactly where the hand directs it. When this is not the case, a small quantity of water must be added; the field must be sown with the mixture in the ordinary manner, and the manure harrowed in; the seed is then drilled as usual. Perhaps the preferable mode would be to broadcast two-thirds of the guano applied, and to drill one-third with the seed. The young plants would then have enough manure under the drills to serve the early stages of growth, while the guano sown broadcast would supply the wants of the plants in a more mature state, when the roots would have spread in every direction in the soil.

## WHEAT, BARLEY, OATS, AND OTHER CEREALS.

—The researches of modern chemistry have in no respect proved of greater benefit to practical agriculture than in the analysis and estimation of the components of different manures, and in the careful examination of the effects of these components on different crops when applied either alone or combined. This is, in fact, the only philosophical mode of arriving at a true knowledge of the manuring substances best adapted for the development of various forms of vegetable life. From the analysis of thousands of samples of manure in the laboratories of the College, and from a knowledge of the effects produced by these manures on a variety of crops, the conclusion has been irresistible that NITROGEN is the cheapest substance to apply to cereals. The same conclusion has been arrived at by numerous other chemists. The results also of the experience of farmers in all parts of the country for many years is, that nitrogen, in any of its ordinary combinations, is the matter of all others best adapted for the growth of wheat and other cereals, and which for these crops will yield the greatest percentage of profit. Not that corn requires no phosphates or other materials for its development, but that the latter are generally supplied to the soil for other crops in the ordinary

\* Some varieties of wood ashes, which contain a considerable amount of free alkali, are not suitable for mixing with guano, as they liberate the ammonia. This may easily be shown by mixing a shovel-full of the ashes with the same quantity of guano. If a strong ammoniacal odour be immediately perceived, the ashes are not fit to be mixed with the guano. The mode of preparation here described should be used, with slight variations, according to circumstances, for all varieties of crops.—J. C. N.

course of rotation, or, as in the case of guano, are found in the manure itself. The market value of nitrogen of course varies with the source of its supply, and with the rise and fall in price of its various combinations; but at the present comparative price of guano, this substance appears to be nearly, if not altogether, the cheapest source of nitrogen, at least in any considerable quantity. There can be no doubt of the vastly increased production of corn, and consequently of profit to the farmer, which would accrue if guano were more extensively used. Our most intelligent agriculturists, among whom we may mention Mr. Caird and Mr. Iaves, agree that the application of two cwt. per acre will give an increase of between eight and nine bushels of grain, besides one-fourth more straw than usual. Mr. Caird† has proved that without any increase of rent or taxes, an expenditure of twenty shillings per acre produces a net profit of thirty-two shillings and sixpence. If these facts were more generally known, it is impossible to believe that farmers would not at once avail themselves of the opportunity of making a profit of more than one hundred and fifty per cent. upon the annual additional outlay. Many farmers prefer using the whole of their guano for wheat in the autumn. A portion, at all events, should be sown *broadcast* at that period. This is more especially needful if no dressing of farm-yard dung be used. If guano be used for wheat in lieu of farm-yard dung, a greater quantity, often the whole, ought to be applied in the autumn. Care, however, must be taken not to stimulate the plant too much, otherwise it will be liable to suffer injury from frost. One cwt. or two cwt. per acre on light lands can be applied broadcast, and harrowed in during autumn, either before or after the drilling of the wheat. In the spring a further application of not more than one cwt. or two cwt. may be made, harrowed in with light harrows. If the wheat be drilled sufficiently apart to allow of horse-hoeing it will be found advantageous. Should wheat, manured with dung as usual, look unkindly in the spring, it will be greatly benefited by a dressing per acre of two cwt. of guano and four cwt. of salt. Salt has great effect in strengthening the straw of wheat and other cereals; and where any of these crops are liable to lodge, or whenever guano is used, four cwt. or five cwt. of salt should always be sown per acre. For barley and oats two cwt. of guano and four cwt. of salt may be sown broadcast per acre, the seed drilled, and the whole harrowed in together.

TURNIPS.—For this crop guano may be applied, either broadcast or by drill, mixed as previously shown. The quantity of guano to be used per acre will vary with the condition of the farm. About two to three cwt. may be applied with advantage, and six cwt. have been used with safety on heavy soils. Two cwt. or three cwt. sown broadcast, and one cwt. drilled with the seed, will probably give the best chance for a successful result. Experiments have proved that, when a portion of guano is applied between the drills, and well horse-hoed in after the turnips are up, that large crops are obtained. It is questionable whether this is not one of the best means of applying guano, as on light soils there is less liability to loss in the guano, and the roots of the turnip are supplied with fresh manure at a vigorous period of their growth. Two cwt. or three cwt. broadcast before the turnips are sown, and one cwt. between the drills afterwards, will be found sufficient. A combination of superphosphate of lime with guano has been used with much success. For this purpose two or three cwt. of guano is sown broadcast, and the same quantity of superphosphate of lime, mixed with ashes, drilled with the seed.†

\* See Mr. Caird's Letter, at the end of this Essay.

† The prize for the best forty acres of swedes, in one of our most important agricultural counties, was taken by a gentleman who followed this plan.

We may here suggest to some of our intelligent practical farmers, to try the effect upon the turnip crop of a mixture of Peruvian guano and sulphuric acid. Sulphuric acid is undoubtedly a manure *per se*, and it seems to exert a specific effect on the turnip. A mixture might be made of four cwt. of guano and one cwt. of white acid, of sp. gr. 1.84. The guano must be laid in a heap, a hollow made in the centre, and the sulphuric acid must be poured into it; the whole should then be well worked together with a spade or other instrument. Considerable chemical action will take place, but in a short time the whole will become dry and ready for the drill. If the brown acid, of sp. gr. 1.7, be employed instead of the white, one-fourth more must be used. The above quantity will be sufficient for two acres. We believe that a mixture of this kind will prove a most efficient manure. It is of some importance, in using guano for turnips and other roots, that the whole of the nitrogenous matter is not taken out by the crop, but that a portion is left for the subsequent corn crop. Large quantities of guano are used for heavy land by many of our best Essex farmers on mangel as a good preparation for wheat, the mangel being wholly withdrawn from the field.

**MANGEL WURZEL.**—Guano is an excellent manure for this crop. On heavy and loamy soils the land is ploughed, and ten or twenty tons of farm-yard dung are worked into the soil—before Christmas, if possible. Two or three weeks before drilling the seed, four cwt. of guano, with an equal weight of common salt, is sown broadcast over the field and well harrowed in. The seed is drilled in the usual way, and at thirty to forty inches apart. In thinning the plants afterwards, they should not be left too close together. Repeated horse-hoings between the rows is of great importance, for air and nutriment are thus admitted to the roots of the plants. As in the case of the turnips, great advantage will be obtained by occasionally sprinkling a little guano between the rows previously to the hoeing. This insures continued nutriment to the plants. When no farm-yard dung has been applied in winter, six cwt. of guano may be used instead of four cwt. On heavy land this may be put on either in the autumn or spring, and well worked into the soil, following this up by a small dressing afterwards between the drills at the time of hoeing. The land in either case will be left in good condition for wheat. On light chalky soils, a mixture of guano, nitrate of soda, and common salt, at the rate of two cwt. each per acre, has been found very efficacious in the growth of mangel wurzel.

**GRASS.**—The experiments of Kuhlman, the French agricultural chemist, upon the action of ammonia on grass lands, at once point to guano as one of the most important manures for increasing the productive power of our pasture and meadow land. This chemist applied ammonia in different forms alone, and combined with other simple manures, and he found that in all cases the amount of grass or hay produced was in exact proportion to the amount of nitrogen contained in the manure. Guano containing a large amount of ammonia, and being also at present its cheapest source, must, therefore, prove of great benefit in the production of grass. For grass land, from two to four cwt. of guano, mixed with soil, may be used per acre. Wet or damp weather should be selected for sowing it. Probably the end of March or beginning of April is the best time. Under certain circumstances, guano may be applied to grass land in the autumn, particularly where the under-soil is of a strong or loamy character. Thus applied, it will have the effect of bringing up the grass earlier in the spring.

**POTATOES.**—From the comparison of numerous series of experiments, it would appear that guano succeeds best with this crop as a top-dressing, in conjunction with farm-yard dung. The ground is prepared in the usual manner. The farm-yard

dung is deposited in the bottoms of the drills, the sets of the seed potatoes laid upon the top of the manure, and the whole earthed up. Before the plants appear, the guano is to be sown on the top of the drills, covered over with the plough, and then rolled. If the potatoes be grown on the level, and not in drills, the guano may be sown over the field broadcast, two or three weeks after the potatoes have been planted. The quantity of guano to be used per acre is from three cwt. to six cwt. Many experiments have proved the great utility of sulphate of soda, or sulphate of magnesia, in conjunction with guano, upon this crop. As far as our experience goes, these salts have a decided effect in diminishing the liability of potatoes to disease. We should therefore recommend, in addition to guano, to put per acre, at the same time, one cwt. of sulphate of soda, and one cwt. of sulphate of magnesia. If farm-yard dung be not used for potatoes, broadcast and harrow in three cwt. or four cwt. of guano, and set the potatoes as usual. Three or four weeks afterwards sow over them and lightly harrow in the quantity of guano and one cwt. each of the sulphates of soda and magnesia. The mixture of sulphuric acid and guano mentioned under the head of "Turnips," would probably be found an excellent manure for this crop. Near the Humber, as much as ten cwt. annually is used for potatoes, with extraordinary results.

**BEANS, PEAS, AND LEGUMINOUS PLANTS.**—For beans or peas, two cwt. or three cwt. per acre may be used, either broadcast before sowing or a portion afterwards between the drills at the time of horse-hoeing. The latter would probably be the better plan. For vetches, lucerne, saintfoin, or clover, two cwt. or three cwt. per acre broadcast may be used. This should be sown in the beginning of April, on a dewy morning, or during wet weather. It is useless to sow if there be a probability of dry weather ensuing for any lengthened period.

**FLAX.**—This crop, in olden time, had the renown of being one of the most exhausting crops which could be put into the land. We have now learned that white crops, and those in general which have the repute of "drawing the land," are those which require the largest amount of nitrogen for the formation of seed, and for which, consequently, ammoniacal manures are precisely adapted. With the aid of guano or other ammoniacal manures, flax can no longer be considered an exhauster of the soil. In using guano for this crop, from two cwt. to four cwt. per acre, mixed with ashes, may be sown broadcast, and harrowed in a few days before the seed is drilled.

**CABBAGE, CARROTS, &c.**—Guano has been found of material benefit for these crops, and may be employed advantageously at the rate of from two cwt. to four cwt. per acre. It must be remembered that carrots require deep cultivation, and that both crops will be benefited by the proper stirring of the soil between the rows, and the occasional addition of a little guano.

**HOPS.**—To no crop does the addition of a proper amount of ammoniacal manure prove more advantageous than to the hop. The constant withdrawing of the hops, year by year, from the land necessitates the importation upon the soil of a considerable amount of both mineral and organic ingredients. Four cwt. of guano and three cwt. of salt per acre, applied at two separate times, and well worked in between the alleys, will be found a useful application. Or the manure may be put round each hill, and covered up with the soil. From several analyses of the hop plant, the following mixture was recommended by the Author, some years ago, as a proper manure for the hop:—

**MANURE FOR AN ACRE OF HOPS.**—Three cwt. of guano one cwt. common salt, one and a-half cwt. saltpetre, or nitrate

of soda, one cwt. of gypsum. This manure has been used with considerable success in various parts of Surrey Kent, and Sussex.

It will not be necessary to give any further details of particular crops for which guano is suitable, or to describe more fully the mode of its employment. The intelligent farmer will soon learn to vary its application to suit the end he may have in view.

Guano, however, is useful to others besides the farmer. To the horticulturist it is invaluable, and many specimens of the finest vegetables and fruits, and of the most beautiful flowers, have been indebted to the judicious use of guano for the admiration they have excited, and the prizes they have obtained.

For further particulars respecting its horticultural use, we must refer the reader to the columns of the *Gardeners' Chronicle*. And in concluding this part of our subject, we cannot refrain from quoting the opinion of Dr. Lindley, the learned editor of that valuable journal, that "if the experience of the last few years has taught us one thing more certainly than another, it is the unfailing excellence of guano for every kind of crop which requires manure."

THE COMPOSITION OF GUANO.

Our space will not permit us to describe all the varieties of proximate elements contained in different samples of guano. Nor is it, indeed, necessary for the practical man to be acquainted with them, as the commercial value of guanos is best determined by the amount of nitrogen (ammonia) and phosphate of lime they contain.

For more minute information on this subject the reader is referred to Dr. Ure's paper on guano, in vol. v. of the *Journal of the Royal Agricultural Society*.

In this inquiry we have devoted our observations more especially to the Peruvian guano, as the quantity of this article at present brought into the market very far exceeds that of all the other kinds of guano put together.

A word or two may not, however, be out of place respecting the other varieties, the principal of which are the Angamos, the Chilian, the Bolivian, the Saldanha Bay, and the Australian. The island of Ichaboe, on the African coast, furnished a few years back large supplies of a medium guano. It is now, we believe, wholly exhausted.

The Angamos guano is from the western coasts of South America. It is the most recent deposit of the birds, collected by hand, with considerable danger and difficulty, from the bare surfaces of the precipitous rocks which they frequent. When pure, it is of first-rate quality, and having suffered no decomposition, frequently contains from 20 to 24 per cent. of ammonia. The smallness of the quantity, however, that can be collected, renders it of little general importance to the farmer.

The Saldanha Bay, and other varieties, having been deposited in rainy climates have suffered great deterioration. The valuable ammoniacal salts and soluble phosphates have been in great measure washed away, the nitrogenous animal matter has been decomposed, and little remains but the common phosphate of lime. The Chilian and Bolivian are often contaminated with large quantities of sand, and the Shark's Bay (Australian) guano, is certainly not worth the carriage to this country. The farmer ought at no time to buy any of those descriptions of guano without an accurate analysis, as, owing to their varying impurities, it is otherwise possible that he may pay for them several pounds per ton above their real value.

An idea of the great difference of composition which exists in samples of guano from distinct localities, can only be formed by a comparison of their respective analyses. To enable the

agriculturist to form a correct judgment of the kinds now in the market, we give a table of the composition of six varieties—

ANALYSES OF DIFFERENT VARIETIES OF GUANO.

	Angamos guano.	Angamos guano.	Peruvian guano.	Chilian guano.	Bolivian guano.	Saldanha Bay guano.	Shark's Bay guano.
Moisture.....	10.90	12.55	9.30	20.46	16.00	17.92	14.47
Organic matter, &c. ....	67.36	61.07	7.30	18.50	13.16	14.08	7.85
Sand, &c. ....	1.04	5.36	0.75	22.70	3.16	2.80	14.47
Phosphates.....	16.10	13.76	23.05	31.00	60.23	59.40	29.54
Alkaline salts, &c.....	4.60	7.26	9.60	7.34	.45	5.80	33.67*
Nitrogen (equal to) .....	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Ammonia.....	19.95	18.24	15.54	4.50	2.11	0.63	0.35
	24.19	22.12	18.87	5.47	2.56	0.76	0.47

\* 29.54 per cent. of this was gypsum.

The above are analyses made at the Kennington Laboratories. The samples were from cargoes received recently in London. The Chilian and Bolivian guanos are much inferior to those formerly imported, in consequence, we believe, of all the finer qualities having for some time been worked out.

We may here caution the farmer not to put any trust in those analyses, often placed in his hands, which merely indicate that the sample analysed contains such and such a percentage of animal organic matter, or of salts of ammonia.

From these deceptive analyses, it is perfectly impossible even for the most experienced chemist to obtain the slightest notion of the value of a manure; and we recommend the farmer, under no circumstances to buy a guano, unless the precise amounts of ammonia and phosphate of lime are distinctly mentioned.

Should the farmer wish to prepare a sample, for chemical analysis, half a pound should be taken from each of five or six bags containing the bulk. These should be mixed together on a sheet of brown paper, until thoroughly incorporated and homogeneous. Two or three ounces of the mixture is enough for analysis; and it can easily be sent per post from any part of the kingdom. To prevent evaporation from the sample, it can be wrapped up in tinfoil, or lead-leaf from a tea-chest, and afterwards in paper. If the tinfoil cannot be procured, two thicknesses of strong paper should be used.

In order to furnish a standard of comparison to the farmer who may think it desirable to ascertain the composition and value of the guano he purchases, we subjoin an analysis of an ordinary sample of Peruvian guano, recently imported:—

## ANALYSIS OF AN AVERAGE SAMPLE OF PERUVIAN GUANO.

Moisture .....	15.10
Organic matter, &c. ....	51.27
Silica .....	2.20
Phosphate of lime .....	22.13
Phosphoric acid ( <i>equal to</i> ) ...	3.23
Phosphate of lime .....	7.00
Alkaline salts, &c. ....	6.07
	100.00
Nitrogen .....	13.54 per cent.
Ammonia.....	16.42 „

## ON THE ADULTERATION OF GUANO.

After the observations we have made on the utility of guano to those engaged in agricultural pursuits, it would have been very gratifying to have concluded our remarks.

It is, however, our invidious duty to refer to a less pleasing, but not less important, part of the subject.

The high manuring value of guano, and its extensive sale, combined with the want of knowledge among farmers as to the genuineness of the article, and their manifest reluctance to be at the expense of a chemical analysis, have, together, induced many fraudulent dealers to adulterate this manure systematically, to a great extent. The strong desire which unfortunately exists among a large class of farmers to purchase guano at the lowest terms per ton, without due reference to the quality or composition of the manure, has also operated most materially to their own disadvantage.

If the honest dealer offers a genuine article in the market, upon which he puts a reasonable profit, and finds that his roguish neighbour can more readily sell an adulterated article, he has no alternative but to abandon the trade or to turn rogue himself. The man who likes *cheap* manures should be reminded that to the buyer they are always *dear*, as he has to pay the whole expense of adulteration, as well as the twenty or thirty per cent. profit of the dishonest dealer. In fact, we should recommend the lovers of cheap manures to follow, in preference, the example of Quiu, who finding his milk more than half water, armed with two jugs, demanded of his milkman "to give him them *separate*, he could *mix* for himself."

It is, indeed, scarcely possible to give persons at a distance an idea of the extent to which guano is adulterated in London and some other large towns.

The demand of the farmer for *cheap* manure, acting upon the trade through the medium of the unscrupulous dealer, has given rise to a fraudulent and hitherto successful business.

A most extensive and profitable trade is at present carried on by parties who practise the compounding of specious-looking ARTICLES, to mix with guano; these they supply to dealers in that manure.

The materials used to sophisticate guano are numerous.

Sand, marl, clay and chalk, limestone, bricks, tiles, gypsum—ground, when necessary, to a fine powder—constitute the materials for which the farmer is destined to pay £8 or £10 per ton. The marls of Stratford, Wanstead, and other places in Essex, and the yellow loams of Norwood, in Surrey, are in particular request. These, mixed in proportions to counterfeit the colour of guano, are sold to roguish dealers in town and country, who *introduce a little genuine guano* to give the necessary odour. Some recent actions brought against parties who have sold adulterated guano, in which heavy damages were obtained, and the failure of several of the largest of the manufacturers of the "ARTICLE," have contributed some little to arrest this nefarious traffic. The real remedy lies with the farmer, who ought to prosecute vigorously those who impose upon him.

Though numerous unprincipled dealers exist in the manure trade, yet there are certainly many others, honest men, upon whose fair fame there has never yet been a breath of suspicion.

We advise the farmer, therefore, to purchase his manures from men of established reputation, who have a character to lose, and who will not demand from him more than a fair and reasonable profit.

It should be also remembered that £11 per ton is the lowest price at which Messrs. Ant. Gibbs and Sons sell Peruvian guano; and this only in wholesale quantities. The country dealer has, in addition, to pay wharfage, carriage, and other expenses, which must be added to the cost of the guano. He is also entitled to a reasonable interest for his money, if he gives long credit for that manure which he himself is compelled to pay for in cash.

We leave it, therefore, to the common sense of the English farmer to judge whether a genuine guano can possibly be purchased at the prices at which guanos, *purporting to be genuine*, are constantly offered in the country markets.

To assist still further in preventing the frauds to which the incautious buyer is constantly subject, we shall offer some simple observations on the methods of detecting adulterations in guano.

## METHODS OF DETECTING THE ADULTERATION OF GUANO.

The chemical analysis of guano is, of course, the best means of ascertaining any fraudulent mixture which may have been made; and it is a subject of regret that few farmers yet avail themselves of chemical aid, though the expense of the necessary information is quite insignificant compared with the importance of the object to be attained.

It has long been a desideratum to obtain some method of ascertaining the purity of guano, sufficiently simple to be easily understood and put in practice by any person of ordinary intelligence. With this object in view, we have tried in our laboratory many long series of experiments. These have ultimately led us to propose a few simple tests, which will readily discover the adulterations in any sample of sophisticated guano which has yet appeared in the market.

As guano is generally adulterated with marls and sands, much heavier than itself, our attention was first directed to the specific gravity of guano as a means of detecting the admixture.

In a lecture delivered some time since, before the London Farmers' Club, we had shown that an ounce of good guano, put into a cylindrical glass tube, occupied nearly twice the space of an equal weight of an adulterated sample. We subsequently tried many hundreds of experiments with various guanos, in tubes of like dimensions; but though the tube easily detected all the adulterated samples we procured, yet it was thought desirable to propose some more delicate test.

Various other experiments were undertaken, and the following series gave us the necessary foundation for the method we ultimately selected.

A stoppered bottle, capable of holding 3,000 grains of water, had four ounces avoirdupois of good guano placed in it. Water was then added, and the materials shaken until well mixed. A little more water was added, and the bottle again agitated, and then allowed to rest for three or four minutes to permit the air-bubbles to arise. The bottle was now filled completely with water, the froth running over; the stopper was then gently, but accurately, fitted to its place, and the bottle wiped with a cloth.

A counterpoise, previously made equal to the weight of the bottle alone, was then placed in one pan of a small pair of ordinary scales, and the bottle, with the guano, in the other. From a numerous series of experiments, it was found that the bottle and guano, on an average, weighed 664 grains more

than the bottle and water alone: that is, the water in the bottle would weigh 3,000 grains, and the guano and water 3,664 grains.

The following table contains the results of a long series of experiments made upon specimens of genuine guano obtained from separate vessels, and also upon various sophisticated samples, and substances used for adulteration.

WEIGHTS INDICATED BY GUANO TESTER.  
THE BOTTLE HOLDING 3,000 GRAINS OF WATER.

	OZ.	NAME OF VESSEL.	GRAINS.
1	4	Field .....	3663
2	4	Columbia.....	3662
3	4	Princess Victoria .....	3668
4	4	Digby .....	3665
5	4	Liskeard.....	3655
6	4	Duncan Ritchie .....	3669
7	4	Rosina.....	3677
8	4	Mary Ann .....	3668
9	4	Albyn .....	3679
10	4	Johann George .....	3661
11	4	Rosamond .....	3645
12	4	Ann Dashwood .....	648
13	4	Alfred .....	645
14	4	Juno .....	3659
15	4	Brothers .....	3665
16	4	Richardson .....	3641
17	4	Hamilton.....	3679
18	4	Anna .....	3677
19	4	Midas .....	3659
20	4	Will Willmott.....	3659
21	4	Macdonell .....	3653
22	4	Cumberland .....	3651
23	4	Retriever.....	3677
24	4	Lacy .....	3677
25	4	Vigilant .....	3669
26	4	Julius Cæsar (damaged).....	3719
27	4	Vicar of Bray (damaged) .....	3703
28	4	Field, adulterated 10 per cent. ....	3709
29	4	Ditto 20 per cent. ....	3757
30	4	Ditto 30 per cent. ....	3815
31	4	Guano, £7 10s. per ton (adulterated)..	3867
32	4	Guano, £7 12s. 6d. per ton (ditto) ..	3894
33	4	Salt .....	3930
34	4	Sand .....	4095
35	4	Gypsum .....	4065

The per-centage of mineral matter or ash in different samples of guano was found also very uniform, varying, as the following table shows, only from 30 per cent. to 35 per cent. :—

TABLE OF THE PER-CENTAGE OF MINERAL MATTER CONTAINED IN PERUVIAN GUANO.

	NAME OF VESSEL.	PER CENT. OF ASH.
1	Johann George .....	33·4
2	Ann Dashwood .....	32·2
3	Alfred .....	32·0
4	Juno .....	32·3
5	Brothers .....	33·2
6	Richardson .....	30·7
7	Hamilton .....	33·4
8	Anna .....	32·5
9	Midas .....	33·0
10	Will Wilmot .....	34·0
11	Macdonell .....	33·1
12	Cumberland .....	32·3
13	Retriever .....	31·9
14	Lucy .....	31·8
15	Vigilant .....	33·5
16	Rosamond .....	35·0
17	Julius Cæsar (damaged).....	38·2
18	Success (damaged).....	33·6
19	Guano, £7 10s. per ton (adulterated)..	62·7
20	Guano, £7 12s. per ton (adulterated)..	65·8

The following simple plan will easily detect all the ordinary adulterations of guano :—

Procure from any druggist a common wide-mouthed bottle, with *solid* glass stopper; one known as a wide-mouthed six-ounce bottle will do very well. Let this bottle be filled with ordinary water, the stopper inserted, and the exterior well dried. The scales to be used ought to turn well with a couple of grains. In one pan of the scales place the bottle, and exactly counterpoise it in the other by shot, sand, or gravel. Remove the bottle from the scale, pour out two-thirds of the water, and put in four ounces avoirdupois of the guano to be tested. Agitate the bottle, adding now and then a little more water; let it rest a couple of minutes, and fill with water, so that all the froth escapes from the bottle; insert the stopper carefully, wipe dry, and place the bottle in the same scale from which it was taken. Add now to the counterpoised scale one-and-a-half ounce avoirdupois and a fourpenny piece, and if the bottle prove the heavier, the guano is in all probability adulterated. Add, in addition, a threepenny piece to the counterpoise, and if the bottle and the guano prove the heavier, the guano may be considered as adulterated. By this simple experiment, the admixture of a very small amount of sand, marl, &c., is distinctly shown.

We venture also to propose another method founded on the properties of the mineral constituents of guano. When guano is burnt to ashes at a red heat, the ash has a pearly-white appearance, which is owing to the absence of iron and other colouring metallic oxides.

As iron is always found in marl, clay, &c., the ash of any sample of guano contaminated with them will not only be coloured, but its weight will be increased.

These facts give us the following method of detecting adulteration :—

A small pair of scales, a little platinum capsule, a pair of little tongs or pinchers, and a spirit lamp are all that are required. Ten grains of the guano are placed in the platinum capsule, which is held by the tongs in the flame of the spirit lamp for several minutes, until the greater part of the organic matter is burnt away. It is allowed to cool for a short time, and a few drops of a strong solution of nitrate of ammonia added, to assist in consuming the carbon in the residue. The capsule is again gently heated (taking care to prevent its boiling over, or losing any of the ash) until the moisture is quite evaporated. A full red heat must then be given it, when, if the guano be pure, the ash will be pearly white, and will not exceed three and a-half grains in weight. If adulterated with sand, marl, &c., the ash will always be *coloured*, and will weigh more than three and a-half grains.

Even the simple burning of a few grains of guano on a red-hot shovel will often indicate by the colour whether a fraud has been committed; but we cannot particularly recommend this method, as the iron of the shovel will itself sometimes give a tinge to the ash.

It will be perceived that the per-centage of ash will not always detect damaged guano, nor are the tests generally intended to apply to wet or moist samples, which are palpably from damaged cargoes. Good Peruvian guano is perfectly dry to the touch.

If the adulteration be made with light or flocculent matters, they may be detected easily as follows :—Dissolve in a quart of water as much common salt as it will take up, and strain the solution. Pour a quantity of it into a saucer or basin, and sprinkle on the surface the guano to be tested. Good guano sinks almost immediately, leaving only a very slight scum. The adulterated leaves the light materials floating on the water.

If chalk or ground limestone be used, it may be shown by

pouring strong vinegar over a teaspoonful of the sample placed in a wine glass. On stirring, effervescence shows its presence. Genuine guano, under the same circumstances, merely allows the escape of a few air bubbles.

If farmers could be prevailed upon to spend a small portion of their time in trying the foregoing simple experiments on the samples of guano they use, the fraternity of rogues would certainly have far less chance than they at present possess of pursuing their calling with profit. Still these little operations are only offered as a means of detecting the grosser adulterations of guano. Minor ones may still be practised, and men of real intelligence and business habits will regularly call to their assistance the aid of the analytical chemist.

Summing up the experiments, the following facts would appear:—

1st. If four ounces of guano, weighed with bottle and water, as previously directed, take more than one and a half ounce

and one fourpenny piece to counterpoise it, its purity is doubtful. If an additional threepenny piece is required, the guano may be considered as adulterated, and the sample should be immediately analysed.

2nd. If the ash be coloured in any way, and not of a pearly white, the guano is bad.

3rd. If the ash of ten grains of the guano weigh more than three and a-half grains, or less than three grains, the genuineness of the sample is doubtful.

4th. If strong vinegar cause a considerable effervescence when mixed with the sample, the latter is adulterated.

5th. If the guano floats, when sprinkled on a strong solution of salt and water, it is not genuine.

NOTE.—A complete set of the apparatus necessary for making the previous experiments can be obtained at a moderate cost from Messrs. Simpson, Maule, and Nicholson, Operative Chemists, 1 and 2, Kennington Road, London.

### LIEBIG'S MINERAL THEORY.

SIR,—I forward you the following communication for your invaluable journal, adopting a *gaseous theory* as well as the mineral one, as promulgated and so adhered to by Baron Liebig, the professing chemist at Giessen; should you deem it worthy of an insertion, for the perusal of your numerous and scientific agricultural readers, you have it at your disposal.

From an analysis of 2,000lbs. of the *ash* of the *grain* and *straw* of wheat, barley, oats, and beans, of the potato and turnip bulb, we have the following tabular result, as shown by the late and lamented Professor Johnston, in his "Elementary Treatise of Agriculture and Geology"—

	Wheat.	Barley.	Oats.	Turnips.	Potatoes
Potash .....	362	228	453	419	557
Soda.....	93	84	97	51	19
Lime .....	95	111	141	136	20
Magnesia.....	159	125	138	53	53
Oxide of iron .....	20	25	22	13	5
Phos. acid.....	531	421	464	76	126
Sulph. acid.....	61	11	138	136	136
Silica .....	666	949	511	79	42
Chlorine].....	11	6	35	36	42

Now we see, from the above table, that the inorganic constituents most essentially necessary for the fabrication or building-up of our most inestimable plant, the wheat crop, are silica, phosphoric acid, potash, and magnesia; and that of the turnip are potash, lime, sulphuric acid, phosphoric acid, and silica. Hence, when the practical farmer knows the proportion of these substances required for any particular crop, he at once may foresee the consequence from a deficiency of any one of them from his soil, and especially if the *crop* which he intends to sow require that mineral in a larger proportion for its maintenance.

Then it appears a matter of fact that if silica, phosphoric acid, and potash—the chief ingredients of wheat—be largely deficient in any soil, it is impossible for that crop to acquire such vigour as when these minerals are sufficiently present; so with turnips, if potash, lime, sulphuric acid, or any other substance as mentioned in the table be sparingly included in a field or *compost heap*; that an unsuccessful crop will surely ensue, let the season be almost as propitious as it may. For this reason, then, it is obvious that whatever kind of crop the farmer intends to rear, it is of the utmost importance that he should administer to his land—in the form of a compost, and in a sufficiency too—all the minerals as given in the ash analysis,

However, undoubtedly it sometimes happens that land contains in abundant quantity all the minerals necessary for the structure of the plant, yet part of them in so large and unavailable a state as incapable of being taken up from the soil as pabulum by the tender rootlets of the growing plant; hence it is evident that a crop may vary in point of yield or straw from this cause. If we compare the produce of a crop of one year with that of another, we may find an extraordinary difference, which may arise—as Baron Liebig tells us in his "Principles," in comparing the produce of 1844 with that of 1845—from lack of rain. 'If in the year 1844 a certain amount of rain fell on the land, and thus a certain amount of mineral constituents was rendered available for the plants; and if in 1845 there fell at the favourable season one-half more rain, this obviously dissolved one-half more of mineral constituents. Had these not been dissolved, they could not have entered the plant, and been there employed; that is to say, without their aid the crop of 1845 could not have increased by one-half.'

Undoubtedly this is a truism; for the plants, of course, will be enabled to take up a larger supply of minerals from the soil. We know from our ancestors, that when land became exhausted or incapable of producing a satisfactory crop, fallowing was adhered to, to gain or renew the fertility; but this mode of practice is now fast dying away, in consequence of the many manures which are being manufactured at home and exported from exotic parts.

Now it seems plain that, from the mode of fallowing the land, it undergoes a mechanical and chemical change whilst being in a state of rest: by the former, the minerals contained are reduced into a minuter state of division, due to summer culture, rains, and *atmospheric action*; and the latter by attracting ammonia from the atmosphere, which is known to be always present in some degree. Astounding effects are also obtained from lime, which is generally known by the practical farmer. When limestones are put into a kiln, and burned in the usual way, they are made to undergo a chemical change; the carbonic acid gas contained in them is evolved during the process of burning, in the form of vapour. When they are sufficiently burnt, lime shells are obtained; these, when drawn from the kiln and slaked with water, immediately begin to crackle and fall into an impalpable powder, which then, from the chemical nomenclature, takes the name of caustic lime or hy-

drate of lime. When applied to the land in this caustic and powdery state, and evenly mixed with the soil, it acts in a twofold measure :

In the first place, owing to its causticity, the almost inert fibrous matter contained in the soil is assisted in its decomposition, and made more available for a future crop to be reared ; secondly, in consequence of the lime being so minutely divided, the crop has the advantage of taking its full per-centage of that mineral which is so necessary for its structure : hence it is that we have good results from applications of lime. We have, likewise, good effects from *fresh soils*, such as stick-hill bottoms, edge-side cleanings, and "warped" or alluvial soils ; because within these, in some proportion or another, are the minerals and organic matter which has once been in the composition of a growing tree or vegetable, and of course is again made available when applied to the soil.

I have in the foregoing, like Liebig in his "Principles," endeavoured as much as possible to point out that land, with a supply of *all* the inorganic ingredients, as in the ash analysis, are necessary for the support and carrying on of a growing plant ; however, at the same time, it is also of vast importance that we should add an artificial supply of available nitrogen to the soil, in the form of an azotised manure, and not depend upon the atmosphere for a supply, if we wish to gain a twofold produce. Yes, I say, of importance, because our senses tell us that the vegetable kingdom consists of a far greater proportion of an organic compound, formed of carbon, nitrogen, &c., than it does of the inorganic.

By a simple experiment, we can be shown the comparative proportions of the organic and inorganic parts which compose our crops. If we burn the produce of a given portion of land, we at once have the result ; the residue or ashes left behind are the materials forming the inorganic compound which has been withdrawn from the soil whilst growing, which appears in a very small quantity, and that must have been in a very

minute form to have entered into the crop's composition ; hence we see the advantage of loose friable soils, so that the rootlets may have easy access to run everywhere, to gather the fine mineral particles most adapted for its structure. It may be questioned by some, then, what has become of the rest of the materials which composed so large a bulk before consummation ? Is it totally destroyed ? No ! in one sense it may be answered ; for there is no such thing in nature. The organic compound has been driven off into the atmosphere by the heat, in the same way as the vapour which arises from our steam apparatus ; and as the rain which is evaporated from our earth during a hot summer day.

Last year I procured some guano, and in way of experiment divided it into two equal portions—one part, with *salt* and *lime*, I disengaged the ammonia it contained ; the other part I left as procured. These portions I spread upon two equal-sized plots of wheat. The plot which had the ammonia nearly disengaged by the salt and lime was not to be equalled with the produce of the other plot with its ammoniacal guano. Hence we have it manifest that an ammoniacal or nitrogenous manure is of very great service in agriculture. Let Liebig give preference to his mineral theory, if he choose, and say that "the carbon and nitrogen the plants can assume from the air." I say an alliance ought to be made between ammoniacal salts and the minerals, if we intend to bring our land into the highest pitch of agriculture. Yet, as the old intelligent Norfolk farmer says, in the *Mark-lane Express* of the 24th ult., "That when the farmer has done everything that the wisest and most enlightened policy can suggest, a blast of the hurricane, a night of severe temperature, a breath of poisonous miasmata may neutralise his best efforts, and dash his hopes for the season to the ground." However, these are Nature's occurrences, which we cannot modify or stand against.

R. M.

*Timber, 8th April, 1856.*

## PROGRESS IN MANURING LAND.

The lecture delivered before the Council of the Royal Agricultural Society, Wednesday, April 30, brings it under fresh obligations to Professor Way. There is, perhaps, no branch of agricultural chemistry more interesting than a review of its progress, especially in relation to the food of plants. From time immemorial, agriculturists have been familiar with the fact that land under culture requires an artificial supply of manure ; but it is only within the last hundred years that any definite knowledge, chemically speaking, has existed as to the nourishment required by the vegetable kingdom ; for, prior to the days of Black, the discoverer of the chemical properties of quick-lime, Lavoisier, to whom is mainly due the modern theory of combustion, Priestley, who discovered the constituent elements of the atmosphere, and Cavendish, the "Newton of chemistry," all was hidden in the chaotic mysteries of alchemy ; and even up to the commencement of the present century, how little was done to disentangle this all-important science from the hypothetical speculations of the past ! The experimental researches and discoveries of Sir Humphrey Davy, dating from 1801, commenced a new era, in which public attention—more particularly that of the agricultural world—was drawn to

their importance. It was not, however, until the works of Liebig were published in this country that English farmers, as a body, can be said earnestly to have embraced chemistry as a useful science ; but since then, the rapid progress made is incredible, while the science itself, though once repudiated, is now universally acknowledged as second to none. This, perhaps, is in a great measure due to the successful labours and popular works of the late Professor Johnston, Messrs. Nesbit, Lawes, and others.

Agricultural chemistry is thus, scientifically speaking, but of very recent origin—a science, too, whose history presents to the inquiring mind discoveries more than ordinarily interesting. A very condensed review of these—forming, as they do, the successive links in the chain of progress—will suffice to prove this. First, for example, those made during the latter part of the last century threw a faint glimmering of light on the manurial nature or fertilizing influence of the atmosphere, with the action and use of organic manures. The labours of Sir Humphrey Davy and his coadjutors, home and foreign, again, during the early part of the present century, advanced our knowledge of the elementary substances of the inorganic portion of the

soil. The mineral theory of the food of plants received a still farther advance from the talented pen of Liebig, whose eloquence and professional enthusiasm in the great cause at issue appear to have led him to attach a greater importance to mineral manures than was justly due, or even what he himself ever intended (judging from his more recent works in reply to Mr. Lawes). Since the translation of Liebig's works, a more extensive acquaintance with geology, mineralogy, and the physiology of plants, has been, and is now, pointing to the propriety of using both organic and inorganic manures.

Throughout the whole of our subject, conclusions appear to hinge on two prominent points deserving of special notice: first, that hitherto experimental inquiry has, with few exceptions, taken the precedence of scientific; in other words, that Practice with Science, or *experimental science*, can only now be received, as we have frequently stated in the columns of the *Mark Lane Express* of late; and second, that for the future a better mechanical comminution of the soil, under successful steam culture, promises to be productive of the most important results in agricultural chemistry—reconciling jarring differences now existing, such as those which lately took place between Liebig and Lawes, and uniting farmers as a body to manure in accordance with the common principles of chemistry, so to speak, each responding to the demands of his own farm, crops, and climate.

In both these cases how prominent a place does *Practice* occupy, and how subordinate a one *Science*! No doubt, as principles are better understood, they will be more uniformly reduced to practice, as stated above; but before implicit confidence can be placed in them, they must first be tested by experiment; and such is the perseverance of those farmers in the field who understand chemistry, that their labours have every appearance of continuing, as they have hitherto done, to anticipate those of the chemist in the laboratory. In point of fact, the laboratory at present would be unable to comply with all the analytical demands of the field, were they made; for how many analyses ought every farmer yearly to have, in order to enable him to know the chemical state of his soils and crops, and what changes are taking place?

An endless variety of examples may be adduced in support of these general conclusions, one or two of which will suffice for the present.

During the last century, the minds of its more intelligent agriculturists, such as Platte, Ramsey, Evelyn, Moore, Bradley, Tull, and others, were grasping at the improvements of the present, and even superintending their reduction to practice in many cases, though in a rude manner. That they were ignorant of much that is now known, cannot be questioned; but, although unable to account satisfactorily for many chemical phenomena, they were nevertheless cognizant of their existence. Who, for example, has ever advocated more enthusiastically and more confidently drainage, deep culture, and the aëration of the soil and crops, as now practised at Lois Weedon, than Platte, Evelyn, and Tull? Who has ever been, practically speaking, better

acquainted with the fertilizing influence of the atmosphere and of thunder-showers? or who ever understood in a higher degree the advantages arising from applying clay to sandy land, sand to clays, and such-like mixtures of soil, involving the mineral-manure theory, than they? With regard to manures individually, almost all the substances, organic and inorganic, now used, were then applied to the soil in some form or other. No doubt, Peruvian guano was not then introduced into England; but Peru herself was discovered, and its successful application there witnessed and appreciated. Again, Moore was so sanguine of having solved the golden problem of steam-culture, that he sold his farm-horses! In all these cases, it was the results of experiments which dictated further progress; while the principles sought to be reduced to practice were identical with those of the present day, though less perfectly understood.

Between the commencement of the present century and 1840, again, the agricultural chemist was as unable to overtake, in his laboratory, the intelligent farmer in the field, as before; and between the latter period and the present day, how much more has been done? Last year, for example, we visited our native parish, after an absence of sixteen years. When we left, few farmers, except those who had been educated at some of our universities, knew anything scientifically of chemistry; now, the great bulk of them are familiar with the writings of Liebig, Johnston, Nesbit, and others, and also with the generality of the artificial manures: but, in principle, agricultural practice is there essentially the same as when we left. At one time, irrigation was common on every farm having a command of water, but was given up about the commencement of the present century. In one or two cases, the liquid-manure system of Ayrshire is now being introduced; covered home-steads are common; while steam-culture, and its "golden sheaves," are as familiar in farmers' mouths as "household words." These are facts which speak for themselves, showing the relative positions of the laboratory and the field in the great march of progress.

But while Experiment demands its well-merited dues, the fact must not be overlooked, that the question ultimately resolves itself into the progress of chemical knowledge in the field *versus* the progress of chemical knowledge in the laboratory; the mind which conducted the experiments at Rothamstead *versus* the mind which conducted the experiments at Giessen. Many of our practical farmers are now well versed in this branch of science. Indeed it may be safely affirmed that they include amongst them some of our best agricultural chemists; and that further progress will in no small degree depend upon their deductions in and suggestions from the field, whether we refer to improved culture and fertilization from the atmosphere, or to the manufacture of artificial manures, solid or liquid, and their application to the soil.

Admitting thus much, however, the counter fact ought ever to be borne in mind—that the number of farmers who master chemistry are few when compared with those who do not; that agricultural experiments are of little chemical value unless performed under the superintendence of those possessing the necessary knowledge of chemistry to control them, judgment

being always of more value than mere length of experience; and that every experiment in agriculture is only applicable, generally speaking, to its own individual case, owing to the diversity of soil, climate, and other circumstances. The Rothamstead experiments, for example, are only applicable in every point to Rothamstead; the Lois Weedon ones to Lois Weedon; Tiptree Hall to Tiptree Hall, and so on. No doubt general principles are elicited in each of the three cases quoted; but what is their value to me, unless I have judgment to determine whether my farm comes within such rules, or no? because the action of the atmosphere on the soil at Lois Weedon keeps a supply of available mineral food for plants, is no valid reason for concluding that the action of the atmosphere on a different quality of soil, as a purely silicious sand, will do so; for nothing could be more absurd than deductions of this kind, however frequently they may be drawn.

The object of the proposed lectures or reports being annually to bring before the Society what progress has been made in agricultural chemistry during every past year, the above facts greatly enhance, so to speak, their value, especially to those not versed in chemistry, while they call upon the few who are masters of this science to co-operate with the lecturer in the

laborious work over which he presides. The exertions of no individual, however Herculean and however persevering they may be, can overtake such a work, or even keep pace with the progress of things. Looking at the geological map on the wall, and contemplating the vast variety of soils which it exhibits, and how diversified these individually are, from accumulations of drift, with the equally-diversified character of our climate, members of the Society present must have felt the full force of what we have just said; and how broad, and comparatively unknown as yet, is the field to be explored, before the chemical resources of such a variety of soils can be known, and what part each is capable of performing, along with the agency of the atmosphere and a sufficiency of moisture, in supplying plants with organic and inorganic food. But union, with a systematic organisation of geological data, would enable Professor Way to bring annually before the Society invaluable reports—a union in which we hope landlords will act a conspicuous part, as they are more deeply interested in getting the soils on their estates analyzed.

Such is a glance at the importance of the subject; and when the first report, which it will be seen was reserved for the columns of the Journal, shall make its appearance, we shall of course review it.

### THE REAL VALUE OF SOME OF OUR MANURES.

It was pithily remarked by one of the speakers on a late discussion at the Central Farmers' Club, that "if a weed has been correctly defined to be a plant out of its place, we may perhaps define a manure to be the right thing in the right place." These definitions, in truth, are not so easily made as some persons believe. When the great bankers of London were asked to define a one-pound note, they were as sorely puzzled as the clear-headed Sidney Smith was, who, utterly unable to see his way, cut the knot by declaring, in one of his letters, that the man who began an oration about corn or currency "ought to have an inkstand crammed into his mouth." The farmers of the Norfolk sands very truly believe that clay is a manure; but those of the Wealden and the London basin clays would hardly regard the great staple of their soils to be a fertilizer; and the difficulty of assigning to any substance the character of a manure is not confined to the earths, or the saline manures, or even to the most universal of them all, that of the farm-yard. The farmers of many Oriental countries use it for fuel, instead of applying it to their land; the holders of some of the rich soils of the New World remove even their stables, rather than undertake the heavier task of carting away the heaps of dung which have accumulated around their out-buildings—their prolific fields need not to be thus enriched; for the same reason the serfs who cultivate the black earth of Central Russia, pile up, on the banks of their rivers, the farm-yard dung with which they tell you it would be useless to dress their already exuberant

soil. *They*, therefore, regard even farm-yard dung as anything but a manure. Some of these things forcibly occurred to us, when we were listening to the very interesting and opportune lecture at the Central Farmers' Club, "On the relative values of artificial manure, and their comparative adaptation to different crops." In this address Mr. Nesbit, as might be expected from him, communicated many valuable facts, which will be alike useful to our readers in the market-room, and in their fields, especially if they *use* that common sense with which they are so well endowed, in first considering the real *wants* of the soil; and secondly, in as carefully avoiding all dealings with those impostors who offer, for little money, substances which can neither supply what the soil requires, nor be made or imported for the price at which they are willing to sell them. We again, at the season when manures for root crops are now in such extensive demand, earnestly warn our readers to beware of these dealers, who are commonly not only unprincipled, but profoundly ignorant of the true and honest objects which must be steadily borne in mind by the preparers of the manure—take, for example, the instances adduced by Professor Anderson, in the present volume of the Transactions of the Highland Society, of two manures professing to be produced from sewage water. Only mark the result of his analyses, and their insignificant real value. He found in these—

	I.	II.
Water .. ..	18.04	4.03
Organic matter .. ..	19.71	30.13
Phosphoric acid .. ..	2.03	0.60
Peroxide of iron and alumina .. ..	6.93	7.10
Sulphate of lime .. ..	27.05	3.14
Carbonate of lime .. ..	6.43	3.70
Alkaline salts .. ..	3.00	—
Sand .. ..	16.81	51.13
	—	—
Ammonia .. ..	1.13	0.64

Let Dr. Anderson's remarks on the result of these analyses obtain the attention which their importance demands. These substances, he observes, are of very trifling value. The first, which is the best of the two, and contains 2 per cent. of phosphoric acid, and 1 of ammonia, when calculated according to the method used for determining the price of a specimen of guano, proves to be worth only about 16s. per ton; and the second does not exceed 7s. And yet these, and similar substances, are gravely declared to be equal in value to guano!!

### OBSERVATIONS BY THE WAY.

The privilege enjoyed by those who are permitted to communicate their ideas and observations through the public press is one which ought to be highly prized, and never abused. To present a partial view of a subject which is of general interest, and corresponding importance to all classes of society, is a gross infraction of such privilege; to present a hasty and immature opinion upon any subject in which the well-being of the community is concerned is a great abuse of such prerogative. Writers on practical subjects ought of all men to be extremely cautious in their observations, lest they mislead the public. Theorists may indulge in their speculations with impunity. The practical man must keep to fact: he should take the greatest care that all his remarks are the results of experience, or of well-weighed, cautious investigation; that nothing is concealed, nothing extenuated. With these principles in view, and in all honesty, I offer the following "observations by the way:"—

In the due course of business, we were led last week to take our usual railway rides. The country over which we travelled was very varied, comprising the beautiful and highly-ornamented county of Surrey; thence by rail through Berkshire, Oxfordshire, Warwickshire, by Birmingham, Wolverhampton, into the very diversified and beautiful scenery of Shropshire; thence through Staffordshire to Derby; thence to Nottingham, Grantham, Peterborough, and across the fens from Spalding *via* Peterborough to Wisbech, and from Peterborough to London—a route containing much to note of an agricultural character, although passing so rapidly through by railway.

The most prominent and most important thing to notice was the state of the growing wheat-crop. On the heavy lands of Surrey the crop looks promising; but it is very backward, and will require a long succession of genial weather to bring it into that forward state usually found in June. The light lands look to have a thin and defective plant, and cannot produce a heavy crop. The stock of wheat on hand, judging by what can be "observed by the way," must be a very small one. The stacks are remarkably "few and far between," and those generally small round cobs. The grass and seed lands are looking fairly, and those near London have a good pasturage upon them. The spring-sown corn has been well got in, and is making its appearance

favourably, since the late rains. The fallows are forward and cleanly. The lands bordering on the Great Western line of railway do not anywhere present a very promising appearance: occasionally we meet with a fair pasture and a fair-looking wheat plant; but it is not until we reach the neighbourhood of Abingdon that we are gratified by a good herbage and an average wheat plant. Along the whole line, thus far, the absence of corn stacks is remarkable, and as we proceed it becomes still more so; indeed, as we approach the populous districts, a corn stack is scarcely to be seen; and in some of the agricultural districts only one or two are to be seen whilst travelling over a space of from 10 to 15 miles. Along the line from Oxford to Banbury, a district very well farmed, and likely to exhibit a favourable plant of wheat, but with few exceptions all looked thin and backward. The spring-sowing was by no means completed. Here and there, along this part of our route, as also onward toward Leamington, the turnips were still under consumption by the flocks, some fields being thrown, very properly, into heaps for cutting, others standing and running fast into flower. We doubted if these farmers had experience in the exhaustion of soil by allowing turnips to run into seed in this way; it is strikingly injurious. As we proceeded, we evidently came upon a stronger soil and a better country, the pastures and wheat plant looking much more thriving than any we had previously passed; and the immediate neighbourhood of Leamington and Warwick manifested signs of a successful grazing season. Many lands along the line now appeared to be laid in for stocking, &c. We continued to be struck with the paucity of corn stacks, and frequently exclaimed, as we approached, and on passing through these beautiful towns and the immense population contained in the country, beginning at Leamington, and ending at Wolverhampton, How is the population to be fed? Where shall we find food for this people? We must have large importations, or it cannot be done. The country between Warwick and Birmingham is fairly farmed; a fair plant is observable occasionally; but we expected to see much better things, and in a much more forward state—at all events, on the gravelly soils; but these cut a sorry figure, and all crops on the light soils liable to injury from frost and drought are decidedly bad. We could not but censure the practice of ploughing with three, four,

and even five horses in length. It is unnecessary waste of horse-labour. We know farms of very heavy clays where ploughing is successfully executed with two horses abreast. Ransome's, and Howard's, and other similar ploughs, need no more power to work them. Why waste so much "horse-flesh"? Pray let the Oxfordshire men look to this. However, they do not stand alone: the practice prevails along the line.

We arrive at Birmingham—that vast emporium of our hardware—the nation's workshop for the innumerable iron fabrications of dire necessity; without which our agriculture itself would prove a failure. We soon pass through it. What a region of smoke and flame are we now flying through! smoke, flame, and furnace; furnace, flame, and smoke, mile after mile, mile after mile!—a region of blackness and darkness, which John Bunyan himself would fail to describe: one vast gloomy valley, through which the eye in vain tries to penetrate: a very *fac-simile* of Pandemonium itself. The peaceful arts of husbandry can have no abiding place here. Scarcely a vestige of cultivation is to be seen; the bowels of the earth beneath being infinitely more valuable, the products of iron and coal being immense; and the expenditure in working the various mines, almost innumerable as they are, and in the subsequent smelting of the ore, is enormous. This deeply-interesting, but most uninviting, nay, forbidding district, is, however, quickly passed over, and we find ourselves at the vastly-increasing and wealthy town of Wolverhampton, with its many tall chimneys and blazing furnaces, closely rivalling its elder sister Birmingham, in its manufacturing industry, its skill and enterprize. We, however, speedily emerge from these emblematical regions into a very pleasant and undulating country, partaking of the unusual advantages resulting from its proximity to such a vast population, delightful villas and genteel homes showing themselves everywhere. The land itself also shows good tokens of the industry of the occupiers. Rents of course are high, contiguous to this large, uncultivated mining tract; but the advantages are fully commensurate, and garden culture to a considerable extent prevails, to the great benefit of the cultivators. As we proceed, the country becomes bolder; the hills, though not high, give a fine character to the country; and the soil, which is chiefly on the red-sandstone, yields capital crops of turnips, barley, seeds, and wheat. The Wrekin soon shows his hoary head; and the kindly feeling arises, as we repeat the well-worn toast, "To all friends around the Wrekin;" the view from its summit being panoramic, and nearly boundless. The soil here is prolific; and in the neighbourhood of Shiffnal, much of it is well farmed. Here we alighted. The sheep now to be seen are Shropshire Downs, and they are in good truth a superior breed, having great size and substance, and much good wool of fine quality. We have no predilection for down sheep; but we could not do otherwise than confess to ourselves that the precise breed of sheep around Shiffnal are equal to any we saw on our route down, and greatly superior to some we passed.

Our next route lay through the same dense and fiery country back to Wednesbury; thence to Lichfield, Burton, Derby, Nottingham, and a line of country

abounding with Leicester sheep and shorthorn cattle, the latter in some of the earlier districts making their appearance in the fields; the comparatively bare pastures giving unmistakable evidence of the grazier's position with respect to keeping; the rick-yards also presenting the same unusually barren appearance, with only here and there a solitary corn stack; the growing crops by no means satisfactory. From Nottingham our course lay to Grantham and Peterborough. On this line a marked improvement in every respect was observable extending to Peterborough—more corn, more stock, and better crops, both on the strong lands and the warm gravels approaching that place: indeed we did not enumerate so many corn-stacks during our previous route, extending over a far greater surface, as in this short one. Across the fens the crops are fair, and promising to be very superior to last year, but the number of corn-stacks is much less than usual at this season. The winter food is all done, and much expense is incurred in artificial aids. From Peterborough to London the same general observations may be repeated. The wheat plant is thin and backward, grass late, and heavily stocked, keeping done, corn-stacks very scarce, spring-sowing nearly completed, fallows forward, and in good state. The conclusion to which we arrived on our return is simply this—that the crops or plants of wheat at this precise period are late, and unsatisfactory in their appearance; that the spring-sowing is nearly completed, and has gone in tolerably well; that the fallows are in a forward and cleanly state; that a large breadth has been planted with potatoes, and that the stock of grain held by the farmers is very limited indeed—perhaps less than for many years past; that the grass lauds where rested are in a satisfactory state, but others are too heavily stocked to make progress; that keeping is scarce, and very dear.

We would further observe, that as we are progressing toward a system of agricultural statistics, we would ask, What course is to be taken to show the amount of grain and stock sold, and the quantity on hand, at given periods? The present average returns, which are exclusively for corn, are wholly insufficient for the purpose: for stock we have none. Granted that the returns of annual productions be correct, how are we to ascertain the progress of sales in the absence of such information?

We give the foregoing, and believe it to be, so far as our observations went, substantially correct. We have no end to serve beyond a desire to diffuse correct knowledge as to the future, which is at all times our aim. To do good to our brother-farmers is certainly our principal object in all our writings; and in this instance we would not conclude this paper without expressing our decided belief that the stock of wheat on hand is very small, and unless large importations take place a considerable re-action in the corn trade must ensue, of which we wish our timid farmers to reap the advantage.

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RICHMOND'S PATENT LAWN MOWER.—This year further improvements in the construction of these machines have been made, and they can now be worked with equal facility and advantage on open unbroken lawns, and over narrow verges. They can be adjusted to cut any length, and will produce a more even and uniform surface than the most skilful mower. The grass may be cut when dry, and with this machine and the same amount of labour, more than double the quantity of work can be done than with a scythe. Any ordinary labourer can work it, and with care it is very durable and easily kept in order.

## KENNINGTON AGRICULTURAL AND CHEMICAL COLLEGE.

## LECTURES ON THE GENERAL PHENOMENA OF THE EARTH, HAVING REFERENCE TO THE PRODUCTION AND MAINTENANCE OF ORGANIC LIFE.

BY CHARLES JOHNSON, ESQ., PROFESSOR OF BOTANY, GUY'S HOSPITAL.

## LECTURE VIII.

As a sequel to the general survey of the earth's surface, the external agencies employed in its modification, and the influences resulting from its varied condition, we will now take a cursory view of the circumstances that may possibly have led to the described phenomena, and through them to its existing state, as well as to the probability of subsequent changes no less important than those it has already undergone.

Commencing with the condition of our world as a planet belonging to the solar system, and through that association connected with numberless other bodies distributed in space, it may become a subject of speculation whether much, and how much, of its present adaptation is due to that circumstance, and to the action of those general laws under which they mutually originated. Such inquiry necessarily leads us to reflect upon the real extent of our knowledge concerning the visible creation called the universe.

Irregularly disposed throughout the heavens, are countless self-luminous bodies, smaller or larger, nearer or more distant: the larger and nearer various in colour and brilliancy, as their seemingly restless light reaches our eye; the greater number so distant as to be visible to us only by the combined light of myriads forming a milk-white haze upon the dark face of the sky. What are they? Suns, like our own, dispensing light and heat to unknown and to us yet invisible worlds? We may imagine this, but are wholly uninformed. Our sun we know to be an enormous globe, around which move eight large and many smaller spherical bodies—the planets, of which the earth is one. We have ascertained the relative sizes, weights, and distances of many of these; and, among other circumstances we have learned that the sun is (employing round numbers) 882,000 miles in diameter, and that it contains 355,000 times more substance than our earth.

The globular form of all the members of this solar system is in accordance with a certain law that we trace in constant operation around us, and which occasions the rounded outline of a drop of water or any other fluid. Matter, or substance, is now generally regarded, under whatever form it may exist, as consisting of inconceivably minute parts called "atoms;" a term compounded from the Greek, and signifying that they are incapable of being divided. We cannot positively prove that this is the case, but in the present state of our knowledge it seems at least probable, and it is convenient to assume that it is really so; indeed, the atomic theory, as it is called, constitutes the foundation of modern physical science. The minuteness of these assumed atoms places them, individually, beyond the reach of our senses. Animalcules, such as the monads of stagnant waters, exist, so small, that it has been computed eight millions of them might occupy a space equal in extent to a grain of mustard-seed; and yet these, themselves composed of atoms, require still smaller bodies to subsist upon.

Every atom is endowed with a certain power, acting in all directions around, and tending to draw other atoms towards it. We term this power "attraction," or "gravitation;" and

when two or more atoms are assembled by it, their attractive forces act in unison upon others with a power proportioned to their number. Hence larger bodies seem to draw smaller ones around them, although the attraction is really mutual. It is to the action of this inexplicable power that the globular form of the sun and planets is due; the atoms composing them arranging themselves originally in succession around those that first came together, which thus became the common centre of their masses. It is the same force that maintains the subordinate conditions of the latter, and of their satellites or moons. The mass of the sun, greater by far than those of all the planets of his system combined, retains the whole within his influence. The earth being seventy-five times the bulk of the moon, the latter obeys the mightier attractive power, and follows as it moves. Attraction is modified by distance, and other causes; it is only the nearness of the moon to its primary that compels its attendance on our planet. Were the distance to become increased beyond a certain point, the attraction of the sun would overpower that of the earth for her satellite, and the moon would revolve around the centre of the system as a primary planet.

The "attraction of gravitation" (or the influence exerted by one mass of matter on another, tending to draw them towards each other)—so called to distinguish it from that modification of the power by which the atoms of bodies already in contact are held together, called thence the "attraction of cohesion"—like all other natural agencies, acts according to invariable laws, and is found to diminish inversely to the square of the distance through which it operates. Thus, for example, suppose that at a distance of one mile the force of this gravitation were estimated as equal to one, at two miles it would be only one quarter, at four miles one-sixteenth, &c. So far as we are able to inquire, this law prevails throughout the universe, and upon our acquaintance with it rest many of the most important facts connected with the history of the earth and of the system to which it belongs. To explain the origin of this system, and connect it with the operation of the known laws and properties of matter, is of great interest in philosophical inquiry; and the nearest approach that has hitherto been made to its consummation is found in what is generally termed the "nebular hypothesis:" the term "nebula"—the Latin for mist or cloud—having been long since applied by astronomers to the Milky Way, and other bright spots in the heavens, that the eye distinguishes only as shining mists; most of these are now known, through the use of the telescope, to consist of groups of stars too small or too distant to be perceived individually without such assistance. Some of these nebulae, however, are still supposed to consist of substance exceedingly diffused, resembling that which may constitute the coma, or tail of a comet.

The nebular hypothesis is founded on the supposition that all of the heavenly bodies have been formed by the force of attraction, which has gradually collected into masses the atoms of matter originally diffused throughout space in the nebu-

lous form. It surmises that our solar system has been at first a vast nebula, in which a revolving movement was generated; that, while thus revolving, the middle portion was becoming successively more and more condensed by the force of attraction, eventually forming the central sun: that, owing to the known laws of matter and of motion acting upon such a mass, the still uncondensed external portions might be successively detached, or left in the condition of revolving rings or circles: that, in consequence of these rings continuing to condense after their separation from the general mass, they would be liable to break up into fragments: that, continuing to revolve on the same plane, the fragments of each successive ring, varying in size and density, might coalesce and form a planetary sphere rotating on its axis—the satellites of some of these spheres being the results of smaller rings, similarly detached during the farther condensation of their primaries. The numerous small planets, called “asteroids,” revolving in each other's vicinity between the orbits of Mars and Jupiter, may, according to this view, be regarded as so many fragments of a primary ring, that have remained detached instead of coming together as in the case of the others; a circumstance resulting from some unknown disturbing cause, the action of which the great obliquity of the orbits of Pallas, and some more recently discovered ones of the series, seems to indicate.

The whole of this is mathematically possible, and therefore not altogether improbable. The rings of Saturn would thus be accounted for, as circles formed from nebulous matter consolidated, or at least acquiring a permanent form, subsequently to those which produced its satellites, and previously to the planet's assumption of its present condition; while the peculiarly bright ring extending within the orbit of the Earth, and called the “zodiacal light,” may be a portion of the original solar nebula yet unabsorbed into the Sun's atmosphere. The nebular hypothesis is quite consistent with the revolution of the planets in orbits occupying very nearly the same plane and in the same direction, and likewise with their rotation on their axes, not only being accordant with each other, but corresponding with that of the Sun itself. These and many other circumstances tend to indicate, that whatever differences may exist between them in bulk, density, and other conditions, their association in the same system, and their movements in connexion with it, originated under parallel causes and impulses.

Supposing the globe of the Earth to have been thus formed by the influence of attraction and subsequent condensation, according with the known laws of matter, the heavier portions of its material would accumulate, or tend to accumulate, in the centre, and form a solid sphere; around which, other circumstances not interfering, the water would settle, and, externally, the atmosphere. Its diurnal rotation would, it is likely, modify a disposition, the regularity of which would only be insured by or under a state of rest; and hence originated the depression of its polar diameter, the change from the true sphere, as a necessary result of undisturbed gravitation, to the oblate spheroidal form induced by motion on its axis. Some such arrangement must have taken place to produce its present state. It is true that the face of our globe is exceedingly irregular; but still water has the predominance on the surface, and air surrounds the whole, and, under these conditions, it is the habitable Earth.

A question naturally occurs here: Are the other planets at all similar to it? We, of course, have no means of deciding this, unless by analogy. Mercury and Venus are too near the Sun for us to distinguish their discs plainly, so strongly are they enlightened; but, from the occasional appearance of certain shadowy spots, that are not permanent, amidst this

brightness, astronomers have concluded that those planets may be enveloped in cloudy atmospheres, that serve to mitigate the intense heat and light to which they would otherwise be subjected, and that it is only the reflection of light from these dense atmospheres, and not from the planets themselves, that we observe. We must examine those occupying a wider range. Mars presents to the telescopic investigator much the same appearance that our Earth might have, viewed at a corresponding distance, namely, a surface varied as if consisting of ocean and land. But is there any water upon it? This question seems to be decided by the brightest parts of the surface being those around its poles, and by their varying in extent as those poles are alternately directed towards the sun like our own; indeed, much in the same manner as our polar snows—alternately melting and again accumulating—would appear viewed through a telescope from Mars: it is likely therefore that water is present upon that planet, and, if water, an atmosphere likewise. Jupiter and Saturn are too distant from the Earth for us to distinguish and map out their discs, as astronomers have ventured to do that of Mars: but the changing belt-like appearances around their equatorial parts are supposed to indicate the presence of an atmosphere with clouds floating in it; and they are, indeed, probably, appearances resulting to those planets, under the action of similar laws to those which operate over our own tropical regions.

Our Moon, the nearest to us of all the heavenly bodies, presents, very distinctly and unequivocally, irregularities of surface resembling those of the Earth, mountains—some of them far loftier than the highest peaks of the Andes—extensive levels, and hollows, but no appearance of water; which, indeed, could scarcely exist, unless in the form of vapour, exposed to the action of the Sun's rays, without the pressure of an atmosphere. The presence of this latter medium, all observations hitherto made have tended to disprove; stars especially disappearing at once behind the moon's disc as it passes them, without suffering the slightest previous diminution of brilliancy, a circumstance that must occur, provided an atmosphere, of even the two-thousandth of the density of the earth's, existed around it. From the absence of air and water we may conclude that vegetable and animal life are likewise wanting there. Still the telescopic aspect of the moon is not so essentially different from that which our own lands would present under similar circumstances as to induce us to suppose its substance very different from that of the earth.

In addition to all of these circumstances, the occasional fall of meteoric stones, which, from facts connected with their descent, can scarcely be considered other than bodies previously existing in space beyond the earth's atmosphere, and which consist of metallic and other substances well known as belonging to the materials of our own globe, lends support to the opinion, that corresponding elements may compose all the bodies of the solar system, although certain fluid and gaseous compounds, as air and water, may be absent in some of them, as in the case of our moon, and probably of the satellites generally.

But it may be argued, what connection has the composition of the universe with the subject ostensibly before us? Immediately it has little; but, as bearing upon the origin of the earth itself, and as associated with the causes which have led to its productiveness, it has much. In the introductory lecture it has been observed, that at some past period, prior to the creation of organic beings upon its surface, our globe might have been in a state of igneous fusion. Now, as whenever matter or substance of any kind becomes condensed, or passes into smaller compass, heat is given out; as a piece of

metal becomes hot by being hammered. If the nebular hypothesis be correct, it is possible that the earth might thus evolve a violent degree of heat during the process of condensation from its original form as a ring of vaporous matter, and its surface be afterwards gradually cooled into a solid crust. That it was once in such a heated condition is far from being improbable; that it is so still in the interior seems likely, from a variety of circumstances.

The widely extended phenomena of earthquakes, and the vast quantities of heated and even fused material ejected from volcanoes, can scarcely be satisfactorily accounted for, unless under such a supposition. Indeed, the deeper we descend in the excavation of mines, the warmer does the temperature become. This has been often proved by experiments with the thermometer in deep mines, in different parts of the world; and the facts are quite independent of the differences of climate, because the increase of heat or cold at the surface is not experienced at a little more than a hundred feet below it, while the thermometer is found to rise uniformly as it is carried successively lower. One of the earliest and most striking experiments of the kind was made in a mine in Saxony, where at the following depths were the corresponding ranges of the thermometer—

At 236 feet 47 degrees, or one degree higher than at the surface.  
 At 552 feet 55 degrees.  
 At 880 feet 59 degrees.  
 At 1246 feet 66 degrees.

Compare these with the temperature observed in the mine of Dolcoath, in Cornwall, which at the depth of 1,440 feet was 82 degrees; and this latter, with that of the silver mine of Guanaxato, in Mexico, which at the still greater depth of 1,730 feet, or nearly one-third of a mile, is 98 degrees; and the gradual increase of heat in descending a distance so small into the crust of a globe eight thousand miles in diameter is so marked as to render the supposition, that the heat existing at the depth of a few miles may be intense, not at all improbable: indeed, if it increase in the same proportions, we must admit the possibility before alluded to—that we are dwelling upon the hardened, cooled surface of a planet, the interior of which may still retain a degree of heat sufficient to hold in fusion the most refractory rocks and metals that compose its substance. There is much in the irregular character of this surface, and in the condition of some of its materials, that is accordant with such a belief. The disposition of the great chains of mountains, chiefly following directions transverse to each other, or from north to south, and from west to east, is that of crevices naturally formed by the fracture of a cooling and consequently contracting surface; while the materials constituting the interiors and peaks of the mountains individually, such as granite and other crystalline rocks thus uplifted, are of the same texture and composition as those which seem to form the foundations of the more level parts of the earth's crust, and they present the corresponding appearance of having passed into their present state from one of fusion by intense heat.

The elevation of mountain chains by successive explosions through such cracks in the cooling crust of the earth is not an unreasonable supposition, when we consider the effects that have been produced from time to time by volcanic eruptions during the later periods of human history—raising mountains of seventeen hundred feet in height, and pouring fire streams of lava fifty miles in length, from twelve to fifteen miles broad, and from one hundred to six hundred feet in depth. The former took place during the eruption of Jorullo, on the high plains of Mexico, in 1759; the latter from Hecla, in Iceland, in 1783. The causes of these and corresponding catastrophes may be attributed to the operation

of the ordinary and well-known laws of matter upon a highly incandescent central mass of mineral substance; while the superficial irregularities thus produced are among the most important exemplifications of design traceable in the vast series of changes that have contributed to render this a habitable world.

If we inquire into the probable source of the action of volcanoes as they at present exist, we are led to comparisons which seem to yield very powerful evidence that the elevation of mountain ranges and other irregularities of the surface of the earth and ocean basin, that took place during the earlier periods of our world's eventful history, were dependent upon similar causes, however different might have been the circumstances under which their action occurred. Phenomena of the kind are doubtless far less violent, and their results less extended, than they formerly were, and at the same time much less frequent; but they are still sufficiently numerous and distributed to warn us of the instability of our abode, and of the possible revolutions it may yet be destined to undergo, through an agency as correspondingly vast and inappreciable as that which has previously depressed the unfathomed depths of the Atlantic, and lifted up the majestic summits of the Andes and Himalayas. The scattered disposition of eruptive volcanic cones and craters over the world tends to prove the prevalence of subterranean disturbance to be very far from limited; and though the fiery vents may be individually distant and isolated, the wide spread of the earthquake is a fearful reminder of the probable connexion, if not of the uniformity, of their origin.

Active volcanoes are generally in the vicinity of the sea. Of nearly 200 that are now occasionally eruptive, or which have at least been so within the present and the last centuries, one-half are situated in islands; and the continental ones are almost all of them either in peninsulas or in countries near the seaboard. Mountains, it is true—whose form, as well as the nature of the rocks composing the surface of the surrounding territory, proves them to have been volcanoes at some past period—are met with, even in the interior of the great continents; but such are always so circumstanced as to show that, during the time of their activity, some portion of the land that now surrounds them was covered by the sea. On the other hand, earthquakes are seldom experienced to any great extent in the inland parts of continents, their most alarming and destructive effects being almost exclusively confined to maritime districts: it is, indeed, in the immediate vicinity of the sea-coast that the greatest mischief has been done in all of those of which we have any accounts, and this although the space affected by the convulsions has in some instances been of vast extent. The earthquake that on the first of November, 1755, nearly destroyed the city of Lisbon, was felt over a surface of about four millions of square miles; but it was chiefly about the coasts of the Atlantic and the Mediterranean—especially on the African shores, where the cities of Morocco and Algiers suffered almost equally with the Portuguese capital—that its consequences proved so destructive as to place it on record as the most devastating of natural catastrophes that has occurred in recent times. All of these facts are in favour of the supposition that both of these fearful disturbances of the surface of our globe may arise from the influx of water upon its highly heated and melted interior, and its consequent conversion into steam, by the expansive force of which the lava is forced upward, and the solid crust caused to tremble and even undulate.

The effect of an earthquake is such, occasionally, as to elevate permanently large tracts of land. This occurred in November, 1822, on a line of a hundred miles in length upon the coast of Chili; while similar risings sometimes take place gradually, without any sensible shock, as in the southern part

of Sweden, where the slow elevation of the coast-line of Scania has been long a subject of observation. In a similar manner depression or subsidence may be produced, either suddenly during the disturbance by an earthquake, or slowly like the rise of the land in Sweden. Of the former, instances have been numerous; of the latter a very striking one is in operation on part of the western coast of Greenland, where, through a length of six hundred miles, the land is gradually subsiding beneath the sea; so that in one case, as observed by Dr. Pingel, "the Moravian settlers have been obliged more than once to move inland the poles upon which their large boats are set, and in some instances the old poles still remain beneath the water as silent witnesses of the change."

Direct evidence of the central heat is still wanting; and many geologists and natural philosophers are disposed to question its existence, and especially its capability of maintaining that continuous internal fluidity by fusion, which the issue from time to time of melted mineral matter from volcanoes seems to indicate. Nay, there are chemical and electrical causes by which it has often been surmised that these wonderful phenomena might be occasioned, without resorting to their explanation by the hypothesis of a gradually cooling planet. But our limits forbid the discussion of opinions that are at present purely speculative; and in adopting the more plausible (though not upon that account, perhaps, the more

decided) view of the subject, it is not intended to insist that it has any further claim to notice than its plausibility; neither is it necessary here that it should, unless it were possible to replace assumption by theory less liable to objection than are any of those hitherto proposed to account for the production of terrestrial heat.

The inequalities of the earth's surface, however they may have been occasioned, are most important conditions for the support of life; they have exposed the hard crystalline and vitrified rocks, the granite, and the cooled lava to the action of moving water, which, aided by other causes, has worn and broken them to fragments, so as to form successively through periods of incalculable duration a loose and changeable covering above their solid masses, in which the plant was to strike its roots when the time arrived for its creation. The effect of this wearing action in the earlier geological eras is seen in the numerous layers of sand, and mud, and gravel, long since hardened into stone, that lie disposed over the shapeless rocks that were at first produced by that explosive force, of whatever nature it may have been, which raised the mountains and uplifted the continents above the ocean; and the sand, and mud, and gravel were then, as they are now, the preparation for that soil by means of which the previously barren face of the earth was to be rendered fertile.

### THE MANGEL WURZEL CROP.

The mangel wurzel crop is becoming annually of greater importance. Its value to the grazier during the past spring has been invaluable. The turnip crop was lost by premature decay throughout nearly the whole kingdom, and the most available and reliable resort has been to the mangel wurzel, which in the last season was very abundant, was well secured in the autumn, and kept well during winter. Many thousands of cattle and sheep have been thus preserved through this protracted season in good order and condition, and will in good time be fully fattened; and thus by means of this crop the public will for this season be blessed, in having provision made for its customary supply of animal food. What would at this time have been the situation of the British public, had this crop failed to secure the approval of the farming body? Its comparatively recent introduction into the kingdom has been of incalculable value, and the improvement the roots in their varieties have undergone through the attention of its cultivators has secured its very general adoption as a field crop; and this season it has unquestionably been the salvation of thousands of flocks and herds, and will be the means whereby the public will (without feeling the inconvenience, further than a continued high price) be adequately supplied till the ordinary and customary supplies find their way to market.

In the immediate district from which we write, so great has been its value during the late cold spring, that provision has been made to extend its growth very considerably, and the seed is now being deposited under favourable circumstances. The favourite variety is the long red-bugle mangel; but the long red, long yellow, yellow globe, and red globe, are all cultivated in the dis-

trict and with great success. The long-reds in both varieties are preferred on the rich deep loams, and the globes on shallower soils. All are grown of good quality, and in good seasons yield very large and heavy crops.

The crops are put in on a clean fallow, well and deeply pulverized, chiefly on ridges, and either drilled in by the dry or liquid manure drill, with superphosphate of lime and ashes, or other artificial aids; or it is dibbled in, and the superphosphate of lime, as mixed, &c., economized by lads dropping the seeds and covering in the holes by the application of a handful of it in a damp state. The latter mode though tedious, is highly approved. The ridges are manured with good foldyard dung, at the rate of from 12 to 16 two-horse cart-loads per acre. The seed is invariably steeped to encourage its early vegetation. Hoeing commences as early as is practicable, and is continuous; it having now become an established truth that this root cannot be stirred too frequently.

Our principal object in introducing the mangel crop now, is to call attention to the importance of attaining the greatest amount of nutritive value in the roots. Crops large and bulky may be grown, but of comparatively little real value. The quantity of water contained in mangel-wurzel roots is astonishing; and although we do not depreciate a crop of vast weight, but deem it of great worth, inasmuch as a requisite quantity must be supplied to satisfy the cravings of the animal's stomach, yet if it is destitute of nutritive value the animal is soon affected by scouring or other ills, and but little good is the result. What is absolutely required is nutritive value, and to obtain this it is necessary to supply the soil with those

manures and chemical ingredients which will not fail to secure such a desired acquisition, so that we have in fact and reality "quantity and quality combined in plenty."

The following may be useful in causing many growers to adopt the best possible practice in the cultivation of this invaluable root.

COMPOSITION OF THREE VARIETIES OF MANGEL WURZEL IN THEIR NATURAL STATE.

	Long Red.	Short Red.	Orange Globe.
Water .....	85.18	84.68	86.52
Gum .....	0.67	0.50	0.13
Sugar.....	9.79	11.96	10.24
Casein .....	0.39	0.26	0.33
Albumen .....	0.09	0.18	0.03
Fibre, pectin, and pectin acid ....	3.08	3.31	2.45
	<u>99.20</u>	<u>100.89</u>	<u>99.70</u>
FLESH-FORMING PRINCIPLES.			
Wet state .....	1.60	2.12	1.94
Dry state .....	10.70	13.88	14.40

According to some authorities 1 ton of mangels remove the following quantities of mineral matter from the soil:—

	Mean of 3 specimens of bulb.	Mean of 3 specimens of leaf.
	lbs.	lbs.
Potash .....	4.99	7.86
Soda.....	3.02	2.52
Lime.....	0.41	3.31
Magnesia .....	0.43	3.27
Oxide of iron .....	0.12	0.52
Phosphoric acid .....	0.66	1.94
Sulphuric acid .....	0.65	2.20
Chloride of sodium....	5.29	12.82
Silica .....	0.54	0.76
	<u>16.11</u>	<u>35.20</u>

Inferences suggested:—1st. That the culture of this crop on sandy poor soils, which generally contain mere traces of soluble alkaline salts, cannot be successfully practised; but that a good dry loam, or a calcareous or sandy clay soil, will be best adapted for raising good crops of mangels, because these kinds of soils are richer in soluble salts of potash and soda than any other description of soils.

2nd. That the application of wood ashes, burnt clay, liquid manure, green manures, and other fertilizers rich in soluble potash, will improve the condition and raise the quantity of a crop of mangels; because this crop does require potash in large quantities for the perfection of both leaves and bulbs.

3rd. That the addition of chloride of sodium or common salt to the manure for mangels is likely to be attended with beneficial results.

Mr. M'Culloch's recorded experiments prove the relative value of mangels and swedes. He comes to the conclusion that 3 lbs. of mangels are equal to 4 lbs. of turnips. He states that 1 acre of 30 tons of mangels would yield 34½ stoncs of beef at 6s. 6d. = £11 4s. 3d.; that 1 acre of 20 tons of swedes would yield but 17½ stoncs at 6s. 6d. = £5 13s. 9d.—difference £5 10s. 6d.; and it is a generally received opinion that 30 tons of mangels are as easily to be obtained from an acre as 20 tons of swedes.

Mangels contain 11.766 of solid matter, Swedes 9.489. Mangels keep well if properly harvested; Swedes are liable to great fermentation in grave. The Long Yellow is proved to contain the most nutritive matter, but does not produce a crop so bulky as the Long Reds.

## THE BELLE-ISLE NUISANCES.

SIR,—I trust I shall be forgiven for addressing you on the subject of the pending prosecutions against the establishments for boiling blood, and other animal matter, at Belle-isle, connected as they are with the New Cattle Market, and so essential to the preservation of cleanliness, and freedom from putrescence which would otherwise accumulate in its area if some pecuniary stimulus did not exist to insure its instant removal. And my object is to show that, under proper regulations, such works are not only innocuous in themselves, but that the immediate collateral benefits derived from them far outweigh any inconvenience that may be felt individually by those residing in the neighbourhood.

It is necessary for me to premise that I am not in the least connected, or even acquainted, with the proprietors of these establishments, or their conductors; that I have never visited any of them; and that I have no interest whatever in defending them, beyond the elicitation of truth, and the prevention of a useful manufacture from being broken up by prejudice and caprice. And having myself been, some years ago, concerned in the working of a similar establishment in another part of the kingdom, which was, after four years of prosecution, stopped by an adverse verdict, obtained by the grossest

perjury, I can speak from experience, and, I trust, after so many years, dispassionately, on the subject, which is one of considerable importance to the public generally, and to the slaughterers and others connected with the market in particular.

I shall now, therefore, proceed to show that such establishments are absolutely necessary; that they must be placed in the vicinity of the supply of materials; that under proper regulations they can be rendered not only perfectly healthful, but free from anything that constitutes a nuisance; and that they are of importance, as creating both capital and labour out of materials otherwise a real nuisance wherever they exist.

First, the necessity for such establishments will, I presume, be disputed by no one who considers the subject in a proper light. The immense quantity of blood of animals slaughtered in the metropolis weekly must be disposed of in some way or other. At present it is collected in casks, and removed to these establishments, where it is boiled down in a fresh state, which prevents putrescence or decay, and renders the slaughter-houses comparatively clean, and free from impurities. What would be the consequence if these establishments were set aside? Why, that the blood would be turned into

the common sewers, to run into the Thames, where it would accumulate in coagulated masses on the shore, scattering poison in all directions by its putrescence, and thus becoming that real nuisance which it is now represented to be. This, I assert, is the *only* resource the butchers would have, if the boiling establishments were done away with; for as to its being removed otherwise, in that case it must be laid somewhere, and wherever that might be, it must become a nuisance of an intolerable character, as well as a heavy expense in its removal.

If, therefore, these establishments are necessary, the question is, where are the proper places for forming them? Common sense will tell any one that a heavy raw material like blood will not pay for a removal to a distance; and, in all respects, the nearer to the source of the supply of raw materials the manufacturer is placed, the better. If I understand the case of the Belle-isle plants, they were fixed there before the neighbourhoods now complaining so bitterly were built over; in which case they have come to the nuisances, and not the nuisances to them. I question whether in that case a jury would convict. One great advantage of having these near the slaughter-houses is, the facility of reducing the blood by boiling in the freshest possible state, and before any change of a deleterious character can take place. No animal matter, in fact, so soon putrefies as blood; and in that state the gases emitted are really poisonous. But the boiling of blood in a fresh state is no more injurious than the operations of a cook's shop. I have known men who worked at these manufactories who became more robust than before; and their families, who resided within a few yards of the boilers, never knew what illness was, whilst they continued there.

Let such establishments, however, be fixed where they may, it is better for them to be together than scattered; as they would only, in the latter case, acquire the greater odium. For this reason, the tanners and curriers have fixed themselves, in a body, at Bermondsey; the manufacturing chemists, too, generally lie near each other; and why these also should not be considered nuisances I cannot say. But there they have been, time out of mind, without molestation or complaint. I would engage to say that if a tanner or a currier were to plant himself in any new neighbourhood, he would at once be denounced as an intolerable nuisance by the sensitive persons, between whose nobility and the wind they should chance to come.

I have already spoken of the innocuous character of a blood-boiling establishment. This, however, I admit, depends upon the care taken to boil the materials fresh, and to keep the casks and utensils, as well as the whole of the premises, scrupulously clean. If this only is attended to, I defy any medical man to prove that any deleterious gases can be emitted from it in sufficient quantity to produce illness. Nor is this challenge offered at random, having now before me the professional opinion of one of the most eminent chemists of the present day, drawn up expressly for the purpose of exonerating a similar establishment from the absurd

charges that were brought against it, and showing that, when conducted on proper principles, it is impossible that any evil consequences to public health can ensue, or any gases of a poisonous nature be evolved. The danger can only arise from the negligence of the workmen, in allowing the boiling material to burn at the bottom or sides of the boiler, by which carbonic acid gas is evolved; or using putrid materials, which is opposed to the interests of the proprietor; the yield of solid product being in exact proportion to the freshness or otherwise of the blood, &c., under process. It is therefore the direct interest of the proprietor to see that this condition—so essential to the healthiness of the establishment—is carried out to the fullest extent.

Such, however, is the improvement effected by science in these processes, that what is considered offensive in them, may not only be suppressed entirely, but rendered profitable to a large extent. By the use of condensing and evaporating pans, the various gases may be separated and condensed. The most abundant of these is *ammonia*, which may all be absorbed by placing pans of common salt within the pipes through which the gases pass from the boilers, &c. When supersaturated, the salt becomes a valuable article of commerce, as *sal-ammoniac*, or ammoniacal salts, the use of which, in agriculture, is so well known by scientific men. The inflammable gases also may, by a simple process, be separated and usefully employed in lighting the premises. In fact, every particle of the æriform fluid evolved from these animal substances may be thus arrested and converted to some beneficial and profitable use; and these establishments, which now create so much alarm, apprehension, and hostility, will, in the end, be found to be not only perfectly harmless, but free from annoyance to any one, and doubly beneficial to the community.

I am quite aware that my last proposition—the pecuniary consideration—ought to have no weight, if it could be proved that the establishments themselves were injurious to the public welfare or health. But having, I trust, shown that such is not the case, I shall now proceed to show that in the creation of capital, the employment of labour, and the consumption of materials of various kinds, these establishments are of no small importance to the community. And in order to illustrate this more forcibly, I shall give you a short sketch of the history of the one to which I have already referred, as having been suppressed by an adverse verdict, obtained by the grossest perjury it ever was my lot to hear in a Court of Justice.

In the year —, a house in London determined to form an establishment for drying blood in the town of —. Previously, this material had been poured down in the sewers which emptied themselves into the river —, where it always lay in a mass of putrid coagulum, and infected the quays at all times, with febrile disease, especially in hot weather, when the effluvia were intolerable. Not one shilling had ever been derived from this material, nor was it ever turned to any account.

Our friend having contracted with the slaughterman, commenced his operations. His establishment consisted of a premises which had been shut up for years,

and which stood in *the middle of a field*, two drays and horses, two draymen, two boiler-men, and one warehouseman. To these he paid wages ranging from 10s. to 18s. per week, with overtime money for night-work. Besides these, he immediately called into requisition the services of the carpenter, bricklayer, ironfounder, cooper, wheelwright, and many other craftsmen, for some of whom constant, and others occasional, employment was created. It is unnecessary to go into all the details of this concern; and it will suffice to state that from £800 to £1,000 per annum was paid in the purchase and manufacture of an article which never before fetched a penny, but was a constant nuisance and injury to the health of the town; that £90 per annum was paid for premises previously for a long period unoccupied, £250 for labour, £130 to the steam-vessel companies, and considerable sums to every kind of tradesman and mechanic, whilst not one shilling of the profits of the concern were ever spent out of the town, of which all the *employés* were natives.

With regard to the establishment itself, it stood in a field open to the south and west, and at the distance of from 60 to 100 yards from any houses to the north and east. *The whole* neighbourhood almost consisted, on these points, of every description of trade that might properly be termed "nuisances." Within a radius of 250 yards, not less than fifty or sixty of such establishments were to be found—tanners, curriers, skimmers, knackers, catgut makers, glue, size, and parchment boilers, malt roasters, manufacturing chemists, rectifiers of acids, dyers, distillers, and a variety of others "too tedious here to mention." In fact, almost every other house in the vicinity was occupied by persons connected with one or other such trade; and the neighbourhood ought to be considered as the "Bermondsey" of the town of —

It might reasonably have been hoped that this alone, setting aside the utility *per se* of the concern would have prevented any prosecution. But no! before ever a brick was laid of the new factory, a cry was raised by a doctor who happened to have a garden near the factory. It was instantly taken up by the residents, and the whole town was laid under contributions to commence a prosecution against what they even did not

know the nature of; and the proprietors of some of the most deleterious establishments joined in the hunt. To make a long story short, after four years of persecution, and having brought the parties up before the various courts fifteen times, they at last succeeded in obtaining a verdict against them, and the concern was stopped. This was principally through the evidence of a medical man; the value of whose testimony will be estimated when I state that, wanting to show that it was of no use shutting the windows against the effluvium, he swore that he "*saw the steam rise from the pipe* (about 2½ in. in diameter), *fly across the field, settle on a chimney, and disappear!*" This horrible fact paralyzed the whole court, except the judges and counsel, the former of whom exhibited something like a smile at the unscientific absurdity of the evidence. The consequences, however, of the verdict were that the blood from the shambles again flows into the river, that the butcher-boys are without their pence on the Saturday night, that a large establishment is broken up, and that from one thousand to fifteen hundred pounds per annum are lost to the town of —, which has once more returned to its original state of filth and foetor, the nursery of fever and every abomination.\*

Whatever, then, may be the clamour against the establishments in Belleisle, I trust the magistrates will pause before they hold the proprietors to bail to answer the charge at the sessions. Rather let them insist upon their doing all in their power to suppress the effluvia, so as to render the concern inoffensive as well as harmless. Let them carry out the improvements that I have suggested, and they will accomplish this without difficulty. As to the sickness said to be superinduced by it, I am quite aware that "*imagination will kill and imagination will cure*"; and I ascribe the sickness to the outcry raised by the medical man, who, I have no doubt, will make a very good thing of his opposition. Repeating, then, that I know no parties on either side this controversy, and that I never conversed on the subject with a single individual, but have taken it up on general and public grounds, I beg to subscribe myself,

Yours truly,

FAIRPLAY.

London, Feb. 2nd, 1856.

## FARMING WITHOUT A DRILL.

It were difficult to estimate the general loss sustained for the want of proper implements and machinery in connexion with agriculture; and perhaps at no season of the year is this more severely felt than in seed-time. How many farms, for example, are there in the United Kingdom, upon which there is not a single seed and manure drill, a harrow worth the yoking, or roller that is not worse than useless! and yet upon these very farms the tenants are the greatest grumblers about bad seed-times, and their consequences—increased expenses in hoeing, and deficient harvests. Drills are let out to hire at so much per acre, one serving a whole "country

round," having five or six times the land to go over which it can do in a season; hence the majority of farms are too late, while some, to avoid this, have recourse to the opposite extreme. Politicians may advocate secrecy in collecting agricultural statistics; but so far as implements are concerned, *ought not the reverse to be the rule?*

We lately met with an interesting example of this kind, in examining a farm of 300 acres, not 100 miles

\* This prosecution, too, was conducted under the instructions of the Board of Health!

from the British capital, for the purpose of renting it ; and what made it doubly more so, is the fact that it was and had been for some time in the natural possession of the proprietor—one who cannot plead the want of capital ! The arable land, consisting of about 200 acres on a four-course shift, was principally a dry, sandy soil, subject to suffer from drought during summer. That portion of it for oats and barley was ready for sowing, with the exception of one field under winter turnips, which had to be eaten off by sheep. We hinted several times gently that the land was in the best possible order for harrowing, drilling, and rolling, while the season was more than inviting ; but the bailiff grumbled as often, in reply, about the want of a drill, there being nothing of the kind upon the farm ! With a “dripping May,” the land produced fine crops, he said ; but if burnt up about this time or prior, only so and so, there not being very much corn, and still less straw. The fields were rather small, so that we soon got over one into another, where the topic of a fine seed-bed appeared before us as fresh as ever. Having gone over some three or four, we came to one under winter tares for eating off with sheep. The crop was luxuriant, and promising in the highest degree ; proving in a very satisfactory manner the importance of having plenty of sap in such ground. At length we came to the lands which had been under turnips. One field was ploughed, and ready for sowing ; while a second was nearly so. The crops in both had been eaten off with sheep, so that our practical readers will readily comprehend the state they were in, and the loss being sustained from lying exposed in this manner to the weather. Here every ridge ought to have been harrowed, drilled with seed, and rolled as soon as ploughed, in order to keep in the sap ; but instead of this, ridge after ridge was left exposed to the rustling and drying winds of March, in that cloddy state peculiar to sheep-trodden lands during winter. By this time the want of a drill was as familiar in our mouths as household words ; so, accordingly, by way of consolation to the bailiff, we pointed to the clouds as promising rain at no very distant date, not knowing that some wet clay-land fields lay only a little before us, ploughed and ready for getting in the seed, in excellent condition. Mr. E—— had unquestionably his master's interest at heart ; he at this time giving unmistakable evidence of it. His tongue—a very voluble one—pouring forth a torrent of figures, like the columns of a “Ready Reckoner,” proving beyond a doubt that 300 acres of land could well afford to keep a drill, and something more. Three long days and nights, however, had yet to expire before the promised time of a drill arrived, and even this depended upon the weather, and circumstances over which the contractor had no control. What the sequel was, we did not wait to see ; but so far as gone forms part of the history of an English landlord farming without a drill.

But this is not all ; for, on coming to the “conditions

of lease,” we were told by way of commendation that less than £—— would cover the out-goings, including implements, tillages, &c. ! “What next ?” was the first impulse which such a proposition as this left upon the mind ; but of course civility demanded a different answer. Accordingly, we started the counter one of *farming without a drill* ! It was successful, the parties at once comprehending that we intended the farm as an experimental one for *steam culture*, involving a little more capital. The fact is, the farm would have been a bad bargain at no rent at all, had the tenant been bound to farm with the stock then upon it.

This, too, is no premature conclusion ; for in going over a farm, it is always necessary to estimate results from the means used to effect them. In the case in question, for example, we had for results part of the wheat and barley crops of 1855 unthrashed ; also hay in the stack-yard, with some turnips, potatoes, and carrots not yet consumed. In the fields again there were the winter wheats, young seeds, tares, and grass on the meadows and pasture fields ; next, the quality of the soil of the respective fields on which the above products were grown and growing, with the manure applied ; then the implements and machinery, with the live stock and household accommodation ; and, lastly, the number of servants employed on the farm. Now, between these we had to strike a balance ; and that balance showed that what the bailiff was paying in the shape of rent was too little for us as tenant's profit. Before we could have taken the farm under such circumstances, we would have required to have seen some prospects of deriving a little more for ourselves than the balance after paying expenses, leaving nothing for the landlord as rent ; whereas, with a proper stock upon the farm, and a sufficiency of artificial manure applied, a fair rent could have been paid.

Such is the difference between good and bad farming—between the requisite amount of improved implements, machinery, and manures, brought to bear upon the soil, and the reverse ; between the flail of the last century, and the steam-engine and thrashing-machine of the present ; between hiring your neighbour's drill, and using your own ; in a word, between antiquated systems and modern ones. The details of such a picture we leave our readers to fill in. The flailmen in the barn, together with the old thatched buildings, would certainly form a rich subject for a modern Hogarth, such as would do justice to Marlborough House or the National Gallery. In the field, again, the horses' feet were doing more harm than the harrows were doing good. Once over the ground with a pair of Howard's would have been more effective than three times with such things. Even the hundred acres of meadows were so intersected, like a network, with open drains, as to render the use of a haymaking-machine next to impossible. And what is not the least amusing part of the story, is the fact that the farm, after all, was among the best-managed ones in the district !

## THE LONDON, OR CENTRAL FARMERS' CLUB.

## THE APPLICATION OF GEOLOGY AND HYDRAULICS TO THE DRAINAGE OF LAND.

The usual monthly meeting took place on Monday, May 5, at the Club-house, Blackfriars; Mr. J. Wood in the chair. The subject appointed for discussion, introduced by Mr. R. Baker, of Writtle, was "The Application of Geology and Hydraulics to the Drainage of Land."

After a few introductory remarks from the Chairman, Mr. ROBERT BAKER commenced his observations by stating that he hoped to be able to treat the question without reference to the particular practice of any one, feeling assured that the object he had in view, of explaining the principles of draining, would be better attained by dealing with the subject as a science, than by attacking or defending any particular systems adopted by others. He then proceeded to observe that the diagrams and plans he had introduced had been prepared for explaining the principles of geology; the larger one explained the geological arrangement of the strata of the earth, and was copied from Dr. Buckland's celebrated work; the other he had prepared himself, to explain the subject then under notice, and of which he should treat as he was best able, begging the members to excuse his not having prepared a well-digested paper in place of the imperfect address he was about to offer; but although he was aware that no excuse should be allowed to persons who neglected the performance of any duty self-imposed, still, from the pressure of business, and other matters, he craved their indulgence. The science of geology treated of the formation and disposition of the various strata of the earth; and, although the subject under notice would not afford him any opportunity of bringing it before them beyond that of explaining the theory and disposition of the soils and subsoils affecting the operations of draining, still some of the phenomena attendant upon their distribution might not be out of place; and, commencing at the beginning, he would state that one of his diagrams explained the relative position of the primary and transition rocks—the primary being those of the oldest character, as granite, igneous in origin, and unstratified; the secondary, or transition rocks, being those which had been produced from the primary by the action of the elements, and had become deposited by water and stratified; the tertiary series consisted principally of chalk, London and Wealden clay, together with every variety of clay which had been at a later period acted upon by currents of water or displaced by its power, and this series was denominated erratic, from the deposits of gravel, sand, loam, and other substances becoming irregularly intermixed with large boulders beneath the surface, and upon the nature of which he

should have occasion to dwell. Mr. Baker then proceeded at some length to explain the various depositions of the earth's strata in their regular order and succession, in relation to each other, and explained by the geological map the respective positions assigned them upon the surface of this kingdom, showing by proceeding from the north-east in a south-westerly direction, the diluvium of Norfolk, consisting of beds of sand and gravel, to the crag, clay, chalk, gravel, loam, and other deposits of Suffolk and Essex, passing over the London clay to the chalk clay, and thence to the chalk of Cambridgeshire, the green sand of Huntingdonshire, to the oolite of Somersetshire, &c. He then by the diagram explained that the deposition of the erratic strata was of an alternating character, a porous soil usually resting upon a tenacious or impervious soil beneath, the water percolating freely through the former until it reached the latter; and there, meeting with resistance to its further descent, flowing underground until reaching some point where the obstruction was least, it flowed out and formed springs, generally at the lower edge of hills and mountain-ranges; thereby, by a wise ordination of Providence, plentifully supplying every district with pure spring-water. Were it not for the retentive character of the clay, by which the water was prevented sinking beyond our reach, it would not be available for our use, thus almost disproving the opinion advanced by a certain class of drainer, that water percolates freely through compact homogeneous clay freely. Mr. Baker next proceeded to explain the nature of Artesian borings for water, showing that, as the water, from being confined within a channel at a very great depth beneath the surface, and its accumulation being greatest at a higher level, rose by its own force, and by means of the perforations made by these borings, from 100 to 300 feet and upwards, as the case might happen, and flowed over the surface constantly for many years together, thereby benefiting districts hitherto unhealthy, by affording them an abundant and continuous supply of spring water; and no doubt that the water so accumulated at length found a natural discharge by aid of the porous strata, through which it flowed to the sea, as the rising and falling of the tides affected the discharge of the bored springs, the columns of water from them rising and sinking every twelve hours, with the flow and ebb of the tide, at all points where they had been formed near the sea coast. The vast accumulations of water by which we obtained a continuous supply with apparent little diminution was, nevertheless, affected by long seasons of drought, exactly as large fresh-water reservoirs were also affected

above ground. Lake Erie, for example, containing upwards of 10,000 acres, discharged itself by the fall of Niagara, yet sometimes the height of the water was several feet higher than at other times; this arose from the supply becoming increased by sudden rain, the melting of the ice and snow upon the mountain ranges, &c., influenced also by low temperature and lessened evaporation, which, being confined within the bounds of the lake, and escaping by one outlet, influenced the discharge at that point in the same way as an immense underground collection of water influenced the flow of ordinary springs at the surface. The ordinary springs he had referred to were produced by water escaping from extensive reservoirs beneath. Water compressed in any channel would seek the lowest level, and then, by its own elasticity, would invariably have a tendency to escape upwards. Whenever thus disposed in underground channels, the description of land lying above was called spring land, and it required a mode of drainage entirely different from another usual description, which obtained an overcharge from above, from which it could not be relieved except by evaporation, or by slowly percolating through the subjacent soil. Water by its own gravity would descend into a soil more or less porous, until, from becoming fully surcharged, it would flow over the surface at the lowest point of inclination; or it proceeded laterally and horizontally to an adjacent drain, and thus, by gradually discharging itself through the soil, left it dry and fit for cultivation, and the production of agricultural crops of grain or roots. Upon the majority of strong clay soils the largest portion of the water that became absorbed effected its passage therefrom into drains a little below the point where the cultivable soil united with the tenacious subsoil below; or, if the upper stratum happened to be porous, it sunk deeper, until at length it found its way into the drain in the manner before described. By way of experiment this winter he had a trench cut exactly one yard from a new pipe-drain, three-and-a-half feet deep, the drain being also of the same depth, and parallel thereto. The trench was filled with water, which during the first night was discharged to the depth of 18 inches; but the remaining portion of the water remained in the trench, to the depth of about two feet, for several days afterwards; proving that it could not escape through the clay, or, if it did so, only by percolating very slowly. Water exerts a power in all directions equally: the pressure downwards is always in relative proportion to the height of the column, and is equal upon each square inch of the base yielding it support; but it must be recollected that a column of water is never found to exist in a subsoil of two feet in depth. Water sinks by its own gravity, and, if it meets but little resistance, exerts a pressure in accordance; but, if a soil of close texture intervenes, it percolates only, and that slowly, and is partly upheld by it; but, as the resistance is always least nearest the drain, the water escapes at once rather than by sinking in the soil downwards, where a greater resistance exists than is found in

the direction of the drain. The space of soil nearest the drain being the first that becomes discharged of water, the next portion of the soil also discharges itself, and so in succession to half the distance betwixt the nearest drains, and continues so to discharge itself until the whole of the upper soil becomes released of its superabundant supply; but if the distance is too great betwixt drain and drain, the water does not escape freely from those points furthest distant therefrom. It will thence become apparent that in draining soils of a retentive character at the surface, the depth of drain is no longer an object that is absolutely necessary to carry off the water freely. It should be so deeply placed below the surface as not to be liable to derangement by external interference, and for this a drain three feet in depth would be amply sufficient; but if, on the other hand, the upper soil is kept in a wet state by the upward action of water from below, then the drains will need to be made deeper to enable them to carry it off sufficiently, and not to allow it to rise by the pressure produced from below, by its flowing from a higher level, also aided by the capillary action going on in the soil above. Mr. Baker then at some length explained how drains acted most efficiently, whether by diagonally or straight up and down the greatest inclination of the surface. He stated that undoubtedly the line down the hill was the best, provided it was not too sudden; and explained that a drain of three feet in depth would drain a porous soil, even deeper than the drain itself, as water lying above a given point would be drained to a depth the difference of the fall from the point in question, in a direction up the level of the drain; but that a drain diagonally would drain the soil lying above it parallel a further distance than the soil below; also parallel by the difference of the fall, proportionate with the distance from the drain. Mr. Baker then adverted to the effects that had been produced at a later geological period upon the surface soils of this kingdom, by water converting the clay subsoil into ridges, almost similar to the ridge and furrow system pursued above; and afterwards by subsidence filling the interstices so excavated with porous soils, through which water percolates freely. Hence the system pursued upon the Keythorpe estate of Lord Berners, in Leicestershire, and which had been drained by taking advantage of this circumstance, by first digging trial-holes at various distances from point to point, and afterwards by observing how far distant the drains operated upon them, cutting other drains to secure a perfect system. Mr. Baker said that this question had been gravely discussed, with little advantage; the fact was, that every drainer set up a theory of his own, which he would not resign, however convincing any other theory might appear, or however much practice confuted it altogether. As much discussion had probably taken place respecting pipes in clay as had taken place over pipes of clay, and probably with as little satisfactory result. He considered it essential that every one proceeding with the drainage of land

should beforehand perfectly understand the nature of the soil below that he might have to deal with; this was essential to success, and indeed soils were designated below by appearances above. The plants that grew upon the surface also indicated the quality of the subsoil below. Thus the corn poppy, tinc-tare, May-weed, corn marigold, white charlock, groundsel, fumitory, all indicated by their presence a light sandy or silicious soil. The wild oat, garlic, daisy, charlock, millilot, fescue varieties of grasses, cowslip, orchis, all indicated the presence of chalk, especially chalky clay soils; corn mint, arsmart, coltsfoot, &c., indicate wet spongy subsoils; thus geology and botany go hand in hand so far as the constituent properties of soils and subsoils influence vegetation. The knowledge of these matters greatly influences successful draining. The mixing or combining the subsoils with the upper soil materially influenced production. Through the silicious districts of Norfolk cultivation was accelerated by digging up marl clay from beneath, and spreading it on the surface. Throughout Essex and Suffolk the carting of chalk clay acted more beneficially upon the first application than continuous applications of manure would effect. The clay of Lincolnshire was dug up and combined with the peat soil above, and the utmost productiveness was attained. It was necessary that a farmer, upon hiring a farm, should know sufficient of geology beforehand to enable him to predicate what he would find below. It was a most important consideration upon many farms, and might be turned to as good account as the application of either chalk or lime, found so beneficial for the production of grain crops throughout districts of vast extent in this kingdom. Mr. Baker concluded by stating that his object was to elicit truth, and not to set up any theory of his own (Hear).

Mr. BAILEY DENTON (of Stevenage, Herts.), after some introductory remarks upon the general subject of the lecture, proceeded to comment upon the observations of Mr. Baker with regard to drainage. That gentleman had stated that drains at four feet depth would not draw water, and that clay was impervious. He (Mr. Denton) begged to say that it was his intention shortly to publish the result of some most minute experiments which he had made, and which went to show the facility with which water would penetrate clays, that were the most homogeneous and impenetrable according to the shallow-draining theory, and the water running from the outlet would answer to the rain-fall. At Haiskworth, in Bedfordshire, the soil was proclaimed to be undrainable; but it had been drained nevertheless, and that with such accuracy that it responded most minutely to the rain-fall. That fact was an incontrovertible answer to all that might be said to the contrary. Again, Mr. Baker said that cross drains were not so good as upright drains, or drains which ran in the direction of the fall of the ground; but was he not aware that the most prominent point about the Keythorpe system was that the drains

crossed the fall? He (Mr. Denton) had risen thus early in the discussion because he had been challenged to give an opinion with regard to the Keythorpe drainage, and had come prepared to do so to-night, and also to challenge contradiction of what he said. When he opposed the Keythorpe system in 1854, he had not seen it; he had only read the description of it in Mr. Trimmer's paper. And why had he opposed that paper? Because it advocated a system of drainage where one-tenth part of the whole was drained 18 inches deep with straw and bushes. This might, perhaps, explain clearly enough why Mr. Baker sympathized with Lord Berners; but he (Mr. Denton) would ask any reasonable man to say whether that was a system of drainage that ought to become a national system, a system for any other person to follow except tenant-farmers, and it might be very good practice for them. But, as a national system of drainage, was a depth of 18 inches a proper and reasonable depth? and further, were such materials as straw and bushes the proper materials to be used for the purpose? Besides, the drains crossed the fall of the ground, and Mr. Baker himself conceded that that was an error. These, then, were the grounds upon which he had ventured to disagree with the theory of Mr. Trimmer, not the practice of Lord Berners; but he never denied that the drainage had been effective, and that the theory of Mr. Trimmer was there exemplified. Subsequently certain members of this club, Mr. Baker and Mr. Webster among them, visited the Keythorpe estate, and all proclaimed that the drainage was perfect.

Mr. WEBSTER: As far as they saw.

Mr. DENTON: In deference to such knowledge, of course he was obliged to admit it as proved. A year after that he was asked to read a paper to the Society of Arts. He did so, and again he did not deny the theory of Mr. Trimmer, nor the effect of Lord Berners' drainage; but he spoke to the same points as he had done before. Again, it appeared that the cost of the drainage was 35s. an acre, and that for labour only; consequently, in an economical point of view, it had little to recommend it. Since reading his paper before the Society of Arts, he had himself visited Keythorpe; and here he might be permitted to record his sincere appreciation of the great hospitality with which he had been received by its noble proprietor, and of the worthy example he had set to all landowners and men of his own rank in life. He would adopt for his motto on this occasion, *non quod sed quo modo*, and he was sure there was not a person then present but would echo the sentiment. Well, he had seen Lord Berners' work, and been challenged to express his opinion upon it; he hoped, therefore, he should be excused of egotism if he answered to that challenge in his own language, in the first person singular. He had examined the drainage at Keythorpe, and he at once proclaimed that it was most defective. The quality of the soil at Keythorpe was various. There were clays and there were sands, there were gravels and there was rock. The gravels and sand were drained perfectly in some places; but it appeared as if, where it

was perfectly drained, it was done by accident and not by system (laughter). This statement might be a startling one; it was nevertheless true (renewed laughter). As to the clays, some portion of them was not drained at all, another portion was drained shallow, and again another portion was drained deep and drained well: but, upon the whole, there seemed to be a total want of anything like system or premeditation. Several fields were undoubtedly well drained, but the majority were defective. Mr. Trimmer left the impression by his paper that the estate consisted of clays, whereas a large portion of it was gravel and sand.

Mr. WEBSTER: Resting upon clay.

Mr. DENTON would be excused if he said that he doubted whether the lias clay was on that portion of the estate which he was shown, at all. Mr. Trimmer, in his paper, spoke of the subsoil with a corrugated surface, and certainly the undulations looked very nicely upon Mr. Trimmer's paper; but M. de la Trehonnais said that when he was at Keythorpe he asked Lord Berners to show him those corrugations, but the reply of his lordship was, "Let Mr. Trimmer answer for himself; I cannot show them."\* He (Mr. Denton) also pressed his lordship to show them to him; but although he went down for that purpose, he was disappointed, and did not see them. What had Lord Berners done? He had decidedly made use of the gravels to drain the clays, to a certain but very limited extent. He remembered an old rhyme which, speaking of the value of a dry season, ran thus:—

"When the clays feed the sand,  
Then 'tis good for Old England;  
But when the sand feeds the clay,  
Then she cries, 'O! lack-a-day.'"

Lord Berners had, no doubt, made use of those variations in the soil to drain the clays, but he had not made use of them to empty the ridges and furrows described by Mr. Trimmer, and the effect was very small indeed. Now, he (Mr. Denton) would suggest that the Central Farmers' Club should appoint a committee to go down and investigate the Keythorpe drainage. He would then put in contradistinction to the Keythorpe drainage two drains of his own, and ask the committee to decide between the three; and beyond paying the expenses of the committee, whom he pro-

\* Mr. Bailey Denton has furnished the following explanation of what he said on this point:—"What I said in referring to the regular corrugations of subsoil portrayed by Mr. Trimmer in the *Journal* of the Royal Agricultural Society of England, and transcribed by M. de la Trehonnais into the pages of the *Journal d'Agriculture Pratique* of France, was that when at Keythorpe myself I asked Lord Berners to afford me an illustration, on the ground, of the undulating subterraneous surface shown by Mr. Trimmer to be so temptingly regular on paper; and his Lordship's remark was, 'I will leave Mr. Trimmer to answer for himself.' I did not quote any words of M. de la Trehonnais, but contented myself by referring to the published drawing by which he had exhibited in the French Journal the condition of the subsoil stated by Mr. Trimmer to be frequent in England, but which I believe will be found to be exceptional in the most limited degree, and to have no beneficial influence on the general practice of draining, either in this country or in France."

posed to name himself and who he knew would be unexceptionable, he had drawn a check for 20 guineas, which he now handed to the chairman, to dispose of in any way he might direct, in the event of Mr. Trimmer's theory proving to be the correct one. His great anxiety was to elicit truth, and the names of the gentlemen he would propose as a committee were M. de la Trehonnais, the chairman of this club, and Mr. J. C. Morton (Hear, hear, and laughter).

Mr. TRIMMER (of Dartford) was glad that Mr. Denton had made up his mind on the point whether the Keythorpe estate was effectually drained or not. He understood him to say that it was not, and also that the subterraneous furrows—the corrugated surface to the subsoil—which he (Mr. Trimmer) had described, did not exist.

Mr. DENTON: I failed to discover them.

Mr. TRIMMER: The Keythorpe drainage in fact depended very much upon the presence of those furrows, and Mr. Denton's appeal to M. de la Trehonnais was rather unfortunate he thought, inasmuch as that gentleman had a letter in the *Mark-lane Express* of that very day, in which he spoke of those furrows, controverted the statement of Mr. H. Davies that they did not exist, asserted that they were at Keythorpe, and that the Keythorpe system depended upon them. With regard to the observation of Mr. Baker, as to the percolation of water down to a retentive bed of clay, there stopping, he was lately over an estate in Suffolk, on which he expected to find these furrows and ridges, and to which he thought the Keythorpe system would be applicable; but although there was the same boulder clay on which he relied for the applicability of the Keythorpe drainage, the surface was level, and not a drop of water came in, unless at the junction of the boulder clay with the brick-earth clay. Trial holes were sunk to a depth of 20 feet, and still no water came in. On the level surface which Mr. Baker had described, therefore, there was a porous soil resting on a stiff clay, yet not a drop of water came in except at the junction of the two clays; and on that kind of soil and surface he certainly did not see what was to be gained by carrying the drains below the junction.

Mr. B. WEBSTER (of Neath) thanked Mr. Baker for the practical information he had communicated to the club. In the early days of drainage, Elkington began by cutting off the springs. He attempted the same system by deep drains on the strong clays of the country, and it was found not to succeed. Mr. Smith, of Deanston, then introduced a system of uniform drains, which answered well, and was adopted throughout the country. Later still, Parkes recommended a system of deep drains with small pipes at wide intervals in strong clays, and this had decidedly not answered. Mr. Denton would bear him out in saying, that, at any rate, wide intervals and small pipes had decidedly failed. And if they examined the drainage in any county in England they would find that deep drainage at wide intervals was not only objectionable on the ground

of expense, but had likewise most completely failed. So that the question still remained to be decided, whether upon those strong retentive soils there was any advantage in going beyond the depth of three feet. According to the report contained in the *Highland Society's Journal*, it appeared that Mr. Hope, of Pentonbarns, had proved that on his farm in East Lothian, the land, which was shallow-drained at moderate distances, produced heavier and better crops than where it was drained deeper. The experiment was first tried in 1842, and this very day he (Mr. Webster) had received a letter from Mr. George Hope, in which that gentleman stated that he had been thoroughly convinced, from that time to this, that on the retentive soils there was no advantage in going deeper than three feet, and that the crops grown on land drained at that depth were decidedly superior to those grown where it was drained at a greater depth. Of course, then, if there were no advantages to be derived from carrying out deep drainage, it would be wise to save the expense of going beyond three feet. At a discussion in the Society of Arts a month or two ago, Mr. Clutton, a most experienced man, stated that where clay land was drained, the action of the air and water passing through it so altered the very nature of the strong yellow clays, that in a few months they would become a deep rich loam. Now that, he (Mr. Webster) took leave to say, appeared to be a perfect absurdity, because they might expose the strongest clays to the action of the sun and air for years, and yet they never altered as in tile and brick yards. And if Mr. Mechi's experiments in deep draining had not changed the character of his clays, he thought there was pretty strong proof that the air and water did not produce the effect which was attributed to them. The only advantage appeared to be that the temperature of the soils was changed and became warmer, but this was not yet proved. As to the system of drainage pursued at Keythorpe, he had been there, and was of opinion that the greater portion of the land was most effectually drained. He believed that that system would prove most advantageous when carried out where it was applicable.

Mr. SIDNEY (of Peckham) said, notwithstanding what had failed from Mr. Webster, he thought the agricultural community were greatly indebted to Mr. Josiah Parkes. Mr. Webster had spoken as if Mr. Parkes had based his whole system on a particular depth, and on the use of small pipes. That this was not the fact would appear from the following extracts from works, of which Mr. Parkes was the author:—"There cannot, in my opinion, be a more crude or mistaken idea than that one rule of depth is applicable with equal efficiency to soils of all kinds: the same remark applies in regard to assigning any common rule of distance between drains, which may be greater or less according to the depth of the drains, and the texture of the particular soil. It must be self-evident that water will flow through a gravel, or a sand, or a loam, with less obstruction to its passage than through a clay, and easier through one clay than through

another containing different proportions of silica and alumina." \* \* \* "An inch-bore pipe is as good in its place as a 6 or a 12 inch; and it is usual with me to employ all sizes between these extremes, and all with equal propriety; but, practically, the size used is subject to great variation in different cases." These quotations were sufficient to show that there was nothing empirical in Mr. Parkes's views. Up to 1843 there was nothing like a system of drainage in this country. The whole thing was a secret on different farms. There was no communication between one farmer and another on the subject.

Mr. BAKER observed that Mr. Smith, of Deanston, laid down a system long before Mr. Parkes (Hear, hear).

Mr. SIDNEY continued: Mr. Smith published a few lectures before 1843; but he did not take a complete and philosophical view of the question, as Mr. Parkes did at that period. Mr. Smith's experiments were directed to the removal of surface water; whereas every one knew now that the great object was to carry off the water beneath the soil. Mr. Smith's shallow system of drainage had proved a perfect failure on every great estate where it had been tried—"No, no!"—while, on the other hand, Mr. Parkes had rendered most essential service to agriculture by placing practical men in a condition, as it were, to argue the question, and to compare the results of their experience.

Mr. THOMAS (of Bletsoe) said, having had thirty years' experience as a farmer and twenty years' experience as a drainer, he wished to say one or two words. As regarded stiff retentive clays, his present mode of proceeding was to drain them with parallel drains, generally at a depth of three feet; and he thought that if they could get the water off by going that depth, it was folly to incur the expense of going any lower. In the case of other descriptions of land he had gone 6 or 7 feet deep; but then he had made one drain suffice for 30 acres. He would defy any man to lay down any rule which could be applied universally; they must always be guided to a great extent by the peculiar circumstances of the case.

Mr. BIDWELL (of Ely) said, amid all this discussion as to the comparative merits of deep and shallow drainage, it seemed difficult to arrive at definite conclusions as to what should really be the maximum and what the minimum depth. He thought that for strong retentive clays a depth of 3 feet was quite sufficient; but he was by no means satisfied that it was so in the cases of clays of a different character, and he would be glad if Mr. Webster would let them hear his opinion on the point.

Mr. WEBSTER said his opinion was, that when they had got to the water at a depth of three feet, and when there was an impervious clay below that depth, it was useless to go any lower. He would never put in a drain of less than from thirty to thirty-six inches deep.

Mr. BIDWELL was glad to hear it now admitted by a gentleman who had been an advocate of the shallow system that about three feet was the minimum depth to which any one ought to go. The difference between

three feet and three feet six inches, or four feet, was not very material.

Mr. C. STOKES (of Kingston, Kegworth) thought there were two essential ingredients in all drainage plans: one was a little common sense, the other a little experience. In all cases draining must, in order to ensure success, be carefully adapted to the nature of the soil. The draining which he had observed to be most effectual was that in which pipes and collars were used. In such draining as that, however, great care should be taken to use only the very best materials: the cost of the work was so great, that the drains ought to be made as permanent as possible. The drainage he referred to was that on the Kingston estate.

After a few words in explanation from Mr. Trimmer and Mr. Denton,

The CHAIRMAN said he thought that, as they had heard so many professional drainers, it was desirable that they should hear more practical farmers—persons who had no *children* of their own to sustain (laughter). Perhaps Mr. Trethewy would favour them with his opinion on the question.

Mr. TRETHERY (of Silsoe, Beds.), in responding to this call, said, he must confess that he felt somewhat disappointed at the turn which the discussion had taken. Instead of having a discussion on the application of geology and hydraulics to agriculture—a subject which, notwithstanding what had fallen from Mr. Denton, he thought Mr. Baker was perfectly justified in introducing (Hear, hear)—they had had one which turned chiefly on the question of the effectual or the non-effectual drainage of the Keythorpe estate. While on that subject, he must complain of a proceeding which appeared to him somewhat irregular, namely, the handing to the Chairman of a cheque for £21 in confirmation of the views which the speaker entertained.

Mr. DENTON: No, not in confirmation of them.

Mr. TRETHERY continued: He believed that such a proceeding was in direct opposition to the rules of the club; and if there were no rule against it, there certainly ought to be one. He had had some experience with regard to draining in several counties of England, and had tried various systems. The great mistake of deep-drainers consisted in making the drains too far apart; and this, in his opinion, had done more to bring deep drainage into disrepute than anything else. As regarded direction, he held it to be a golden rule that the drain should be placed in the direction of the greatest fall. There was one question which had, he confessed, puzzled him a great deal: he referred to the draining of stiff retentive soils upon what was called “high-backed” ridges—a term well understood in some counties—and crooked fallows. He was convinced that if an attempt were made to carry out the parallel system of drainage on land of that description, it would prove a failure. It

was, indeed, questionable whether it were expedient to drain such land at all. In his opinion the effect was scarcely worth the cost of the draining.

The CHAIRMAN said, he thought the question was now pretty nearly exhausted. The leading principles of draining ought now to be patent to all. In the first place, they must know the nature of the soil to be drained, before they could tell what the depth should be: in the next place, they must cut the drains in such a direction that they would most effectually cut the strata of the soil diagonally, so as to carry off the water. He saw no objection himself to draining four feet deep, or even more, provided the drains were not put too far apart.

A MEMBER: What about the cost? (Hear, hear.)

The CHAIRMAN: Well, the cost would perhaps prevent him from going more than three feet (laughter). As regarded depth, he had himself adopted the middle course, acting on the maxim, “In medio tutissimus ibis.” The draught of the water through the soil, as affected by the air admitted into the pipes, formed the great ground of debate between the deep and the shallow drainers. As regarded stiff clays, having observed fissures in all directions towards the drains, he was himself strongly of opinion that water did penetrate into the subsoil to the depth of four feet (Hear, hear). Being one of the party who recently had the pleasure of visiting the Keythorpe estate, he must confess that he did not consider the system of drainage there perfect. He observed, in some cases, holes full of water, within two or three feet of the drain; and he thought he was justified, therefore, in assuming that the land was not thoroughly drained. He thought the estate would have been more effectually drained by means of a few deep drains, constructed on the gridiron system, than by means of drains running through the land in various directions, without any regularity.

Mr. BAKER, in reply, said his object in introducing botany was, to show that they might judge of the nature of the soil below, from the character of the plants on the surface. Though the discussion had not taken the turn which he anticipated, he still hoped that some useful information had been elicited. As regarded hydraulics, he must confess that, when he came to consider the matter, he felt himself unable to deal with that subject as he had contemplated doing. Mr. Baker concluded his reply with proposing the following resolution, which was carried:

“That the principles of draining are so far dependent upon a knowledge of geology and hydraulics, as to render information upon these subjects essential to its utmost development.”

The proceedings concluded with a vote of thanks to Mr. Baker, and a similar compliment to the Chairman.

## DEEP CULTIVATION—AT HOME AND ABROAD.

When the prophet alluded to the divinely-given wisdom which leads the ploughman to "open and break the clods of his ground," he characterised the operation of tillage in terms which the light of modern science and practice has enabled us more fully to understand. We "open" the ground not only to admit the seeds or to allow the free spreading of the roots of our crops, but to let in the atmosphere, the rains, and dews which impregnate the recesses of the subsoil with fertility. We "break the clods" not merely to favour the fine rootlets of young plants, but to expose an infinitely multiplied extent of superficies in the pulverized mould to the chemical action of the gases we call "the air." And the teachings of Jethro Tull, of Deanston Smith, and of Lois-Weedon Smith; the practice of Flemish farmers and vineyard cultivators abroad, and of market-gardeners, cottagers, and trench-ploughers at home, are all commentaries and illustrations developing the significance of the Hebrew's descriptive phrases.

And have we not a corroboration of the advantage of deep and minute tillage in the natural processes which are working around us? Have not we all seen he changed texture and productive quality of a weathered subsoil; seen the sterile clay from the deep drain moulder into manageable and wholesome soil under the culture of a single wintering: reminding us of the saying of Dr. Clarke, that "the frost is God's plough, which he drives through every inch of ground," pulverating and fructifying all?

But to come to particular examples. Mr. Hoskyns has described the practice of the vine-growers in Madeira, which forms a remarkable and striking lesson for us. The vine is not a native of that island; and after growing well for a few years, the fruit begins to degenerate, and makes inferior wine. The expense of new stocks being very great, as they are usually brought from the hock-vineyards of Germany, every expedient has been tried in order to postpone the evil as long as possible; but no manuring, or pruning, or attention, is of any avail; and the only remedy is found in *deep cultivation*. "I once happened," he says, "to see the process. Nearly a score of labourers, hard at work, were standing in a long trench as deep as they were tall, stocking the earth from one side and throwing it up on the other. On inquiry, they told me they were trenching *an old vineyard* for fresh planting—trenching *nearly six feet deep*! Some months afterwards, a merchant, in taking me over his wine-stores, pointed out in some casks that were being broken up a mineral incrustation about as thick as a half-crown and as brittle as glass, which he called *tartrate of lime*; adding, that it was commonly deposited by the wine, especially when new. I afterwards ascertained that potash and soda existed in the deposit. Now these minerals are very deficient in the soil of the island. Here, then, was good reason for

deep trenching. The vine, to supply its mineral wants, robbed the soil so fast of what little alkali it contained, that nothing but the opening of a great depth to the action of the roots would keep up the supply for many years; for the roots of delicate plants will not travel through earth that has never *seen daylight*."

The vegetable gardens which supply Covent Garden, and the other markets of the metropolis, we all know, are not only profusely manured, but deeply tilled; and in many cases the subsoil has been dug up, in the gradual course of time, no less than *four or five feet deep*, to supply the waste of mineral matter to the soil above.

In certain parts of Flanders they have a peculiar mode of gradually deepening the staple by spade-trenching: trenches being dug between the lauds when sown, and the subsoil thrown over the surface. They go about two inches deeper than the cultivator has hitherto reached; and by shifting the trenches sideways each year, at the end of a certain number of years two inches of the entire subsoil become mixed with the upper surface, and the soil is thus deepened by that amount. The same process is then repeated a couple of inches deeper still; and after four or five courses of trenching, the land is brought to a depth of 18 or 20 inches of uniform quality.

In Jersey they use a trench plough, which follows the common plough, and by means of a shelving mould-board raises the subsoil out of the furrow and throws it on to the top of the just turned furrow-slice. This is done as a regular thing once at the commencement of every rotation—that is, at the breaking up in autumn for the next year's turnip fallow.

Now let us observe in these instances that the subsoil is not brought up in large masses to defy the disintegrating powers of weather and crushing implements; nor is the whole of the cultivated staple buried underneath a great thickness of the lifted subsoil, and so placed out of reach of the young plants above; neither is the subsoil merely broken and stirred, and covered again immediately by the original staple, soon to coalesce again into its former impervious condition: nor is it simply mingled partially and imperfectly with the staple, as is the case in some descriptions of subsoil ploughing. But it is lifted bit by bit, *a little at a time*, and *exposed in a granulated state openly upon the surface*, so as to be subjected to the ameliorating agencies that are above ground.

And it is by appealing to long-known and well-established practices like these, that we can readily confute the objections which have been brought against trench-ploughing, and explain the causes of failure in many cases of its trial. The secret of want of success in trenching clays and strong loams, wherever it has occurred, lies, we believe, in the want of judgment exercised in performing the operation, and not in any

poverty or badness inherent in the subsoil. If a man will bury his fertile and highly-conditioned staple of four inches underneath half-a-foot thickness of raw un-mellowed clay—thus providing for his crops a banquet of mineral food in abundance, but food uncooked and incapable of being digested by those fastidious epicures, young plants—can he expect an adequate and quick return of profit from the expensive process? But on the self-same kind of soil he knows there are cottage gardens in plenty, which are yielding richly and profitably to the deep-working spade and fork: and one of the main points in the matter has been that the deepening was gradual. Reason tells us that what the atmospheric influences, manurings, and the growth of vegetation have, in the course of time, made of four or five inches of a mass of clay, they can in the same manner make of several inches more; and this manner is by penetrating and permeating through the avenues opened by tillage. Of course, we ought not to be too wild in our expectations, or too extravagant in our descriptions of such a transformation; so that when a practical man states that “where clay land is drained, the action of the air and water passing through it so alters the very nature of the strong yellow clays, that

in a few months they will become a *deep rich loam*,” we may challenge the accuracy and appropriateness of the terms employed. At the Farmers’ Club, Mr. Webster took this course; but in so doing he unfortunately went too far, and said that we might expose the strongest clays to the action of the sun and air for years “and yet they never altered.” Quite true that after centuries of cultivation our tenacious clays have not been rendered into friable loams; but is not the thin staple which has been cultivated mellowed and of freer texture than the untilled subsoil which it once resembled? And where the tillage has been adapted to accomplish the change talked of; where it has gradually deepened the upper soil and opened the subsoil by deep drainage, subsoiling, and trenching—there it is just as true that the land is made more workable, as well as richer and warmer. If any man’s personal observation, or the instances we have adduced, are not sufficient to convince him, let him go to Lois-Weedon, and thrust his walking-stick into Mr. Smith’s fallow intervals, or witness the easy traction of his ploughs, while in the adjoining fields four horses are turning up a furrow four or five inches deep.

## THE WOOL TRADE.

BY AN OLD NORFOLK FARMER.

### No. IV.

The present century opened with the return of peace (1801), giving hopes of a free intercourse with the continent of Europe. Simultaneously with this flattering prospect, improvements in the machinery used in manufactures were introduced, of such a nature that thirty-four persons could do the work which employed sixteen hundred upon the old principle; and a girl of sixteen was able to superintend a machine that superseded the labour of many men. These changes, so important in the history of our trade, alarmed the operative classes, who fancied they saw their future employment annihilated. A few years after, the recommencement of the war, and the promulgation and enforcement of the Berlin and Milan decrees by Napoleon Buonaparte, by which all British goods were shut out from the whole of Continental Europe, occasioned much distress in the manufacturing districts. Erroneously ascribing this to the use of machinery, an organized conspiracy was set on foot by the operatives, the object of which was the entire destruction of every kind of machinery. From the name of one of the conspirators, *Ludd*, they were called *Luddites*. In Yorkshire, especially the West Riding, the rioters demolished several mills, with all their machinery, before any adequate efforts were made to arrest their progress. At Huddersfield they shot Mr. Horsfall, a respectable manufacturer, dead near his own house; upon which, a reward of £200 being offered for the detection of the murderers, one of the rioters turned approver, and seventeen persons implicated in the out-

rage were tried and found guilty, and were all executed on the same day. By this terrible act of retributive justice—which, however, was quite of a piece with the practice of that period—twelve widows and fifty-seven orphans were left to struggle through a cold and unfeeling world. Several more of the conspirators were under indictment; but the combination being dissolved, and the rioters dispersed, the Government on their part abandoned the rest of the prosecutions.

The efficiency and despatch to which the British manufactures of all kinds had attained, may be judged from the following circumstance, which occurred about the year 1818 or '20:—At an agricultural meeting at Reading, a gentleman offered a wager that he would appear at a ball, to be given in the town the next day, *in a coat made from wool taken from the sheep the same day*. This wager was accepted, and the gentleman (whose name we forget) did actually appear at the ball in a blue coat, the wool of which it was made, having gone through the processes of shearing, washing, carding, combing, spinning, dyeing, weaving, dressing, cutting out, and making into the garment, all within the space of about eighteen hours!

At the close of the war, in 1815, on a proposal from the agricultural interest in Parliament to impose a heavy duty on foreign and colonial wool, a select Committee of the House of Commons was appointed to inquire into the wool trade. It was then found that the price of wool had increased from 20 to 50 per cent., and that the distress of which they complained was in no respect

attributable to the importation of foreign wool, or the low price of English wool, which then sold readily at 60s. per tod; and the Committee therefore could not recommend the imposition of a duty. Another attempt, however, in 1819, was more successful. The embarrassments of the Chancellor of the Exchequer, led him to compromise the affair by offering, that if the landed interest would agree to a malt tax to the amount of £1,400,000, he would impose a duty of sixpence per pound on *all wools* of foreign growth imported. At this period the export of British wool was illegal; and had the agriculturists petitioned for its free export, instead of a duty on imports, it would have been more in accordance with their own interests, as well as those of the country at large. The import of foreign wool amounted, in 1820, to only 16,000,000 pounds, whilst the export of woollen goods made from British wool, consumed 32,000,000 pounds; so that we exported double the weight of imported wool. But the collateral effect was still more direct and palpable. One of the first results of the tax was a prohibition by the Government of Spain, of all British-manufactured goods being admitted into that kingdom; and from that period, the Spaniards supplied themselves with the produce of their own looms, and a considerable portion of our trade was—for the time, at least—destroyed.

But we must now notice the progress made in the cultivation of sheep in the foreign colonies of the kingdom, and especially those of the Cape of Good Hope and Australia, the importation of wool from which forms at the present time so large a portion of our annual supply. The first sheep conveyed to Sydney were brought from India in the year 1783, and the following figures will give the reader an idea of the rapid progress of that trade in wool, which now constitutes so important an item in our imports:—

#### PROGRESS OF SHEEP CULTURE IN AUSTRALIA.

1783, imported from India ..	29
1793, increased to.....	526
1798, " .....	3,902
1803, " .....	10,157
1810, " .....	25,888
1821, " .....	290,158
1843, " .....	4,804,846
1846, " .....	6,859,031

#### IMPORTS OF WOOL FROM AUSTRALIA.

1816.....	13,611	pounds.
1821.....	175,433	"
1826.....	1,106,302	"
1831.....	2,541,205	"
1836.....	4,996,645	"
1841.....	12,399,062	"
1846.....	21,789,346	"
1851.....	41,810,117	"
1853.....	47,075,812	"

The climate of Australia appears to be peculiarly adapted to the breeding and rearing of sheep, as well as for preserving, if not improving, the staple of the finer descriptions of wool. The country consists of vast plains in the interior, lightly wooded, and covered with natural grasses and other kinds of herbage, affording the best of pasturage for cattle of all kinds. The temperature is genial, and precludes the necessity of artificial protection for the flocks. The air is pure,

dry, and bracing. Drought at certain seasons of the year is complained of; but the wide range of country over which the flocks can be shifted affords at all times a sufficient sustenance for any number of sheep, which arrive at maturity earlier there than in Europe. Such was the country upon which Captain McArthur conferred the invaluable benefit of the introduction of the Spanish breed of sheep—the source of unbounded wealth to the colonists, as well as to the manufacturers of the mother country.

The progress made in the breeding of sheep in South Africa has been much slower than in the Australian colonies, owing in a great measure to the wars with the Caffres, who are continually committing depredations upon the flocks. Great attention, however, has been paid to the breeds of sheep, and the colonists have at great expense imported the Saxon and Merino breeds from Germany, the produce of which is highly esteemed by the British manufacturers. Owing to the want of water for washing the sheep properly, the wool from thence is in a far inferior condition to that of Australia. The number of sheep in the whole of the districts is estimated at about four and a-half millions, and the export of wool has progressed according to the following table:—

#### EXPORTS OF WOOL FROM THE CAPE OF GOOD HOPE.

1816.....	9,623	pounds.
1821.....	12,652	"
1826.....	4,192	"
1831.....	47,868	"
1836.....	331,972	"
1841.....	1,079,910	"
1846.....	2,958,457	"
1851.....	5,816,591	"
1853.....	7,221,448*	"

The above will show that the increase has been much greater, in proportion, the last ten or twelve years, than previously. In fact, it was not until the eminent success of the flockmasters of Australia became notorious that the attention of the colonists of South Africa was specially directed to the same pursuit. The cultivation of the vine, and the manufacture of wine from its produce, was almost exclusively attended to, in some of the districts; but latterly, the breeding and improvement of the sheep have become an object of the first importance; and it is probable that from this time, if the colonists can keep the Caffres quiet, increasing quantities of wool will be exported from thence.

The tax imposed upon foreign wool in 1820 proved an great embarrassment to the manufacturers, and petitions were presented to Parliament for its repeal, and at the same time for allowing the exportation of British wool. Both these measures were granted in 1824, a nominal duty of one penny per pound being imposed upon both exportation and importation. In 1825, a bill for the consolidation of the customs having been proposed by Mr. Huskisson, this nominal duty upon the imported wool, was reduced to one halfpenny per pound. The annual importation of wool for the years

\* These figures and those above are taken from the Board of Trade Returns.

1822, '23, and '24 averaged 18,361,218 pounds; but after the duty was reduced, it rose in 1826, '27, and '28 to 29,658,980 pounds. This increase injured no one, whilst it benefited all by the accompanying liberty of exporting British wool. It was found that the foreign manufacturer was as much in want of the long wools of England, as ours were of the fine short wools of Saxony and other continental states; so that by the measure a reciprocal market was at once opened for the interchange, and the price of British wool suffered no diminution.

This healing measure, however, came too late to stop the effect of the duty. In France, Spain, Prussia, and Germany, the native manufactures were stimulated, and the low price of wool consequent upon our duty of 6d. per pound gave them a decided advantage. The Prussians, especially, improved their manufactures so much as to prove powerful competitors with ours. The following statement will show the effects both of the imposition of the duty of 6d. and of its repeal:—

UNDER NO DUTY.

Pieces of cloth, &c., exported from 1816 to 1819.. 2,753,596

UNDER DUTY OF 6d.

From 1820 to 1823..... 2,018,429

UNDER DUTY OF 1d.

From 1825 to 1828..... 2,123,450

EXPORT OF STUFFS WHICH, BEING MADE OF ENGLISH WOOL, PAID NO DUTY.

From 1816 to 1819..... 2,800,541  
 From 1820 to 1823..... 3,645,232  
 From 1825 to 1828..... 4,764,546

The quantity of wool grown in the United Kingdom in 1828 was estimated at 110,164,760 pounds. Immediately previous to the duty being imposed, the price of Southdown wool was 2s. per pound; but in consequence of the decline of our manufactures, and the cessation for the demand for them on the continent, the price gradually fell to 1s. 3d. per pound. On the other hand, the long wools—none of which were imported, and which consequently were not affected by the duty—rose in price, the demand for it in the manufacture of stuffs for exportation, having nearly doubled in the eight years from 1819.

In 1818 the estimated value of the woollen goods manufactured in England was £28,000,000 sterling, of which £7,000,000 were exported; and it is worthy of remark that after the duty was imposed the exports fell off, and never recovered until after the free trade measures of 1847, the average exportation of woollens for the years from 1840 to 1849 inclusive being £6,525,744 sterling; but that from 1847 they began to increase, as the following statement shows:—

EXPORT OF WOOLLENS.

1848.....	£5,733,828
1849.....	7,342,723
1850.....	8,588,690
1851.....	8,377,183
1852.....	8,730,934
1853.....	10,171,263
Average.....	£8,157,437

Whether the rather retrograde progress of the woollen manufactures for the export trade, arose wholly from the imposition of the duty in 1820, and the stimulus thereby forced upon the foreign manufacturer in self-defence, we will leave the reader to judge. Undoubtedly, the long continuance of peace, and consequent necessity for the various Governments on the continent to find employment for their people, supplies a sufficient reason why they should promote the growth of their own industrial pursuits. One thing, however, cannot be denied—that, with the utmost freedom of trade, and a boundless extension of commerce, the price of every article of agricultural produce, not excluding wool, has suffered no diminution, but, on the contrary, has risen in value in proportion as the mutual interchange of commodities has created new wants amongst all nations and all classes of society. Nor has the enormous increase of our importations of foreign and colonial wool, in any respect lessened the demand for that of our own growth, which finds a ready market at a remunerative price at all times.

No. V.

We have stated that some of the Merino flock belonging to George III. were purchased by continental breeders; but these by no means constituted the whole or the first experiments of the French and other European flockmasters to introduce the Spanish sheep for the improvement of their respective staples. We believe, however, that the enterprise of our utilitarian monarch in this respect gave the impetus which urged them to follow his example. Several of the continental states, indeed, had long before this made successful efforts thus to improve their breeds of native sheep. So early as 1723 Mr. Alstroemer, a Swede, had imported a small flock of Merinoes into that country, where he succeeded in acclimatising them and propagating the breed; and even in that high latitude they maintain their original character in respect to the closeness, fineness, and length of staple of the fleece. They also acquire greater size, and some of the rams have yielded 13lbs. of wool at one clip.

In 1786 Denmark and its dependencies, seeing the success with which the experiment had been attended in Sweden, procured a few sheep from that country; and in 1797 the Danish Government purchased in Spain a flock of 300 sheep of the best breeds of that country. Saxony had imported the Spanish sheep in 1765 and 1778. In the former year the Elector of Saxony procured from Spain 100 Merino rams and 200 ewes, selected from the best flocks belonging to the Spanish king; and so well did they succeed, that in 1778 the same number of rams and ewes were procured, which he caused to be sold at prime cost to the various flockmasters of the electorate. It is unnecessary to state that from that period Saxony has stood at the head of continental Europe as a fine wool-growing country, as well as for cloths produced from their own manufacturers.

In 1786 Frederick II. imported into Prussia, direct from Spain, 100 rams and 200 ewes. Great attention

has been given to this breed, and there are at the present time in the Prussian states large flocks of sheep entirely composed of fine-woolled breeds.

In 1775 the Empress of Austria, Maria Theresa, imported from Spain a flock of 300 Merinoes, which were placed at the Imperial farm at Marcopail, in Hungary, where a school for farmers was instituted.

Several other of the German states have followed the example of the larger states, and introduced the Merino sheep, which have uniformly succeeded.

The first importation of Merino sheep into France took place in 1776, when a few only were purchased from different countries. But in 1786 a flock of 367 rams and ewes were selected from the breeds of highest repute in Spain, and sent into France under the direction of a mayoral and three Spanish shepherds. They were placed at Rambouillet; whilst other flocks, the produce of the former purchases, were kept at Perpignan, Pompadour, and Alfort. An official examination of these several flocks was made in 1808, under the Imperial Government, when it was found that after 18 years from their first introduction the quality of the wool had not in any respect deteriorated with regard to fineness of staple, whilst the weight of the fleece ranged from 6 to 12 lbs. each.

During the last war with France we were precluded from importing the produce of these fine-woolled sheep into the United Kingdom; but in 1815 we began to purchase wools in Germany, the importations of which went on increasing with great rapidity until the colonies of Australia and the Cape began to supply us with so great an abundance that the German wools became of less importance to our manufacturers. The following table, drawn up with intervals of five years, will exhibit both the increase and decrease of our continental wool trade:—

IMPORTS OF WOOL FROM CONTINENTAL EUROPE:

Date.	Spain.	Germany.	Other countries of Europe.	TOTALS.
	lbs.	lbs.	lbs.	lbs.
1815....	6,297,934	3,137,438	3,416,132	12,851,504
1820....	3,536,229	5,113,442	913,420	9,563,091
1825....	8,206,427	23,779,661	6,018,881	43,004,969
1830....	1,641,773	26,073,882	2,551,823	30,267,478
1835....	1,602,752	23,798,186	8,816,230	34,217,168
1840....	1,266,905	21,812,664	8,541,264	31,620,833
1845....	1,074,540	18,484,736	17,606,515	37,165,791
1850....	440,751	9,166,731	8,703,252	18,310,734
1853....	154,146	11,584,800	26,861,166	38,600,112

The large increase in the last year of this schedule may be accounted for by the state of war and the uncertainty prevailing on the continent respecting the turn that political affairs might take, which led the holders of all kinds of commercial stock to send it to England as the only place of perfect security. On the other hand, all the continental nations during the long peace, had cultivated their own manufactures, and consequently consumed a large proportion of their native produce. This was particularly the case with Spain, which now consumes nearly all her own wool in her native manufactures. This was first suggested to her at

the time the duty of 6d. per lb. was imposed upon imported wool. It was fortunate for this country that our colonies were able to supply us with such an abundance of fine wool, superior even to the Spanish in the length of staple and in that peculiar softness which constitutes their distinctive characteristic.

The failure of the attempt to establish the Spanish breed of sheep into England, would probably have proved fatal to the manufacturers of fine broad-cloths had not this colonial resource sprung up, as it were, from the wilderness. Little, indeed, did either the worthy old king or Colonel M'Arthur—(the first as the seller and the other as the purchaser of a few Spanish sheep)—foresee that in 50 years the distant country to which they were taken would supply the mother country with 50,000,000 lbs. of wool per year, superior in quality to any that Europe could furnish. On such apparently trivial circumstances does the prosperity or welfare of nations and states turn! The discovery of the gold fields of Australia has furnished her with a great influx of wealth, and drawn a vast multitude of emigrants thither to augment her population; but we confess we view the amazing progress she has made in the growth of wool of far more importance in a moral and political point of light, as conducing more to the stability of the colony as an infant state, and to the real prosperity and moral happiness of the individuals who compose it.

The failure just referred to, however, did not arise from an actual defect in the whole soil or climate of the United Kingdom, as wanting in adaptation to the nature and habits of the Spanish sheep. There are many districts where they could have been fed and propagated quite as successfully as on the continent, although on the more highly-cultivated land they were found to suffer deterioration in the quality of the wool. Neither was it *entirely* prejudice that banished them from our grazing lands, although those who were accustomed to the beautiful symmetry of the native sheep of that period might well be excused for their dislike to the foreign intruders. The writer perfectly recollects the disgust and derision displayed by many of the Norfolk flockmasters when the first exhibition of Spanish sheep took place at the Holkham sheep-shearing, under the auspices of Sir Joseph Banks as the representative of their royal owner—shapeless, high-shouldered, and bony, and with *nothing* to recommend them but the fineness of their coats. When placed by the side of the improved and half-bred Leicester and the pure Southdown, with their broad chest, small deer-like head, slender legs, and barrel-shaped carcase, the strangers went down at once to a heavy discount; and although out of deference to their noble host, some of the more wealthy farmers purchased the sheep, in order to give them a fair trial, it was quite evident that the experiment would not succeed.

The result, however, has fully justified the choice made by the sheep-breeders of that period. A heavy fleece, and a valuable carcase under it, has been the point aimed at ever since, in the first place; and in the second, by a careful selection of the breeding sheep, to lay the heaviest weight of meat on the most valuable part of the carcase. In both these points they have succeeded, with the important additional advantage of bringing them to maturity in less than half the time formerly required. Nor has the improvement of the staple of the native wools been unattended to, or cultivated with less success, than that of the carcase. The following statement in fractions of an inch will show that the pure Southdown

wool approaches far closer to the staple of Merino in fineness than many persons would suppose.

COMPARATIVE DIAMETER OF VARIOUS CLOTHING WOOLS.

	Outward end.	Middle.	Inner end.	Mean.
Spanish ewe ..	$\frac{1}{1232}$	$\frac{1}{1433}$	$\frac{1}{1468}$	$\frac{1}{1370}$
Southdown ..	$\frac{1}{1026}$	$\frac{1}{750}$	$\frac{1}{1174}$	$\frac{1}{1110}$
Ryeland ram ..	$\frac{1}{844}$	$\frac{1}{750}$	$\frac{1}{1076}$	$\frac{1}{989}$
Wilts ewe . . . .	$\frac{1}{825}$	$\frac{1}{721}$	$\frac{1}{880}$	$\frac{1}{806}$
Saxony . . . . .	$\frac{1}{1222}$	$\frac{1}{1191}$	$\frac{1}{1194}$	$\frac{1}{1202}$

It was the opinion of Lord Somerville that the climate of Great Britain from the most northern to the most southern point would grow wools of the finest quality; and for that reason he deprecates the breeding of long-woolled sheep. The chief competition of his time was between breeders of the Merinos and those of the new Leicesters and improved Southdowns. His Lordship strongly advocated the first; but, as we have seen, they did not long stand the competition, and the abundant supplies we now receive both from our colonies and from the German States leave no reason for regret at the result.

Experience proves that the softest wools are grown on an argillaceous or a silicious soil; whilst a calcareous soil, whether limestone or chalk, produces wool remarkable for its harshness to the touch. It is probable that this is more a mechanical than a chemical effect, although the different quality of the feed may have something to do with it. Everyone knows the effect that lime or chalk has upon the skin wherever it touches it, and the same is undoubtedly produced upon the skin and hair or wool of animals who lie upon a soil of that nature; and we much question whether the insensible perspiration, to which the wool in a great measure owes its softness, is not greatly impeded or deranged by a limestone or chalk soil.

Not only is the quality of the wool in regard to its softness affected by the soil, but even its colour undergoes a change

from the same cause. In Gloucestershire, for instance, it acquires a deep yellow. In Hertfordshire, Warwickshire, and other counties possessing a red soil, the wool partakes of the same hue, inclining to brown. In Lincolnshire and Cambridgeshire, the fenlands communicate a dark brownish tint. On a chalky soil, the wool is distinguished by its whiteness; and thus, in every district, the colour of the fleece evinces the action of the soil, either by insinuating its particles into the fleece and its fibres, or chemically uniting with its surface; and it is remarkable that the colour thus obtained is indelibly fixed in the wool, so that no washing or other method can remove it, nor can its whiteness be quite restored by any artificial process hitherto discovered.

The demand for English long-wools and yarns on the continent has been uniformly large since the removal of the prohibition of its export. In Ireland, too, a considerable proportion of the long-combing wool has been annually purchased by the continental wool-staplers\*; and thus a reciprocal trade in the raw material has sprung up, beneficial to all parties, in lieu of that selfish jealousy which caused us formerly to look upon any advance in the prosperity of the industrial pursuits of a neighbouring State as so much taken from our own. On the other hand, the enormous and increasing imports of colonial and foreign wool in the United Kingdom, has, of necessity, given rise to the system of periodical wool sales, by public auction, in London and Liverpool, which are resorted to by manufacturers and staplers from all parts of the continent of Europe, and even America, as well as those of the cloth districts at home. These public sales, which are conducted with great spirit, ensure to the owners the best price the market can afford. The growth of wool in the United Kingdom is estimated at from 140 to 150 million pounds; but Mr. Southey's estimate in 1846 makes the number of sheep 40 millions, and the number annually slaughtered at 15 millions, which, at an average of five pounds per fleece, gives an aggregate of 275 million pounds; add to this, 77 millions of imported wool, and we have the enormous total of 352 million pounds of wool annually brought to sale in the United Kingdom.

DAIRY MANAGEMENT.

We have much pleasure in responding to Mr. Horsfall's wishes, as expressed in the last number of the *Mark Lane Express*. There is no branch of husbandry so far behind, generally speaking, in the march of progress as dairying, and therefore none meriting priority of consideration or requiring to be investigated with greater care. In dietetics milk and its products are estimated in point of value as second to no other articles of food; hence their importance in the domestic economy of the nation. "Far-fetched fowls have fine feathers," it is said: and so we may talk of foreign dairying as exemplary. But the immense quantity of abominable stuff annually imported tells its own tale. The fact is, butter—home and foreign—is so notoriously bad, and has been so for such a length of time in all our large towns, that their inhabitants have all but learned to do without it—not more than a fraction of the quantity being consumed which otherwise would be so were the quality good. In other words, many of our dairy-maids turn out to market butter so inferior in quality,

that modern chemistry can produce a better sample. Indeed, such is the state of the English market that a Vice-president of the Royal Agricultural Society considered it his duty to plead earnestly for a mixture of tar with grease imported for machinery to prevent engineers, stokers, and carmen using it to their bread, to the absolute ruin of the British farmer!

It would, doubtless, throw much light on the subject were the contents of the various compounds sold for butter in the British capital known to purchasers.

Our own butter-merchant, for example, does not keep any tenpenny-mixtures. A thrifty customer or two—good ones, however—wanted some; accordingly a small purchase for their supply, consisting of four or

\* The following were the quantities of British and Irish wool exported in four years, viz.:—

1849 . . . . .	11,200,472 lbs.
1850 . . . . .	12,002,773 "
1851 . . . . .	8,517,500 "
1852 . . . . .	11,965,672 "

five samples, was made. Before delivery, he melted a pound of each, poured them into separate vials to allow them to cool, when to his amazement, no less than information, they settled in different zones—the heaviest constituents falling to the bottom, and the lightest rising to the top! On seeing the bottles in the window, sealed as if containing some new-fangled product of commerce, we had the curiosity to ask what they contained; and received for answer—“Don't know, but I bought it *ex* Holland for butter.” (?) The sequel is soon told—the spurious stuff being returned, thrifty customers expressing a willingness to pay for a higher-priced article. Now, were the public sufficiently cognizant of nefarious butter of this kind, and how detrimental to health it is, there would be a difference of price between it and the opposite quality such as to open the eyes of dairymen to the £ s. d. value of Mr. Horsfall's practice, and the importance of its being generally carried out.

From the amount of attention now being paid to the adulteration of food, it is manifest the period in question is fast approaching when bad butter will fetch but little in the British capital, while a first-rate article will realize more than its present value; consequently, it is high time the improved practice in question was generally adopted throughout the length and breadth of the land.

Before this can be done, however, more must be known of that practice than has yet been told; while the objections brought against it must be tossed overboard, and every obstacle of this kind surmounted.

If we understand rightly “No. 1” of Mr. Horsfall's last letter—which, by-the-by, is not so clear on several points as we could wish—results under his management of cows are different from those under the old practice. For example:

As stated on a former occasion, cows, under certain constitutional circumstances, are naturally disposed to convert their food into fat; so much so, that there is great difficulty in keeping some individuals in a breeding state, more especially improved shorthorns, Devons, and Herefords. Turn a cow of this description into rich grass, and she is soon useless for anything but the shambles. The quality of the milk she gives may be fine, but the quantity almost nothing. We have had a Devon, the property of a noble duke, which carried off the first prize in her class at one of the Royal Agricultural Society's meetings, not giving more than a quart at a milking!

On the other hand, there is another class of cows naturally disposed to turn all their food into the pail. Turn a cow of this kind into rich grass, along with the one above, and she will rather get poorer every day, if the milk is taken from her; while her plump and sleek rival is gaining weight. The former will consume greatly more grass and water than the latter, returning for it, in proportion, a still greater quantity of milk, but inferior in quality. In town dairies, when fed on sour grains, distillers' wash, &c., the quantity sometimes yielded is almost incredible. When such is the case, however, life is generally short, especially if cows are in a low state at calving. Hence the reason why

dairymen purchase near-calvers of this class, in good condition.

The above two classes may be called extremes, between which there is a mean—cows which, if turned into a rich field of grass along with the others, would keep themselves in good condition, and give a medium quantity of milk, the quality depending upon the richness of the food.

Calling these three classes—for the sake of brevity—Nos. 1, 2, and 3, we should like to know of Mr. Horsfall to which of them his cows belong, and also to which he applies the following two sentences, quoted from his letter—viz.: “I should expect from a cow in moderate condition, when gaining flesh, richer milk than when fat and losing flesh. If we take into account the disposition of the cow to apply her food to the enrichment of her milk rather than her own maintenance, we may, I think, safely infer that the milk of a cow gaining flesh and fat is replete with casein and butter, to the extent she is enabled by her organism to supply these from the food she consumes.”

In these there is a good deal of obscurity, if not inconsistency; for as they are advanced by way of objection or qualification to what we formerly said on cows fed under the old system on food not calculated to enrich milk, some explanation is obviously required. Most probably they apply to his own cows, food, and management, in which sense they are not applicable to what we said.

Again the objection: “I differ with ‘W. B.’ in thinking that a lean cow, skin and bone, fills the milk-pail better than a well-fed one,” falls to the ground; for the simple reason that we never thought anything of the kind. For what we said was, “That the skin-and-bone milker filled the pail better than her plump and sleek rival”—a very different statement: it being neither more nor less than that No. 2 gives more milk than No. 1, for the reasons above assigned. The former class being technically termed skin-and-bone milkers; and that Nos. 1, 2, and 3, give richer milk when fat than when lean, the cows being fed under the old system of receiving as much as they can eat, say three well-conditioned cows and three lean ones in the same field of grass; but that the latter yield the largest quantity, for the simple reason that they consume greatly more grass and water. There is, no doubt, a degree of leanness in the cow beyond which an increase of quantity would not be obtained, as we formerly stated, and also a degree of fatness when quality would also be affected; but these are extremes which cannot be taken as exceptions to any general rule.

Were the lean cows to eat no more food than the fat ones, doubtless results would be otherwise, or were they to receive properly cooked food; for then, as we formerly stated, sour or saccharine food would prevent No. 1 from laying on fat, while it would induce to an increase of milk, but of thinner quality; on the other hand, fatty albuminous food would have the counter effect on No. 2. Again, properly flavoured and seasoned food may induce each of the three classes to consume more of it, and hence to give, *ceteris paribus*, a larger yield of richer milk. Is this the case in Mr. Horsfall's practice?

We should also like to know a little more about the temperature of the dairy, milk, and hot water. Data of this kind require to be stated in the plainest terms, without regard to the tautological use of words. If the temperature of the atmosphere of the dairy, for instance, is 55 degrees when the milk is put into it, the temperature of the milk 90 degrees, and the temperature of the hot water 100 degrees, the hot water being allowed to cool, then the first effect produced would obviously be a slight increase in the temperature of the milk and atmosphere of the dairy. If the temperature of the hot water is kept up to 100 degrees, the increase of temperature of the milk and atmosphere would be greater. Much, again, will depend upon the size of the dairy, the quantity of milk and quantity of water, with the manner they are exposed, as regards the depth of milk and water in the dishes. Farther, the kind of wall, whether of brick or stone; the windows, whether single or double; the roof, whether slated, &c., &c.; and the temperature of the atmosphere outside—are all questions which should be distinctly stated in detail, in giving experiments and results under the new practice, as they are required to be known before judgment can safely be pronounced as to its merits. Farther, the process of cooling, both of the water and milk, requires to be given in greater detail, as the rising of the cream may greatly depend upon this. For example, the temperature should be taken at every fifteen minutes or so, and noted down, as also the progress made in the rising of the cream. What, for example, is the quantity, and what the quality, of the cream which rises during the first half-hour, compared with that of the other periods of equal length?

Again, a range of 8 degrees of temperature for the dairy, or from 52 to 60 degrees, is too great; while the conclusion that results are the same, whether this temperature is kept up by artificial or natural means, is impossible, and therefore is calculated to induce the opponents of the practice to say the experiments are carelessly performed, and unworthy of credence.

The conclusions as to the increase of the weight of flesh or muscle under "No. 4" are, we apprehend, subject to revision; the principal increase of weight in a full-grown cow taking place in the adipose tissue. At all events, if Mr. Horsfall can

increase the weight of muscle 10lbs. per week by the use of his peculiarly-cooked food, it is high time the breeders of our improved stock were turning their attention to his cattle-cookery and dietetics; for, taking Shorthorns and Leicester sheep as examples, both are defective of muscle.

The quantities of oil and margarine are of the highest importance to be known, as upon them the value of the practice during winter mainly depends, and therefore we hope an effort will be made by Mr. Horsfall to ascertain results under this head. Also the analysis of his skimmed-milk and butter-milk.

With regard to the objections advanced against the practice last year by Mr. Scott, they rather belong to the Irish school, and require to be treated accordingly.

1. A "return of 25 ounces of butter from one quart of cream" "proves nothing." Does it not prove that Mr. Horsfall's cream is richer in butter than Mr. Scott's?

2. Mr. Horsfall's cream yields 70 per cent. of butter, and of course 30 per cent. of butter-milk; "whereas the usual residue is fully 50 per cent.," ordinary samples of cream yielding only 50 per cent. of butter: *ergo*, Mr. Horsfall's butter contains 20 per cent. of butter-milk. Consequently a sample ought to be produced. A sample is produced, which contains no butter-milk, but "air cells." *Ergo*, such butter should be put through Mr. Scott's newly-invented "butter-pug-mill;" which turns out to be a failure.

3. "If his (Mr. Horsfall's) butter were extracted from ordinary creams," "the result would overthrow the reliability of all the Society's reported trials in connection with competing churns during the last and previous years." But Mr. Horsfall's butter was extracted from his own cream! *Ergo* the Society's trials are in no danger. If the awards of the Judges were honestly made, is it possible for them to be in danger? And if so, what right has any one to make insinuations to the contrary?

It will thus be seen that the objections brought against Mr. Horsfall's dairy-practice amount to something like mere prejudice.

W. B.

## THE ART OF ADULTERATION.—DR. HASSALL'S SERVICES.

The respectable tradesman who bade his man sand the sugar, water the rum, damp the tobacco, and come up to prayers, was, after all, a tolerably true type of a class. The art of adulteration has been practised for ages, simply as a matter of business—and as a very fine business, too. The only real crime connected with it was in being found out. A man could very easily satisfy his conscience when he felt that he was only doing that which nearly all the rest of the world did. It became, in fact, almost a duty to his family to make the most of his materials, especially if opposition and low prices ran him at all hard. And so the grocer sanded his sugar, the dealer "mixed" his teas, and the publican doctored his beer, and went to prayers with the utmost self-complacency and satisfaction.

It would be wrong to assume that the public—the customer—has not long heard something of this. It

was not, however, until very lately, that he knew how much or how systematically he was made the victim of these pious frauds. That he suffered in purse, or in other words, that he was being continually robbed by those with whom he dealt, might occasionally occur to him. The Legislature, indeed, now and then hinted as much, adopting at the same time the mildest of measures to lessen the abuse. But there was even something more than this. The master of the house awoke one morning to find that he and his family were deliberately subjecting themselves to the effects of slow poison. He stirred it carefully up in his tea—he spread it out on his anchovy toast—he seasoned his soup with it—ate it with his bread, and drank it in his beer. The most subtle of his enemies could not have administered these small doses more carefully than did his tradesmen. The more inviting, in fact, to the eye or the palate, proportionately more pernicious were

these compounds in their consequences. High colours and fine sauces might give a relish to life, though they tended far more certainly to death.

What should here have been the individual care of every one of us, became, as is too often the case, the duty of none. The Government did actually little or nothing in the matter. Its penalties were seldom enforced, its seizures as rarely made. It remained for one or two strong bold men to do the work of all. Prompted by little or no encouragement to begin with, but braving the rather infinite danger from all sides, they went zealously into the Herculean labour they had volunteered to. Theirs was indeed the cleansing of an Augean stable. The corruption that had been growing for years, the malpractices handed down from father to son—the abominations, in a word, that had received all the sanction of use and custom, were to be attacked and removed. As a consumer's question, the trade of this country was too generally a system of extensive and dangerous adulteration. This was to be shown and proved, thoroughly and fearlessly.

The gentlemen who undertook this dangerous duty were Mr. Wakley, the Editor and Proprietor of "The Lancet," and Dr. A. H. Hassall. It is only right to say that they have proved well worthy of each other. The former, to use a well-known phrase, "stood the brunt of the business," and stood it well, too. The investigations appeared from time to time in his paper. But it was not the general report alone of these inquiries which he inserted—that green tea was liberally seasoned with rank poison, or red pepper still more so, that bread was manufactured from plaster of Paris, or beer from treacle and all sorts of nastiness. That might be the case, no doubt, with some unprincipled people, but not with respectable tradesmen like mine and yours. Is it not so? "At least we will see," said Mr. Wakley; "You, Doctor Hassall, find out all about these respectable people, and I will take care to let the world know it." Either was as good as his word. The Doctor did find out all about them, and the Editor published it forthwith. If Smith sold poisoned tea, in went Smith's name and address, with full particulars as to what he did sell. If Brown made up "a delicate relish for invalids," calculated at least to keep them invalids, Brown and his recipe were recommended accordingly. Jones' patent for converting potatoes into bread, Robinson's celebrated potted lead, and Thompson's as famous destructive curry powder, all had their merits fairly dealt with. No matter whether they traded in Bond-street or Whitechapel, in the Strand or even Finsbury itself, you might always know where to find or to avoid them, as you felt the more inclined.

Any-one in any way acquainted with that great enactment which has long been one of the glories of this country—we mean the law of libel—may form some tolerable notion of the risk Mr. Wakley incurred. His safety, however, was the selection he had made. Had Dr. Hassall proved himself in any degree unequal to the work he had assigned himself, his own ruin, and

that of his associates, must have been the consequence. As it was, in the many thousand analyses he published he never made a mistake. The tradesmen he denounced knew he spoke the truth; while they felt at the same time the more they counted on prolonged inquiry, only the worse could it be for them. Of the many, then, whose wares were bought and tested, only one shop-keeper commenced his action, and that one did not proceed with it!

The effect of this happy union of courage and ability can scarcely be sufficiently estimated. The interests of producer and consumer should be really identical, for after all there is no so damaging an advertisement as a bad article. Either is now put upon his guard. The Government has very properly identified itself with the movement, and it is very clear that investigations like these will never again be allowed to remain without their use. The triumph, in fact, so far attained, will induce the researches of science into many a new field. Agriculture, as our own especial chemists and learned men are day by day coming more to see, may benefit much by the services of such an ally. There is scarcely anything sent into market so little purposely adulterated or deteriorated as wheat and flour. The farmer himself, we are sure, has little to fear from those he supplies, though it may be different with some of those who supply him. At any rate this cannot be too widely known. If, as some people will say, our artificial manures are occasionally adulterated, or injurious chemicals prepared for sale, the murder will soon out. We shall learn the fullest particulars of Smith's guano, Brown's compost, and Jones's coprolites. And truth be it remembered is no longer a libel, and Dr. Hassall but a becoming precedent for Professor Way or Mr. Nesbit.

We have been led into these reflections from having this week witnessed the presentation of the Hassall Testimonial. It was the occasion of a very pleasant dinner at the Freemasons' Tavern, where all went well from first to last. The memorial, a most appropriate one, was the crowning honour to a man who justly deserved it, and whose success points a moral far beyond any merely personal consideration. The opportunity, moreover, served to entirely obliterate any little differences which may have existed between the Doctor and Mr. Wakley. The world cannot afford that two such thoroughly earnest and able men should be any longer apart. The result of what they have done but tends to prove how desirable it is that they should continue to work together. Beyond the members of his own profession, the Hassall Testimonial is subscribed to by many men of distinction and position connected with science, literature, and commerce. Mr. Mechi, who was present, not only answered for the last-named of these, but also appeared in his still more favourite character as the hero of modern agriculture. It is satisfactory to see this is seldom felt out of place. Under the countenance, however, of a brother of so good a farmer as the Duke of Richmond, the art might fairly enough be discussed; while it would be as unfair to close this without an es-

pecial word of thanks to this brother—Lord William Lennox—who, as the *Times* reporter justly records it, “made a most efficient chairman.”

### THE HASSALL TESTIMONIAL DINNER.

On Thursday, May 15, after some little delay from unavoidable circumstances, was finally fixed for the festival (held at the Freemason's Tavern) in especial honour of Dr. Hassall, whose services to the community, as the detector of adulterations in almost every article of nutriment, whether solid or liquid, are already well known, and generally acknowledged with gratitude. Dr. Hassall “has done the State some service,” and it is gratifying to find the profession to which he belongs coming forward in a body to do him honour. The first practical result of the learned Doctor's labours was the appointment of the Select Committee of the House of Commons on the Adulteration of food, and there is now every probability that their report will be followed up by some stringent legislative enactment. The chair was to have been occupied by Lord Ebrington, M.P.; but, in his unavoidable absence from an attack of ophthalmia, it was filled, and most efficiently, by Lord William Lennox. His Lordship was supported by Mr. Oliveira, M.P., Mr. Wakley, the Rev. Mr. Daniell (Hon. Secretary to the testimonial), Mr. Thwaites (the president of the Board of Works), Dr. Waller Lewis, Mr. Mechi, Sir Thomas Tancred, Admiral Duntze, Major Sibthorp, M.P., Dr. Farr, F.R.S., Mr. Tuxford, Mr. Harvey, Mr. Hancock, Dr. Bennet, Dr. Waller Lewis, Dr. Barnes, Mr. Bass, M.P., Dr. Beaman, Dr. O'Connor, Dr. Bastick, Dr. Hogg, and many other gentlemen of influence in their respective vocations. Owing to the Whitsuntide recess, several members of both Houses of Parliament who would otherwise have been present were unavoidably kept away; and among them were the Earl of Shaftesbury, Viscount Goderich, M.P., the Hon. W. Cowper, M.P., Mr. Scholefield, the Chairman of the Adulteration Committee of the House of Commons, and Mr. Villiers, M.P. After the usual loyal and constitutional toasts, the noble chairman rose, and recorded the great merits of Dr. Hassall, dwelling upon the scientific originality of his labours, and the untiring zeal and energy with which he had prosecuted his investigations. The toast was drunk with the greatest enthusiasm. Dr. Hassall, in an eloquent and interesting speech, warmly acknowledged this gratifying recognition of his labours, gave

a brief but lucid history of the subject of adulteration, and stated that he relied mainly for its suppression upon free publicity, citing at the same time some striking instances of the value of the microscope in the detection of adulteration. He took occasion to refer more especially to the obligations incurred by the public to Mr. Wakley, from the indomitable courage evinced by that gentleman by running the risk attendant upon the publication of the names and addresses of the merchants and tradesmen whose goods had been analyzed and “found wanting,” both in quality, measure, and weight. Dr. Hassall concluded by gratefully accepting the testimonial presented to him by so distinguished a meeting. The testimonial itself is a beautiful work of art, designed from Milton's “Paradise Lost,” by the Rev. G. M. Braune, M.A. It represents the angel Ithuriel, clad in armour, touching with his spear Satan, who, having assumed the shape of a toad, sat close to the ear of Eve, tempting her. The testimonial stands about three feet six inches in height; the figure is modelled by M. Fréret, and executed by Messrs. Barnard and Sons. One of the panels of the pedestal is occupied with a basso relievo representing the microscope and the chemical apparatus employed in the discovery of adulteration, while another bears an appropriate inscription. The health of the noble chairman was proposed, in a flattering speech, by Mr. Oliveira, M.P., and aptly acknowledged. Dr. Hassall then proposed the “Health of Mr. Wakley,” the originator of the Analytical Commission appointed by the proprietors of the *Lancet*. This toast was received with much applause; and Mr. Wakley, in returning thanks, jocosely intimated that this evening, for once, he had enjoyed “unadulterated” pleasure. The hon. gentleman at the same time took occasion to express his regret at a temporary estrangement from Dr. Hassall (“a mere lovers' quarrel”), declaring that he came to the festival for the express purpose of bearing his testimony to Dr. Hassall's inflexible integrity and brilliant abilities, and assuring his (Dr. Hassall's) “slanderers” that they should not assail him unjustly. Dr. W. Lewis afterwards proposed “The Select Committee of the House of Commons on the Adulteration of Food.” Mr. Mechi gave “The Press,” which was responded to by Mr. Warren; and special toasts were subsequently drunk in honour of Mr. Thwaites, the chairman of the Metropolitan Board of Works, and Mr. Mechi, as an agricultural improver, to whose merits ample justice was rendered by Mr. Wakley. The festival was protracted to a very late hour of the evening.

### AGRICULTURAL STATISTICS.

SIR,—An article of mine on “Agricultural Statistics” appeared in the number of the “Farmer's Magazine” for November, 1849, and continued in the number of the same publication for the following month; and how far such article may have been productive of the measure now before Parliament for obtaining a yearly return of agricultural stock and produce throughout the United Kingdom, and which, perhaps, ere the publication of the following remarks may have become an Act of the Legislature, is not for me to claim credit, as such might have an appearance of egotism, which I would avoid; but I may state, without undue presumption, that the article in question was one of the earliest notices drawing public attention to a measure of great importance, not alone to any particular class, but to the community of the nation in general. That agriculture

is the most important interest in every country—in being the great source, if not the only source, of a nation's wealth—in being that industrial vocation by which alone matter can be produced and re-produced—and the truth of the remark, “that trade conduces to the production of provision only as it promotes agriculture—that the whole system of commerce, vast and various as it is, hath no other public importance than its subserviency to this end”—cannot admit of a denial by any rational being who may reflect on the subject. And the same remark will hold true in respect to manufactures as a branch of commerce, in there being no new matter created thereby that did not previously exist; and that the wealth accumulated by individuals in such pursuits is no addition to the aggregate wealth of a nation, as the gain thereby to one is, from the nature of transac-

tions in commerce and productions of manufactures, exactly balanced by equivalent loss to another.

Had the country been in possession of correct statistics relating to agriculture, it may well be doubted whether free trade, particularly in agricultural productions, would have been desired by the community of this country. An accurate knowledge of the productive power of the soil of this country, and the consumption of the same, might probably have led the opinion that the free import of the produce of the soil of foreign countries, especially of such articles as the soil and climate of our own country are well adapted for producing, with a heavy national debt and a metallic currency, particularly with a gold standard, as inconsistent with national prosperity, to have been popular rather than the reverse.

From the passing of the free trade measure to the commencement of the war with Russia, the average annual importations of breadstuffs have risen in a four, five, and even six-fold proportion to that required previous to the first-mentioned period; and in the four years immediately preceding the latter-mentioned period we had two of the most bountiful harvests within the memory of man. These facts show that there is a change taking place in the agriculture of this country—either that we are producing less, or we are consuming more. Certainly, with the improvements that are daily taking place in the cultivation of the soil, the great extent of emigration that has for years been taking place, the necessity for such considerable imports—not of corn alone, but of almost every other agricultural produce—does not arise from any want of capability in the productive power of the soil of this country to meet the requirements of the population; but rather the necessity of such importation arises from the impossibility of raising agricultural produce—with heavy general and local taxation, high rate of wages (partly induced by the physical circumstances of the country, and partly by the more expensive habits of the labouring population), and other disadvantageous circumstances of this country—at so low a price as to admit of the export of any surplus production to the markets of other countries in which physical and fiscal circumstances are more favourable for production at a lower price. And hence it is that, not being able to dispose of a surplus, necessitates a production incommensurate to the demand; and from the extreme difficulty of adjusting the limit of imports to the exact requirements, an over-supply producing a lower price than the cost of production also tends to limit the breadth of land cultivated. In support of a contrary opinion to that just advanced, the fact of farms in different parts of this country having been, since the introduction of free trade, let at advanced rents, has been advanced with much stress; but we shall find, on inquiry, that such farms as have advanced in annual value, of late years, have been those of a superior quality for production, or those possessing some superior local advantages, and that such a result is in consequence of land of inferior quality having been abandoned and planted, which has caused a more extensive demand for land of superior quality; and in many instances the farms so advanced in rent have been taken by Scotchmen contented with less return in profit for their capital, and of the more economical habits of life than the English, which characterize the Scotch people. In the matter of much

land of inferior quality having been planted, it is not a mere surmise, as I am acquainted with many whole townships, and even entire parishes, that have changed from agriculture to arboriculture; and were an enquiry instituted into the matter, it would be found that the acreage of plantations has greatly increased of late years. This is a subject for enquiry, of very great importance in the economy of this country.

The amount paid for breadstuffs of foreign growth has of late years greatly exceeded the whole charge of the maintenance of the paupers in the whole of the United Kingdom, and has been a direct furnishing to foreign countries of that which alone has given to this country a pre-eminence in her commerce and manufactures over that of every other—*capital*.

Notwithstanding the disadvantages, under her circumstances, of free trade to this country, I do not for a moment believe that we shall ever revert to protection, in the way of import duties, to any branch of her industrial interests; but that with the accumulated wealth, the energy of her population, and her vast resources in numerous and extensive colonies for her trade, the British empire will maintain her unrivalled superiority among the nations of the world; yet accurate information respecting her most important industrial interest, it is to be hoped, will prevent any legislative measures in future that may in any way be detrimental thereto.

However important correct statistics relating to agriculture undoubtedly are to every class of the community, obtaining the same with perfect accuracy is not so easily to be accomplished as many persons may imagine. The measure is far from being viewed universally by the farmers without jealousy; and if the returns from them be not checked by enumerators properly qualified for the office, the statement will certainly not be of that value which information of such importance demands. Under a properly-organized system of collection, by properly-qualified enumerators, and a complete centralization in some one of the Government boards—say, that of Trade—correct statistics relating to agriculture are not impossible to be obtained; but enumerators should be appointed to districts of limited extent; they should transmit the aggregate return of their whole district direct to the Government board, for being prepared by such board for yearly publication; and, in addition, the enumerators should be required to furnish to the Government a correct monthly agricultural report of their several districts; and the officers employed in such duty should be fairly, but not extravagantly, paid out of the Consolidated Fund of the kingdom.

In conclusion, I have to remark that the agricultural statistics of Scotland, as obtained through the Highland and Agricultural Society of that country, no doubt collected with every care as to accuracy, show a result of great discrepancy to the assumptions of writers on the subject; and no doubt, when the agricultural statistics of the whole of the United Kingdom have been accurately obtained, the facts may be, perhaps, as startling as they will be important, valuable, and interesting to the community.

JOHN EWART.

Newcastle-upon-Tyne, May 10.

## ON THE COMPOSITION OF RAIN AND DRAINAGE WATER.

Professor Way's second lecture before the Council of the Royal Agricultural Society, reserved, as the first, for the columns of the Society's forthcoming number of the *Journal*, will be found, perhaps, the leading topic of the session. We may proceed at once to notice some of the important topics embraced in it.

The first in the order of merit is the washing and aëration of the soil; the second, the quantity of manure added by rain-water; third, the quantity of manure removed by drainage water; fourth, meteorological and geological differences; and fifth, improvements suggested for the manufacture and application of manure, solid and liquid.

The first effect produced by a drain is to remove any stagnant water in the soil; and the composition of that water determines the degree of purification effected. As heavy showers afterwards fall, they percolate through it, continuing the process of washing; and the quality of the drainage water every time indicates the good done. Thus the process is as simple as it is beautifully interesting, when contemplated in detail; blue, tenacious, barren clays changing their colour, and becoming blackish-brown, friable, fertile loams.

Again, every time the water is removed from the soil, fresh air takes its place, performing the important work of aëration. Into the details of this process we need not enter: suffice it to say that both the organic and inorganic matters of the soil are decomposed, that food is manufactured for plants, while all deleterious soluble matter not consumed as food is either neutralized or carried off by the operation of washing; the two processes following each other alternately, without intermission.

Now, viewing the vast variety of geological fields which our provinces present to notice, and the still greater diversity of soils composed of drifted materials, how important would it be to know the composition of the drainage water in each case, and the effect which this drainage, with its auxiliary aëration, was producing in purifying and fertilizing the innumerable soils in question!

The composition of rain-water, our next topic, and its fertilizing effects, have long been questions of controversy among farmers, some affirming that rain in its descent brings large quantities of ammonia and nitric acid from the atmosphere to the soil; others with equal zeal asserting that pure distilled water, applied in warm weather, would just do as much good, the nitrogen of plants being derived from the nitrogen of the atmosphere; while a third party have stood upon intermediate ground.

But Professor Way's investigations in the laboratory very opportunely go far to set to rights this anomalous state of things, as will be found by our readers when the first part of the Society's *Journal* for the current year makes its appearance. Hence their importance.

On "the composition of drainage water" we shall say little, as it forms the main topic of his timely paper, reserved, as already stated. It will be enough at present to mention that the invaluable tables of analyses exhibited corroborate the accuracy of his former experiments as to the absorbent quality of soils, so far as the limited experiments in the two cases extend; the loss of the more valuable elements of manure, as ammonia, phosphoric acid, and potash, being comparatively little from percolation, the absorbent power of the soil being greater than the force of gravitation, with one exception—nitric acid, the loss of which will be found great.

The rainfall, again, we need not tell our readers, is different in different provinces; being greater on the west coast and in the proximity of high hills, than on the east coast and in comparatively level champaign districts; while evaporation is greater in our southern provinces than our northern. Now, as the quantity of manurial element in rain and drainage-water will depend upon the rainfall and evaporation, how important a question do the statistics of the rain-gauge and thermometer become. In point of fact, the day is not far distant when such instruments will be found in every farmer's inventory, and their management part of the routine of every successfully-cultivated farm.

As to geological differences, almost every farm furnishes its own individual example, the rain-water that falls in one field often percolating to the drains of another. Hence how some naturally-drained soils become fertile to a great depth, where the subsoil is of a quality capable of absorbing manurial elements from rain-water in percolating through it; and hence the propriety of deepening all soils, and of mixing absorbing material with non-absorbing (as clay with sand) for this express purpose.

Our last proposition, like the first, was hardly mooted by Professor Way, and therefore we may take a condensed review of it. The manufacture of artificial manure is now a very prominent and promising branch of industry, and the conclusions to be drawn from the tables of analyses at issue warrant us in saying that progress must also extend to the homestead of the farmer; the old "midden" and dunghill giving place to more scientific systems of management. At present we grumble at clay clods baked in the sun as dry and hard as bricks. But why should not these be carted home and ground into powder in mills, and mixed with farmyard-manure in our feeding boxes? How much ammonia would a ton of dry clay-dust absorb? What increase of crop would such produce, if applied to a sandy or calcareous soil deficient of clay? How many things else than clay, at the command of every farmer, might be dried, ground to powder, and mixed with farmyard-manure? And when we think of the chemical and geological character of soils, what different mixtures do they demand?

Again, liquid manure cannot be so successfully applied during winter as during summer, the quantity of drainage-water being greater in the former season than in the latter; while nitric acid should only be applied in the summer season, and that, too, in small quantities at a time, no more being given than the soil can retain in its pores, analogous to gentle summer-thunder-showers, whose fertilising influence is familiar

to all. For a similar reason dry soluble manure ought not to be applied between September and March or April, according as the season is wet or dry, as during that period it is liable to be washed out by frequent drenchings of rain; while in both cases our progress in soluble manures is demanding a deeper and finer comminution of the soil with the mixture of foreign substances, so as to increase its absorbency, than is at present practised.

From these observations it will readily be perceived how important a series of chemical analyses Professor Way has commenced, and how imperative is the demand of his laboratory upon the hearty co-operation of members resident in our different provinces in order to gain the necessary materials for investigation. And what greatly enhances the value of these analyses is the important discoveries he has made since they

commenced, or rather before he could commence, of new processes and apparatus for ascertaining the quantities of ammonia and nitric acid in rain and drainage water, whereby the smallest differences can be determined with a degree of accuracy hitherto unknown. The farther we progress in agricultural chemistry, and the more farmers become familiar with it, the greater will become their dependence upon the details of chemical investigation in every branch of husbandry. If "The Landed Interest" would only respond with that frankness due to the occasion, it would set every laboratory in the kingdom to work, and furnish agricultural science with data which they themselves would soon appreciate in the stimulus it would give to progress in improved culture and manuring, permanently increasing the value of estates and produce of farms.

W. B.

### "THE BONDAGE SYSTEM" IN SCOTLAND.

The history of Scotland's agriculture furnishes us with some anomalies of the most extraordinary and startling character. An advance that has long been held out as an example to the rest of the world has lately been found to be but imperfect and partial in its influence. In a word, the country generally has not benefited as it should have done by this improvement. In a land proverbial for its clanship, and the cherished recognition of those ties which bind the highest to the lowest, the actual exercise of such a feeling would appear to have been at times almost altogether ignored. Scotland shames us with model landlords and model tenants. A union of interest—a union of ability, intelligence, and enterprise—have achieved wonders for the mutual advantage of these two classes. They have progressed in every way—but one. They have better incomes, better land, and better stock. They have, in fact, bettered the condition of everything but the chief agent of their success—that of their fellow-man. Clanship stops here. The man may fight for the Laird, or work for the tenant, serving either with all his heart and strength. He is, too, well known as a good soldier and a good workman. The boast, however, yet remains, and a more mistaken one never was made, "that he can live on his oatmeal porritch," without the white bread, bacon, and beer of the pampered Englishman.

We have lately had to show that the Scotch labourer has everything in due accordance with this oatmeal diet. He is lodged as badly as he is fed. On more than one occasion we have had to comment on the monstrous evils of the "bothy" system—a practice so directly baneful and unprofitable in its effect, that the only wonder is how it could have continued so long undenounced. There, however, the bothies were, on the model farms of Scotland, with men and women worse housed and cared for than the beasts they tended. Still, but once attacked, the ill was one sufficiently great and apparent to work in some measure its own remedy. No owner or occupier could have any further pride in a place in which such hovels were yet allowed to remain.

The agitation of this matter promises even something more than this, its first object. The further we proceed, the more and more do we discover the labourer of the North to be behind his fellows elsewhere, and the less cognisant, in his own state, of that improvement going on round about him. He is not only badly fed and badly housed, but, in a business point of view, he is badly dealt with. There were but few of our readers until lately who knew what "the Bothy system" really meant: there are fewer still, we expect, who are acquainted with the working of "the bondage system." It is a phrase, though, but too well known in Scotland; and we can happily let the Scotch themselves explain to us what this "bondage" implies and enforces.

Following in the steps of the Reverend Harry Stuart, there is now established in Edinburgh a committee of gentlemen whose aim is the improvement of the condition of the Highlanders. In furtherance of this object they have just issued a very able and eloquent "Plea for our Highland and other Agricultural Labourers, or the Bothy and Bondage system in East Lothian and neighbouring Counties." Though here treated as in some degree associated evils, we may confine ourselves to "the Bondage"—strange term to be used in a free country in the nineteenth century! It is simply this:—"In very many districts of East Lothian, Berwickshire, Roxburghshire, and, it is believed, of some other counties, chiefly in those districts where there are no villages, and the population is forcibly kept down below its natural level, the hinds on a farm are *bound* by the farmer to furnish each a stout, full-grown field-worker all the year round, or at least during the summer season. This is popularly and appropriately called the *bondage-system*. When the hind has a son or a daughter of his own who can work the 'bondage work,' he may sometimes feel the arrangement to be an advantage; but it often happens that his children dislike field-work, feel it to be a great drudgery, and prefer some other employment. Yet one or other of them is bound and obliged to turn out to a hated kind of work. It frequently happens that the hind,

who has no family, or whose children are all young, has to hire a stranger into his house as his *bondager*. This inmate, generally a person of but an inferior grade, is often felt to be a burden, a spy, or a moral plague in his small house and among his young family. And further, what he receives from the farmer as the wages of his bondager, frequently does not pay the expenses to which he is put. He has often to give between £5 and £7 a half-year for such a substitute, who only earns for him 10d. or 1s. a-day, while, from wet weather and other causes, there is not a little *broken time*. Now, when to the wages he has to give to the bondager is added the expense of board, lodging, and washing, it is no wonder that the poor hind can often say, in bitterness of spirit, that besides all the annoyance to which he is put, he is a pound or two in the half-year out of pocket."

The effect of this, we are told, is that farm servants seldom remain long in one place; that they universally hate this worse than Egyptian bondage, and are as generally endeavouring to fly from it. "The tie between master and man is now easily broken"; extensive emigration, amongst other things, being considered as one of its immediate results. Couple the forewith the after consequence—that is, a scarcity of proper house accommodation with an accompanying scarcity of labour—and we arrive at this awkward fact: "In many thriving agricultural districts, as in parts of East Lothian, there is a want of native hands to cultivate the soil; there is a confessed scarcity of house accommodation; and the farmers are compelled to resort to all manner of shifts, first to procure labourers in sufficient numbers, and then to furnish them with some sort of shelter. Some of the richest agricultural districts of the country are actually *under-peopled*; and the glaring anomaly is seen of a land teeming with abundance inhabited by a scanty and diminishing population." In a more direct form we gather that "in East Lothian and in Berwickshire, where the large-farm system exists in perfection, the agricultural produce of these counties has for many years been greatly increasing in quantity and value; while the population of both, during these past twenty years, has been nearly stationary. In 1831 the population of East Lothian was 36,145, and in 1851 it was only 36,386; in 1831 the population of Berwickshire was 34,040, and in 1851 it was only 36,297. The agricultural statistics of these counties during that period would show an immense increase of produce; but the population, in a moral point of view the most important item of all, has been little more than stationary in amount, and, it is greatly to be feared, deteriorating in comfort and in character."

In the first instance, one naturally turns to the employer. How say you, tenant-farmers of Scotland, Guilty, or not guilty? "The Plea" we quote from, thus answers for them: "The farmers, as a class, are not to be blamed for such a state of things. Some of them, of late, have offered to pay the landlord a percentage on the expense of building a few more houses for the accommodation of their labourers, and have in general met with a refusal. It is believed that they

would gladly see themselves able to dispense with the bondage-system altogether. Both their best feelings and their true interests counsel its speedy and total extinction."

And, again: "Farmers in general lament and condemn the evils which it is the main purpose of this manifesto to expose. They desire nothing more than to get a sufficiency of labourers in a natural and proper way, and to see their labourers living in comfortable houses."

We call attention to this subject with a double inducement. From any error in the conduct of our neighbour we may learn the better to regulate our own. In homely phrase, let us "look at home." There is no doubt that in certain districts here in England the action of the law of settlement has, or is conducing to the same result now so much, and that may be still more, deplored hereafter in Scotland. One of the first great facts in improved farming is a sufficiency of good manual labour. Machinery, instead of supplanting it, only, as is now well known, increases the demand, the chief consideration being that it should be of a higher character. In a word, to establish improvement you must improve the condition of the workman. Imbue him with a permanent interest in what he is about, and develop that increased intelligence you require of him by increased attention to the comforts, conveniences, and common decencies of his domestic life. You will secure it and him in no other way; for the sooner he arrives at this necessary intelligence, the sooner will he feel the unjust and degraded position in which he is kept.

The farmer may not be to blame, but he has a duty a little more vigorously to perform as the labourer's advocate. He must demand of his landlord the necessary accommodation; while landowners will ultimately discover that nothing can be more shortsighted or unprofitably selfish than to refuse such a prayer. The Edinburgh Committee do not hesitate to place the whole weight of the evil, as it is there experienced, on his shoulders:—"Whence is the remedy to come? From the landed proprietors. If the great truth is admitted, that 'property has its duties as well as its rights,' it seems clear that the landlord is bound to provide decent house accommodation, at the very least, *for all the labourers* that are required to cultivate his estate. Landlords of late have done much to improve the dwellings of the farm-servants, but they have done little or nothing to increase the number of these dwellings. They have in general forgotten to inquire if, while improved modes of culture call for more field-labourers, these labourers can be got by their tenants in a proper and natural way; if they are suitably and decently lodged; and if any hardships are endured, both by tenants and their labourers, from want of sufficient house accommodation. Let it be conceded that the large-farm system in the richer agricultural districts is the most profitable and productive, and also that a surplus rural population ought always, if possible, to be avoided; still it must be borne in mind that proprietors are very apt not to build houses enough on their large farms, and that the evils of under-population are neither few nor small."

There is home-truth enough in this for us all; for though Scotland be the first to complain of the evil, England cannot but take timely warning from her example.

## FRENCH COMMERCE IN AGRICULTURAL PRODUCE.

[BY LEONCE DE LAVERGNE, MEMBER OF THE INSTITUTE OF THE CENTRAL SOCIETY OF AGRICULTURE.]

The alimentary crisis through which we are passing has had, at least, one good effect, namely, that of causing us to adopt—definitively, we hope—both on the part of producers and consumers, freedom of internal trade and freedom of importation of cereals and cattle. In both respects we have seen that this double freedom is not attended with those inconveniences which were feared; but that, on the contrary, they possess important advantages. One point only remains still to be gained, in order to complete the system—freedom of exports. Whilst professing in the *Moniteur*, the true principles in matters of trade, the Government has considered it necessary to maintain, and even to eulogize, the prohibition of exportation. It is possible that this may be a necessary expedient in the actual state of ideas and prejudices. But whilst it is the duty of governments to respect, in such cases, public opinion, there would be a real inconvenience in laying down, as a principle, a mere concession—inevitable if you please, but bad in itself, and which must, in the sequel, disappear with the rest of a system condemned by experience.

In the first place, there is an evident contradiction in prohibiting exportation whilst using every effort to promote importation; were other nations to do the same—and they would be justified in doing so by our example—we might open our ports, but nothing would enter them. What right, for example, have we to call upon the Neapolitan or Roman, or any other government, to repeal their prohibition of export, when we maintain the same ourselves? The reply is too ready; and this reason alone ought to suffice, although it is far from being the only one.

To prohibit exportation in a season of great dearness, like that of prohibiting importation in one of cheapness, is a useless precaution. Where would provisions exported by us at this period go to? Prices are hardly anywhere higher than in France; and where they are so, the expenses of transit will more than make up the difference. That there may, in one or two directions, be a chance of selling to foreigners a small quantity, is not absolutely impossible; but what effect can that have upon the total amount of the national stock of provisions? The exportation, if it were free, could be but insignificant: that is beyond a doubt.

Again: exportation may facilitate importation to a certain extent in the following manner. It is the custom, in treating on these questions, to comprehend everything in general terms, supposing a single category of interests and necessities. We confound all seasons, all commodities, all parts of national territories; now, in practice all this is infinitely divided. The national territory is immense, and it may very possibly happen that at one point importation may be of advantage, and exportation upon another; that it may be useful to export in one season, and to import in another; or it may prove profitable to export one commodity in order to import another. I shall argue these hypotheses seriatim.

Let us suppose that wheat is at 30f. at Marseilles and at 20f. at Nantes, but the distance between these ports being great, the expenses of transit are excessive; if, for argument's sake, we value them at 10f., there will be no actual difference in the price. Suppose, on the contrary, that Marseilles has nearer, but out of France—Genoa, for in-

stance—a better market for buying wheat, and that Nantes, in her turn, has one nearer, say in England, for selling her wheat at a higher rate; in that case, wheat will fall at Marseilles and rise at Nantes. And thus the consumer will gain in one case and the producer in the other, what would otherwise have been uselessly absorbed by expenses, without reckoning the loss of time, the anxiety, the averages, &c., inseparable accompaniments of a long voyage. I need not state that these are not mere suppositions, but facts; being the habitual and normal position of Nantes and Marseilles.

Let us now suppose that Algeria, Italy, or Spain harvest and thrash their wheat sooner than we, without having actually an excess of it, but which it may be advantageous to them, seeing the ravages of insects and other chances of destruction, to sell to us a part at the moment in which we want it ourselves, with the view of purchasing it again of us at a later period when we shall have concluded our harvest and thrashing. Let us suppose again that the same circumstance takes place in an inverse sense with the northern provinces, which harvest later than we, and that we have an interest in exporting thither first, in order to import from thence afterwards. Again, it is easy to perceive that these suppositions have nothing gratuitous in them, being the pure and simple expression of facts.

Lastly, let us suppose, for example, that Alsace has an abundant harvest of potatoes, but stands in need of grain; whilst, on the other side of the Rhine, wheat may be more plentiful and potatoes more scarce: there would evidently be a profit in selling the one and buying the other, and what may happen in this district with potatoes, may happen elsewhere with other products.

At this moment when the price of wheat is so high, we have in France cereals which are not consumed. The departments of the east and south-east produce abundance of maize, which is usually sold for exportation; the Valley of the Saone sells to Switzerland; those of the Garonne and Adour to England. At this time this exportation is prohibited, and the producers who have an excess of maize no longer know where to place it. We are undoubtedly wrong in not consuming it in Paris and at the north of France; but we are not accustomed to it, and our habits are not changed in a day. In the meantime, the maize remains unsold, and the price, which is commonly two-thirds that of wheat, does not now even reach half. Besides the wrong we thus inflict on the producer, the consumer also suffers; for, with the maize we should sell to the foreigner, we might purchase wheat, and this maize would go to fill a void in the consumption of neighbouring countries, and thus contribute to lower the price of wheat in the general market.

Turkey, again, offers us a still more striking example. Bread is dearer at Constantinople than in Paris; not exactly because they want wheat, but because they have not mills sufficient to meet the consumption created by the presence of the allied armies. It would yield a profit to import wheat from thence and to export flour, but we cannot do it. The prohibition of exportation prevents wheat from being sent from Turkey to other countries—possibly France—to be converted into flour.

Nothing can be more artificial than this claim of imposing on the department of the Nord and that of the Var, which are 250 leagues distant from each other, the obligation of exclusively supplying each other with provisions, when they might buy and sell with more profit at their doors. We thus throw obstacles in the way of a multitude of commercial combinations, some of which I shall now state, and there are certainly many others. We reasonably desire to organize on a grand scale the trade in cereals and other alimentary products, for nothing gives so much life to commerce as the liberty to import and export at will, according to the variations in price. That which is true of internal commerce is not less of foreign; what therefore the *Moniteur* has said of the one, is equally applicable to the other.

It is necessary again to revert to England, whose example at this moment, demonstrates perfectly how much importation and exportation mutually assist each other. This little island is becoming more and more the centre of trade in alimentary produce for the whole world. All goes there, because they know that if by chance prices were higher elsewhere, they will be free to reload for that destination. We cannot say that England now exports much; but if prices are a little reduced with her, or raised on other points, she will export more. According to all appearances she will finish by selling wheat to us, and has already made a small beginning. This is to disturb the natural order of things. From this time forward the English journals may remark with propriety, that England is, of all countries in Europe, that in which wheat has risen less, relatively with its usual price, and that scarcely any other country approaches so near that desirable ideal, fixity in the price of grain.

Let us tell the whole truth. French agriculture agrees without a murmur to the free importation of alimentary produce, because a great national interest is involved; it has certainly a right to demand in exchange freedom of exportation. These Custom-house regulations have happily only a very limited influence when they relate to so large a country as ours. If indeed they possessed the efficiency generally imputed to them, the condition to which they would reduce the agriculturists would be insupportable, since it would deprive them of all chance of a rise by multiplying on the contrary, as much as possible the chances of a fall in prices. "No favour, but no injustice." Even in the in-

terests of the consumers, it would be very inconvenient that they should be able to exercise a violent action on prices. However this law may be the subject of regret, it is just that wheat should be dear when it is scarce; for if it was not so, the producer would not find in the augmentation of price a compensation for the deficiency of the harvest, would receive no remuneration for his labour, and his ruin would involve that of the consumer, because he would cease to produce. It is therefore of importance to leave things to their natural course: dearness brings its own remedy by encouraging production—such is the established order of Providence. In spite of the high price of products, it does not appear that the profession of agriculture is very lucrative in France. Leases are not much in request, nor does the value of land advance to the rent it obtained before 1848.

In ordinary times, nothing is more favourable to agricultural productions, and consequently to abundance, than the facility of exportation. England has been the first to comprehend this, as she has also been to see the advantages attached to freedom of importation; and she even went beyond the limit formerly, by encouraging exportation with a bounty. This economic extravagance—for such it was—was infinitely better than the contrary error which prevailed in France at the same time, the prohibition of exportation. Under the empire of these two opposite regimes, English agriculture has made a rapid progress, whilst French agriculture remains "in the rut."

Once more; I do not say that these opinion could now be carried out. "A hungry belly has no ears." It is necessary to respect the national sentiments, even when they are erroneous; but, at the same time, it is necessary to spare no pains to rectify them. Belgium is now the most enlightened country of Continental Europe on these points, and the House of Representatives has just passed an act to prohibit exportation, but only after an animated discussion in which it has been generally acknowledged to be a bad law. The ministers themselves, who had introduced it, have declared that in their estimation it is injurious, but necessary. "Of two evils we must choose the least," said one of them. "I prefer contributing to raise the price of wheat by a false measure, rather than subject myself to seeing cart-loads of it pillaged by the people." I understand *this* argument, but I do not comprehend any other.

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## THE MICROSCOPE AS AN AGRICULTURAL AGENT.

Our agricultural readers, we trust, will give us credit for being the advocates of progress in intellectual and scientific attainments, with the view of producing a more enlightened practical application of the principles of their profession. Certain it is, that within the last ten or fifteen years more advances have been made in knowledge, more light thrown upon agricultural subjects, and greater inroads effected upon prejudice, than in any previous period of thrice its duration. We are, however, still in a transition state in this respect; and what has been already attained serves but to make our remaining deficiencies more palpable. As a body, however convinced the agriculturists may now

be of the advantages of science in their profession, a large proportion of them are still content to take its revelations at second-hand, and to rely implicitly, and without inquiry, on the dicta of those they deem to be better informed than themselves.

Noways discouraged, we are about to tax their attention with a subject which has hitherto been only incidentally adverted to, but which has now been more directly suggested to us by the examination of a work recently published by Van Voorst—we refer to the use of the microscope; the work in question being a "Micrographic Dictionary," edited by two of the most eminent men of science in

the kingdom;\* and which, we apprehend, will prove a standard book in the scientific literature of the country. The subject itself is so important, that we feel inclined to give a short account of the progress made in the improvement of the microscope, and of the practical use to which it may be applied in agriculture.

There is no account, we believe, of the time when the microscope was first invented; but it is generally believed to have been coëval with the discovery of the power of the lens. Like many other scientific inventions, it remained in an imperfect state of efficiency until within a very few years; and although the compound instrument had been constructed, it was not till the year 1824 that its powers were fully developed, when Tulley constructed an achromatic object-glass of 9-10ths of an inch focal length, composed of three lenses, which transmitted a pencil of 18 degrees. Several of the continental *savans* had directed their attention to the same subject at this period, but Tulley's was the first instrument of the kind made in England; and the *principle* has never been improved upon by any subsequent combination of three lenses. Herschel, Airy, Barlow, and Lister have discovered certain properties in achromatic combinations which had escaped the notice of Tulley; and in 1829 Lister read a paper before the Royal Society, showing that by the application of this discovery he had obtained a combination of lenses, which transmitted a pencil of 50 degs., with a large field correct in every part. By this discovery, which was perfected afterwards by Powell and Ross (especially the latter), the defects of sphericity and dispersion were destroyed or balanced. Sir D. Brewster and M. Dujardin have still further added to the efficiency of the achromatic powers of the microscope; and these progressive advancements, which are now patent to all, have enabled our authors to produce the work in question, which forms a complete vocabulary of microscopic technicalities, a lucid explanation of the instrument in all its parts, and a splendid museum of graphic specimens of objects such as no other work in our language can exhibit.

These graphic illustrations comprise 41 plates and 816 woodcuts of portions of the animal, vegetable, and mineral kingdoms, executed in the first style of the art, and constituting altogether one of the most interesting and instructive collections on the subject ever published. A large proportion of these are sections of the bodies they represent, exhibiting their construction

\* "The Micrographic Dictionary; a Guide to the examination and investigation of the Structure and Nature of Microscopic Objects" By J. W. Griffiths, M.D., F.L.S., &c., Member of the Royal College of Physicians, and Arthur Henfrey, F.R.S., F.L.S., &c., Professor of Botany in King's College, London. Illustrated by 41 plates and 816 wood engravings. London: John Van Voorst, Paternoster-row.

in the most natural manner; others are specimens of plants and animalculæ invisible to the naked eye, but exhibiting, under the power of the instrument, their beautiful or grotesque forms, as the case may be. Nearly the whole are more or less magnified, ranging from 3 to 600 times, according to the requirements of the operator. It is impossible to give any analysis that can afford an adequate idea of the elaborate and scientific execution of the work, either in regard to the illustrations or their explanations in the typography. The introduction contains a complete description of the microscope in all its parts and uses, with directions where the best are to be obtained, and the various terms and instruments in use. It forms, in fact, a complete microscopic *vade mecum*, and by it any man of common understanding may readily attain to a knowledge of this branch of science.

It may be asked, of what use can a knowledge of the microscope be to a farmer? and how can its powers and properties be brought to bear upon agriculture? We reply, that in no profession can its use be made more practically beneficial than to that of the farmer, whose success is frequently marred by influences of which he is in total ignorance, and which nothing but the microscope can divulge. We have recently had a case in point under investigation, which will illustrate the truth of this remark in a striking manner. In Lincolnshire, and other parts of the country, the wheat plant has been attacked with some disease or other enemy which had escaped the detection of the farmers; and the case has undergone a microscopic investigation, in order to ascertain whether the mischief arises from animalcules or fungi, there being at the time a difference of opinion on the subject. Both these were found to be concerned, some of them being too small to be discovered by the naked eye, but were instantly detected by the microscope. Possibly means may be found—by dressing the land with lime or some other caustic substance—to prevent this mischief another season.

This is but one of a hundred cases of the like kind in which the microscope can be made useful to agriculture. Many such cases will at once strike the mind of the intelligent farmer, in which it would be desirable for him to ascertain the cause of the evil. There is not a plant he grows but is at times subject to disease arising from animalculæ or fungi, both invisible in their organization to the naked eye, but not less effective in the destruction of the plant. We, therefore, strongly recommend our scientific readers to make a purchase of a good microscope, and, as an essential accompaniment to it, the "Micrographic Dictionary," by which he may speedily acquire a competent acquaintance with its application and uses.

## LAND DRAINAGE.

The attention of our French neighbours is at the present moment strongly directed to the subject of land-drainage. The last number of the *Journal d'Agriculture Pratique* contains a paper on this subject, from the pen of M. De la Trehonnais—a French gentleman, who has been long resident in England, and is, we have been told, connected with some extensive agricultural operations in France, which are to be conducted on the English system.

The writer commences with an observation as to the importance of land-drainage, as an essential condition of fertility, and a preliminary to improved cultivation. This being the case, the great object of inquiry is, he says, what are the most economical and efficacious modes of draining? and in France, where capital is as yet so parsimoniously applied to agriculture, this is the all-important question. We are all agreed, he adds, upon the importance of draining: the only question is, how can the landowners support the expenditure of 250, 300, and even 400 francs the hectare—a sacrifice in most cases unappreciated by the farmer, who will there, for a long time, be unwilling to pay the landlord the increased rent which the operation renders necessary, and the value of which he is at present unable to appreciate?

M. De la Trehonnais then describes the aid which has been afforded in England by the Government, so unwilling generally to interfere in the private affairs of individuals, by means of loans. He also adverts to the different drainage companies which have been formed in this country for providing the necessary funds, and, in some cases, undertaking the execution of the works. He then shows how, in some parts of England—as in Essex and Suffolk—a cheap method of draining land has been struck out, and long practised, which brings it within the reach of the tenant farmer.

“Lastly,” he observes, “a geologist (Mr. Trimmer) and an able practical agriculturist (Lord Berners) have discovered another method, as economical, and much more durable—the one by means of scientific researches, the other by a long series of practical experiments; and the two, as it appears, without any communication with one another, have arrived at the same conclusion. The theory of the one has been verified by the experience of the other. We have described,” he continues, “in a former number, how these two elements were brought together at a meeting of the Royal Agricultural Society, where the geologist explained his theory of the furrows belonging to the erratic tertiary deposits, and pointed out the benefits which might be derived from them in simplifying the operation of drainage. This utility the practical agriculturist, who was accidentally present at the meeting, declared to be established by the testimony of an experience of thirty years. On his Lordship’s invitation, the geologist visited the scene of these successful

operations, to witness the application of his theory; and to this remarkable coincidence we owe the Keythorpe system, so called from the name of the estate of Lord Berners.”

M. De la Trehonnais then declares that, having been an eye-witness of the extraordinary results of this system of draining, and the questions arising out of it having been discussed in his presence, he considers himself in a position to treat the subject, not only from his own observations, but from those of the most eminent agriculturists who have taken part in the discussion. He then explains the principles of the system, which—after all that has been said—as we presume most of our readers must know by this time, consist in the taking advantage of certain natural and subterranean furrows, grooves, or channels, which exist not only between the soil and subsoil, but, at different depths, between different members of the superficial deposits, and perform different functions in land and in spring-draining. Into the theoretical views advanced by M. De la Trehonnais respecting the mode in which these natural and subterranean furrows were formed, we will not follow him. He will find few geologists inclined to coincide with him in attributing the deeper set to a general deluge. Most of them are now agreed that those members of the superficial deposits between which the most deeply-seated furrows exist, were formed by glacio-marine action, during the subsidence and re-emergence of the land; and as to those furrows nearer the surface, which have been formed by some anomalous and hitherto-unexplained action, upon a terrestrial surface, it would be rash, in the present state of the information which we possess respecting them, to found on them another diluvial theory, after the warning we have received from the signal failure of that of Dr. Buckland. Whether the Scripture narrative requires that the deluge by which the human race was once destroyed should have been universal, or merely confined to the regions then inhabited by man, are questions which we may probably discuss on some future occasion: at present, we waive it. The question, moreover, of the manner in which these furrows were formed, is foreign to that of their agricultural application. Their existence, depth, and direction are the only questions with which we have any concern, as regards their practical application to the drainage of land. The first does not admit of a question; and the laws of their depth and distribution, and the forms of surface in which they prevail, are questions only to be resolved by careful observation. It is evident, moreover, that, if they exist, they must have so important an influence on the success of land-draining operations, that the study of them becomes one of great practical importance, to which our draining engineers would do well to turn their attention.

The existence of these furrows is attested by many

impartial observers; and M. De la Trehonnais regards it as an incontrovertible fact. He then shows the effect which they must produce on the land, supposing drains to be laid on the parallel and equidistant system, so as to coincide in their direction with that of these subterranean inequalities, in an impermeable bed filled with a more permeable soil, instead of intersecting them; and concludes this part of the subject in the following words:

"If," he says, "as we have demonstrated, there exist in the subsoil alternations of porosity and impermeability, we must avail ourselves of them to attain our end, in order to diminish the number and length of our drains, and, by so doing, to diminish the expense attending draining operations. The reader," he adds, "will appreciate, like ourselves, the value and importance of a system which has for its basis an in-

contestable scientific fact, and for auxiliaries simplicity, economy, efficiency, and durability."

These views are followed by a description of the method by which the drainers of Keythorpe proceed in regulating the position of their drains by means of trial holes, and the effect of drains in clearing them of water, at different distances. These details are illustrated by two actual sections along the length of an exploring drain at Keythorpe, showing the irregular alternations of porous and retentive deposits following the deeper set of furrows in the lias. Into these remarks, and others which follow, on the manner in which water percolates through the soil, and the manner in which it enters the drains, our limits will not permit us to follow the writer; nor is it necessary, seeing that he has recently explained himself on these points.

### CATTLE PATHOLOGY.

The annual report of the Veterinary College to the Council of the Royal Agricultural Society reminds us that as our live stock are being improved in breed, and forced forward to early maturity, their position is becoming the more artificial, requiring a greater amount of attention in household accommodation and feeding, while they are also becoming more liable to a certain class of diseases, when neglected. Hence the growing importance of pathology, physiology, morbid anatomy, and the other branches of veterinary science taught at the College.

Pathology (from the Greek words *παθος*, a disease, and *λογος*, a discourse), or the science of diseases, treats, *first*, of the naming and arranging of diseases into classes, orders, genera, &c.; *second*, of the predisposing and exciting causes of disease; *third*, of the signs and symptoms by which the disease is marked; *fourth*, of the changes of structure effected, involving physiology, or a comparison with the same functions and structure in a state of health; *fifth*, of the necessary treatment to effect a cure; and *sixth*, and lastly, of morbid anatomy, when cases terminate fatally.

Pleuro-pneumonia, and other inflammatory complaints affecting the respiratory functions, with certain parasitic diseases, appear to have been very prevalent during the period embraced by the report; and from the discussion which followed its reading, are so still in several provinces. In Lincolnshire, and some others, for example, they appear so obstinate and confirmed in character, setting defiance to the exhibition of medicine, that farmers are giving way to despondency, leaving affected animals to the *vis medicatrix Naturæ*, or "curative force of Nature," as it has rather not inaptly been termed.

In all inflammatory cases, and indeed in diseases of every kind, the old adage, "prevention is better than cure," is applicable—a fact specially alluded to in the College report. This arises from the indifference manifested by cattle when first affected, and the consequent

difficulty experienced by farmers in recognising disease, and applying a timely remedy. The moment man feels the predisposing causes beginning to act, he applies to his medical adviser for relief, communicating to him many things which otherwise he could not ascertain at this period from any symptomatic evidence. As soon as a change of structure begins to take place, indications manifest themselves enabling him to prescribe, but not with the same degree of confidence and success as at an earlier stage, while the sufferings of the patient are greatly increased. And before even the first sensations are felt, man, from being endowed with rational faculties, and knowing his own constitutional characteristics, and what course of dieting is necessary to preserve health, is able to adopt the same. These infirmities, too, generally hereditary, are often themselves chronic diseases of the most loathsome kind, liable to assume an acute form, or terminate in others of a more malignant kind. Take scrofula as an example, where the whole lymphatic system is in a diseased state of action, more intense at certain seasons of the year than at others, and where the action not only predisposes the system to inflammation, but gives to it a more obstinate character. Again, a plethoric constitution, or a system overloaded with blood, disposes it to inflammatory affections, as pleuro-pneumonia, apoplexy, &c. In this case the diet should be cooling, temperate in amount, and regular as to meals, accompanied with gentle exercise, the liberal use of the flesh-brush to keep the insensible perspiration up, and an active aperient occasionally, especially in early spring and autumn. The opposite temperament of this—viz., the phlegmatic or verminous—has an excess of serum in the blood and cellular membrane, and predisposes the system to worms and morbid secretions; consequently, as a prevention, a warm strengthening diet is recommended. Then we have gouty, rheumatic, and nervous temperaments, requiring their respective modes of dieting to keep down their action to the lowest degree of

tensity. In all these cases experience has taught man the truth of the adage, and therefore he acts accordingly. The brute creation in a wild state, too, is often guided by instinct to pursue a similar course, by selecting various medical herbs for food, eating earth, going great distances to drink sea-water as a vermifuge, and the like; but with domesticated animals, under our artificial systems, no such privileges are enjoyed, while the poor brutes are, on the contrary, induced by a thousand pampering means to increase the action of constitutional disease. And in addition to constitutional maladies of the above nature, the stomach of man is frequently either in an alkaline or acidulous state, requiring antacids and antalkalies to correct them; and such are always better given in food containing these in their natural state—as lemon-juice or sour milk—than in the shape of crystallized acids and alkalies, as citric acid and lactic acid, from the shops. Such is the case of man; and analogous to it will be found that of our domesticated animals.

To prevent pleuro-pneumonia, therefore, farmers should watch narrowly the prognostics of plethoric animals, and pay attention in time to the kind of regimen or food, and grooming they require, especially when they are constitutionally of scrofulous habits.

Again, to prevent worms in the wind-pipe, a disease very prevalent at present, phlegmatic animals should be narrowly watched, and a warm stimulating and strengthening diet given in time, such as a liberal allowance of oil-cake or linseed-meal and India-corn, with a suitable seasoning of salt and bitter herbs as tonics—the latter more especially for sheep, as they, when left to roam in the natural state, consume large quantities of bitter herbs, many of which are anthelmintics. Parasites on the skin are also common in constitutional habits of this kind, and therefore a similar course of prevention should be adopted in time.

Special notice is also drawn to urinary calculi, generally of the calcareous and phosphatic kinds, in sheep, attributed to too nitrogenous a diet.

There is yet too much diversity of opinion as to the cause of calculous deposits of this nature, to hazard a conclusion as to what kind of diet should be used to prevent them. The more sound philosophy appears to be that they are the result of disease, most probably, of the absorbent and secretory functions, for in themselves they cannot be a disease, nor the cause of injury to the kidneys, ureter, bladder, or urethra, until once they exist. Such being the case, we have to prescribe a diet calculated to promote the healthy action of these functions, and this is more likely to be accomplished by the exhibition of bitter tonics, with diuretics when required, than a less quantity of nitrogen in food.

During the discussion which followed the reading of the report, the chairman, Mr. Miles, M.P., drew the attention of the council to consumption and *cæstrus ovis* (if we understood him aright), as being very prevalent in several flocks this year.

Consumption or phthisis is an hereditary disease; and wherever it assumes this type, the best plan is to change the breed without delay.

Pneumonia, or inflammation of the lungs, when accompanied with a scrofulous habit, frequently terminates in phthisis, sometimes with a slow, incipient, lingering action, but more frequently the very reverse, carrying off its victim in an incredibly short time.

Scrofula being an hereditary disease, the same rule applies to this case as the last—a change of breed.

The bot in the frontal sinuses of the head of sheep is not strictly speaking a disease, but it may or may not be the cause of one; while, on the contrary, it may even prevent disease.

In illustration of this apparent anomaly, we have first to observe that this bot is the larva of the *cæstrus ovis*; that the frontal sinuses of the sheep are their natural winter quarters, and that they thrive here, feeding on the mucus secreted from the membrane to which they attach themselves, without doing any apparent harm, from the time they enter to April and May of the following year. In crawling up and down the nostrils to and from the sinuses it is otherwise; for at those periods, and especially the latter, they greatly annoy the sheep, giving rise to a degree of excitement in nervous temperaments which in a few days often creates alarm in the mind of the shepherd. When, however, the sheep possesses a plethoric constitution as well as a nervous one, or the former only, and is highly fed, and in that condition liable to inflammatory attacks of the respiratory functions, this excitement may counteract, or rather prevent pneumonia, pleuro-pneumonia, or other inflammatory affections; and when the bots are once expelled from the nostrils, it has long been observed that such sheep fatten very rapidly. But if they are seized and the attack proves fatal before the bots have loosened their tentacula or hold from the membrane of the frontal sinus, no counteracting excitement will be experienced, while they (the bots) will be found there by the morbid anatomist.

Whether sneesewort (*Achillea ptarmica*), or any other sternutatory, could be given to sheep to promote the discharge of bots in nervous and phlegmatic cases where excitement does harm, is for the Veterinary College to say; but in plethoric constitutions it would appear that "let alone" is the way to comply with the adage.

There are several other maladies and topics we had intended to notice, but having exceeded our limits already, these we must defer to a more convenient season, meantime thanking the Governors of the Royal Veterinary College for their report.

## RAIN FALLS.

When the English farmers of a past generation gravely employed themselves on rainy days in pondering over the weather predictions in old Francis Moore's almanac, they were on a useful scent, but hunting in a very barren cover. They felt, as they opened their miserable calendar, that on the kind of weather they might expect rested all their harvest prospects. They

sought out, in their anxious musings, the only work on the subject in their possession; and still they pored over its assertions, in spite of the countless failures of old Moore's silly guesses. But by taking another and a surer road to the same interesting object, are there not useful probabilities at least to be gleaned? May we not by the aid of the thermometer and the rain-gauge

gather a few facts from which we may predict the general produce of certain crops—the hay and the turnip crops, for instance? Let us see what these instruments tell us with regard to the grass-growing months of March, April, and May, of the present and two preceding years; and if we find that we have had during these months of the present year a far greater temperature and a much larger rain-fall than during the same period in 1854 and 1855, shall we not be well warranted in our conclusion that the hay harvest of this year will vastly exceed in amount those of the two previous seasons? Now, the rain-fall in inches near London (to May 24 of 1856) has been as follows:—

	1854.	1855.	1856.
March .. ..	0·14	1·13	0·30
April .. ..	0·17	0·10	2·14
May .. ..	3·34	2·32	2·57
Total..	3·65	3·55	5·01

We see, then, that nearly double the amount of rain has fallen this year in the grass-growing months of April and May, than during these months of 1855. And not only has the moisture been more considerable, but the temperature has been commonly higher: take, for instance (not to encumber our pages with that of every night), the lowest temperature of five nights in each month:—

	1855.	1856.
April 1.. ..	20	38
"   6.. ..	31	33
"   12.. ..	37	41
"   18.. ..	30	30
"   24.. ..	24	34
May 1.. ..	34	27
"   6.. ..	28	31
"   12.. ..	32	38
"   18.. ..	40	39
"   24.. ..	39	42

And, again, the temperature of the soil has also been generally greater during these months in the present year. A thermometer placed at 18 inches from the surface, indicated at 9 o'clock, a.m.—

	1855.	1856.
April 1.. ..	35	34
"   6.. ..	37	41
"   12.. ..	40	43
"   18.. ..	43	40
"   24.. ..	39	41
May 1.. ..	40	41
"   6.. ..	40	40
"   12.. ..	43	44
"   18.. ..	42	46
"   24.. ..	46	49

All these facts would lead us to the conclusion that we shall be blessed with a far more profitable hay harvest than those of late seasons. So that amid all our manifold disappointments, surely we have reason to be grateful for being placed in such a climate—capricious, and ever-varying as it is; and thus thought the late Philip Pusey, ever the English farmers' staunch and watchful friend. He could not on one occasion refrain from telling us, on his return from a continental tour, that he felt that our climate is the best in the world for healthful exercise and for farming, enjoying as it does the most temperate summer, combined with the mildest winter, and on the whole a steady downfall of rain, added to a much greater amount of insensible

vapour in our atmosphere than on the continent—an excess of vapour shown by the difficulty of growing in French green-houses the Heath, a plant requiring moist air, and in the difficulty of working our electrical telegraph. The moisture we owe partly to our neighbourhood to the sea on all sides—partly to the prevalence of westerly winds arriving from a wide ocean, full of the warm vapours of the Gulf-stream. Had our summers been hotter, we could not have grown turnips: had they been colder, they would not have ripened our wheat.

## NO COUNTRY CAN BE GREAT THAT IS POOR IN AGRICULTURE.

SIR, — The great-minded, far-sighted, and forethoughted French monarch, Napoleon III., to make France as great and as rich in agriculture as England, has offered magnificent premiums or prizes at Paris for the best kinds of English cattle and sheep, &c. The wise Emperor has also ordered prizes to be given to the best cattle that can be found in any other country besides England upon the face of the earth, which is a gigantic example to all monarchs in the world, because it is the greatest and wisest scheme in agriculture that has ever been put in practice by any emperor, king, or prince since the creation of Adam; for what monarch before him has ever done the like? Therefore Napoleon III. has not only made himself an ornament in France, but useful to all the globe by tempting agriculturists from far distant climes to bring their best cattle and sheep to Paris. And the French people in a few years may expect to see, if the persevering Napoleon lives, the land in France stocked with the best Durham, Devon, Hereford, and Scotch cattle: with them the Dishley, *alias* Leicester, South-down, Cotswold, and Lincolnshire sheep, and their land farmed upon the four-course system, half in green crops, *alias* clover, turnips, &c., green crops being the mainstay of all good farming. It is plain the English farmers of the first magnitude have kept pace with the times: as a proof, where can the English cultivators of land go into a foreign land to improve their cattle, sheep, and horses, we have the best that can be found upon the earth. And the great luminary Napoleon will prove it at the Paris Exhibition. I recommend the French farmers to take the English *Farmer's Magazine*, to enlighten them in agriculture by an interpreter, more especially in the breeding of cattle and sheep; and in foreign and artificial manures, &c., which are brought thousands of miles by sea to manure the English soil. Does any other country do the same? Then does not the English farmer stand pre-eminent not only in cattle and sheep, &c., but in the cultivation of the soil? Millions of gold have been paid by English farmers for foreign bones, guano, &c., to improve the land in England; and the *Farmer's Magazine* and the *Mark Lane Express* will prove my assertion. Let any highly-talented practical foreign farmer value the stock and crops in the far-famed and highly-farmed counties of Lincolnshire and Norfolk in the month of July; or let him value the stock upon the grazing land in Leicestershire, Northamptonshire, Warwickshire, and Buckinghamshire in the same month, and he will find that no part of the world is worth so much per acre in cattle, sheep, horses, and corn, as the above-named counties; and let him finish by inspecting the great Christmas New Smithfield Cattle and Sheep Market.

SAMUEL ARNSBY.

No. 18, Norfolk-street, Hyde Park, London,  
May 6th, 1856.

## GEOLOGY AND "THE KEYTHORPE SYSTEM."

What use or advantage would follow from the researches of the geologist being practically applied to the drainage of land? Common sense prompts us to reply, a very great deal. Perhaps, however, the answer is already supplied to us: the application of such a science *has* been fully acted on? We all of us know well enough how far geology can assist and advise us in bringing our lands into proper condition—Is it so? By no means. There is scarcely any study as susceptible of being hourly tested by the farmer himself, in the pursuit of his business, that is so little understood or appreciated by him. More than this, our very professors rarely allow the science that importance and consideration it should have. We have one or two gentlemen justly famous as the geologists of agriculture, and only one or two. These have, no doubt, done much; though their labours so far have hardly produced that general effect that might have been expected.

A discussion, then, amongst agriculturists, and other practical men, upon the principles of geology, would appear to be very well timed. As we have just intimated, it is a subject so far by no means overdone. There was ample opportunity for both teaching and learning. There was a fair opportunity to encourage inquiry, and lead men to think more of the data upon which they acted. The announcement of such a question being arranged for, could consequently but promise well. It came, too, in every way, under good auspices. The members of the Central Farmers' Club placed it on their card, while one of their best men undertook to introduce it. Mr. Baker, of Writtle, very happily unites in his own person the experience of the farmer, with some of the tastes and acquirements of the geologist. His sayings and doings for many years have shown him to have a natural turn this way; and it is not too much to declare that, from his antecedents, the Club could not have made a better selection, or associated the subject with the name of any one more likely to put it usefully before them.

This discussion took place at the usual Monthly Meeting in May. In addition to Mr. Baker himself, there were other members present who might well follow in the consideration of such a thesis. Amongst these were Mr. Trimmer, one of the few really eminent geologists known in agriculture; Mr. Bailey Denton, and Mr. Bullock Webster, equally enthusiastic as draining engineers; with the chairman, Mr. Tretthewy, Mr. Thomas, Mr. Charles Stokes, and others, to give the customary sound tone and character to the proceedings. The report of what occurred there will be found in another part of our paper. In simple truth the result in no ways realized what was anticipated. The records of these meetings, we know, are read far and wide with much interest and attention. We believe, however, that few will rise from a perusal

of what the London Club said or did to advance the science of geology, but with a feeling of disappointment. The business of the occasion nevertheless began and finished well. The Chairman introduced the subject as "The application of Geology and Hydraulics to the Drainage of Land"; and the meeting broke up with the adoption of a very sensible resolution—one that reads well for the future. It was—"That the principles of draining are so far dependent upon a knowledge of geology and hydraulics as to render information upon these subjects essential to its utmost development." It would be impossible for one to come in stronger or more becoming support of the other. The interim, however—the two hours' discussion—so far as either is really concerned, might almost as well have never taken place. We confess that we never sat out one so thoroughly irrelevant. Every man's hand was against everybody's. Deep drainers stood up for deep draining, and shallow drainers for shallow. Smith of Deanston and Josiah Parkes were alike denounced and defended. There was the flourishing of twenty-pound cheques, and the offers of most *sævus* challenges. There was my Lord Berners and his system, and his hospitality, kept up from one to another as the most agile of shuttlecocks. Was his Lordship a success or a failure? Great was the discussion thereon, and proportionately small that on the application of Geology to the Drainage of Land.

It is but too well known a fact that our different draining authorities hardly work on with as much harmony as is desirable. So far as we can understand the dispute, one division maintains that to be effectual there should be no drainage at less than four feet; the other, that it may often be quite as good at a less depth. The dispute, as far as it has gone, would appear to be endless, though common sense would seem to dictate that a difference of soil would frequently warrant a difference of treatment—in a word, that a knowledge of geology would be of advantage in the draining of lands. Either by design or accident in the first instance, Lord Berners' estates at Keythorpe have been drained in accordance with the dicta of this science—at different depths, and on different plans, as the nature of the soil would appear to warrant. Mr. Trimmer, as a geologist, approves the principle upon which this is done, while Mr. Baker, Mr. Bullock Webster, Monsieur Trehonnais, and others, "pass the work"—The draining is good and effective. On the other hand, Mr. Bailey Denton condemns the principle as soon as he hears it, and condemns the work as soon as he sees it. Mr. Hewitt Davis, we believe, coincides with this view; as to some extent does Mr. Wood, the Chairman of the Club, who, in company with a few of his brother members, has also lately been to Keythorpe—"He must confess he did not think the system of drainage there perfect."

The merits and demerits of this Keythorpe system will be found to have occupied the greater part of the evening. Cited as an example of the application of geology to drainage, we are quite willing to allow this might have been sufficiently in order. Such, however, was not the case. Mr. Bailey Denton, who immediately followed Mr. Baker, scarcely spoke a word to the question as it stood on the card. The application of geology to draining, according to his showing, simply meant himself *versus* the Keythorpe system. Eighteen inches' depth anywhere was wrong; bushes, except for tenant-farmers, were wrong; and going across the fall was wrong. Not much geology here. The cost was great, the system without system, and he would forfeit twenty pounds if he could not show a better! Mr. Trimmer almost altogether contented himself with answering Mr. Denton. Mr. Webster cited the efficacy of three feet, and the rest of the debate went very much on the relative merits of three or four with little or no reference to the subject the meeting was convened to consider.

We fear there is but little good likely to follow from all this. Many will share in Mr. Trethewy's disappointment "at the turn the discussion took." Instead of a new and interesting topic, there was a great deal very old and stale that had been said over and over again at the Club, the Society of Arts, and elsewhere. Indeed it is very evident that, what with its friends and its foes, unless managed with far more temper and discretion, "the Keythorpe system" will soon become less and less inviting. It is very certain that its introduction here "spoil the evening."

Mr. Baker himself pointedly apologised for the little time he had been able to give to his subject. It was plain this was not prepared with that care and completeness he generally bestows on

his productions. There was still sufficient, however, to open the question, and it is from his address we gather almost the only piece of information likely to be useful to the farmer. Even this, too, refers as much or more to the study of botany than of geology:—"He considered it essential that every one proceeding with the drainage of land should beforehand perfectly understand the nature of the soil below that he might have to deal with; this was essential to success, and indeed soils were designated below by appearances above. The plants that grew upon the surface also indicated the quality of the subsoil below. Thus the corn poppy, tine-tare, May-weed, corn marigold, white charlock, groundsel, fumitory, all indicated by their presence a light sandy or silicious soil. The wild oat, garlic, daisy, charlock, millilot, fescue varieties of grasses, cowslip, orchis, all indicated the presence of chalk, especially chalky clay soils; corn mint, arsmart, colts-foot, &c., indicate wet spongy subsoils; thus geology and botany go hand in hand so far as the constituent properties of soils and subsoils influence vegetation. The knowledge of these matters greatly influences successful draining."

It is in some such tone as this the discussion should have continued, instead of with personal challenges, wholesale condemnations, and assumed infallibilities, that can in reality tend to no good. There never was a subject that was stated in more general terms, while there never was one argued so little in accordance with that comprehensive view which might and should have been taken of it. We say nothing of hydraulics; but, confining ourselves to geology, we are quite certain all the chief speakers on this occasion might have shown to much more advantage than they did. Once unkenelled, however, "the Keythorpe fox" went clean away with them.\*

## CALENDAR OF AGRICULTURE.

Turnips are most generally sown during this month, except in the eastern counties, where a later season is less exposed to the fly. Open drills at 26 inches distance by one furrow of the common plough; spread half-rotted farm-yard dung along the hollows in quantity to cover the bottom of the intervals; reverse the drills over the dung by two furrows of the plough, and sow the turnip seeds with a two-drill sowing machine. With artificial manures of all kinds make ridglets as before, with one furrow of the common plough, deep as can be done, and sow the manure and seeds together with Hornsby's drop-drill, which deposits a bulb of manure and seed at nine inches distance, securing a ready food to the plant, and sowing the quantity as in a continuous stream. The coulters pierce deeply the ridglets of soil, and deposit the manure and seed in a moist bed of fresh tilth, which is much superior to making ruts on a level surface of

a parched cultivation. A fresh tilth is invaluable. On very dry lands sow with Chandler's liquid-manure drill, in which the dry manures are mixed in water and deposited in the drills in a liquid condition, with the seeds above the manures. In a combination of dry soils and seasons a large benefit will be derived from this practice.

Sow as the first crop Swedish turnips in the best green kinds, then green round, and lastly white globe, which will provide a succession of feeding roots for winter use.

Plough pared and burned lands, and sow turnips on a single furrow, with ample harrowing, if the land be clayey and stiff; if it be light or loamy fallow land, ridge it and sow as usual. Sow on

\* While the recent Easter party at Keythorpe were inspecting Lord Berners' farms, the hounds more than once came across them, and, as a consequence, agriculture had to give way to the chase.

suitable places rape and cole for winter food. Plough with one furrow lands on which winter crops have been consumed by sheep; scuffle the surface if foul with weeds, and sow turnips on the flat ground by a machine with lengthened coulters. Plough for fallow the headlands of sown turnip fields, or manure with short dung, and sow seeds in broadcast.

Hoe beet, parsnips, and carrots, and precede hand-hoeing by the horse-hoe of width to suit the intervals. In all drilled crops try to approach the *acme* of farming, that nothing, or as little as possible, grows except what is sown.

Harrow potato drills if not rolled after planting; plough the intervals deeply with a small plough for the purpose, the turnip scufflers being too light, but may be used after the ploughing; hand-hoe the drills very clean, passing the hoe between the stems, breaking and loosening the drills.

Continue soiling with clovers and vetches horses, cattle, and pigs in the yards; provide ample littering, and convey the superfluous moisture to a tank.

The grain crops will now require weeding; cut from among them all tall weeds, and from pastures and road sides, and allow not any seeds to be perfected. The shearing of sheep is generally finished this month. Examine every animal; put on separate marks of age and quality, and choose with

great nicety the animals for breeding by the points required. An inspection at this time much assists the sorting for the tups in October.

Lambs may now be weaned. Put the animals on the best pastures, on the mown clover fields, as soon as cleared of hay.

Continue to put mares to the stallion every fortnight.

In early climates sainfoin and clovers, and in some places meadows, will be sown this month. Ted the grass close behind the mower with six persons to each scythe; put the grass into cocks every night, shake it out, and ted in the mornings, and carry to the rick as it is got ready. Clover crops are best dried into condition by turnings of the swathe, which does not break away the leaves as by tedding, and the leaves are the best nutriment. The quality of damaged hay is improved by sprinkling on the rick 20 to 30 lbs. of salt to a load of hay.

Hay-ricks should be built in succession, and not rapidly by trampling; the hay laid on the rick in different times will sink into consolidation by its own weight, and the time of building will be effectually protected from rain by a tarpaulin cloth raised on-stakes, and hung upon pulleys, forming a roof over the rick of hay. In this way a daily quantity will be added to the rick when the weather permits.

## AGRICULTURAL REPORTS.

### GENERAL AGRICULTURAL REPORT FOR MAY.

From a long continuance of cold north-easterly winds, we have at length arrived at a genial spring. Under the influence of a mild temperature, and with an abundant supply of moisture, the crops generally have rapidly improved in appearance; and, with some few exceptions, our accounts on the subject of both the early and later-sown wheats are as favourable as could be expected. It is quite true that, upon some of the heavy clay soils, the wheats do not exhibit quite so healthy an appearance as could be desired: nevertheless, when we fairly examine the general bearing of our reports, we see no cause to be under the impression that we have a bad prospect before us. Spring corn has derived great benefit from the late fine rains; and we have the assurance from numerous large growers that the potato crop is most luxuriant, and, as yet, wholly free from disease. Evidently, the remunerative prices obtained for corn during the present year have stimulated our farmers to increased exertions, and had the effect of bringing into culti-

vation large tracts of waste lands: in point of fact, the whole country, viewed in relation to cropping generally, never presented so fine an appearance as it now does. Fortunate for England there is so much energy amongst us; because, in periods gone by, we have had to deplore a decline in our agriculture, and subsequently to regret, from a variety of causes, that we have not been able to produce more food. Even at the present time, consumption appears to be rapidly gaining upon production: the wants of the world seem to be in excess of the amount of food produced; and each corn-growing country is being drained of its surplus produce. But we are told that, the war being ended, Russia will be able to meet every want, and that prices generally must come down. This question, however, can only be decided by lapse of time. As yet, we see no indications of overabundance in Russia, or that we are likely to be overwhelmed with supplies from that country; still, we must admit that our aggregate importations, combined with home supplies, will be found equal to our wants. But when we consider the

extent of those wants, and the increasing demand for food—the result chiefly of great commercial prosperity—we feel bound to oppose the theory so fully propounded of late, that we shall have wheat selling at a very low price at any period during the present year. It would be impossible for us to state in precise terms the quantity of grain at this time in the hands of our farmers; but we are of opinion that it has been greatly under-estimated by several writers. That our stocks of foreign wheat and flour are very moderate, and that the quantities on passage to the United Kingdom are by no means extensive, must be patent to all who have watched the progress of the trade. The favourable reports from various counties, in reference to the wheat crop, and the possibility of our receiving large importations from the Baltic and Black Seas, have induced great caution on the part of millers in effecting purchases: hence, the wheat trade has ruled heavy, and prices have had a downward tendency. The close of the malting season has had considerable influence upon the demand for barley; and that article has, consequently, sold on lower terms. Most other produce, except oats, has been tolerably firm in price.

Great effect has been produced upon the value of linseed, as well as cakes, by the large arrivals of the former article from India, and the extensive purchases effected in Russia, for August delivery. This decline has given great relief to our graziers; and it has been the more appreciated, from the fact that natural food has become unusually scarce and dear.

A wonderful improvement has lately taken place in the appearance of the pastures in our principal grazing districts. A continuance of fine showers, aided by warm sunshine, is likely to give us a much better crop of hay than we have had for several years past; and this is much needed, as the expenses incurred by flock-masters and others in the purchase of hay during the last two years have been enormous.

The public sales of colonial wool commenced with much spirit, and prices advanced, compared with the previous auctions, from 1d. to 2d. per lb.; but, owing to an immense influx of wool from Australia during the last fortnight of the month, and as it is announced that these arrivals will be brought forward at the next series, the demand has fallen off, the above advance has been lost, and less eagerness has been shown by foreigners to make purchases. It is to be regretted that some better

means are not devised to obtain information from our colonies in reference to the season's supply of the article, and the extent of the shipments to England. At the present time, owing to the defective state of our postal, or rapid, communications, we know little or nothing about quantity or price until the ships have actually made their passage to England. The advance paid at the commencement of these sales would not have been realized had the dealers known that over 25,000 bales were within eight or ten days' sail; and the effect is to place the first buyers in a position of loss. The English wool trade has been devoid of animation; nevertheless, prices have kept up remarkably well. A large portion of this year's clip has already passed into the hands of the manufacturers, and some quantity has sold for shipment to France and Belgium, in which countries the stocks continue unusually small. Some of our growers have tested the value of their flocks by forwarding small parcels for sale at the public sales still in progress. In every instance very full prices have been realized for them; and it has become a question in several quarters whether it would not be much better for the growers to establish periodical public sales, by which they would be enabled to dispose of their stocks at the current price of the day, rather than run the risk of holding over for several months, and until certain fairs, or marts, take place. Sales of this kind could be easily conducted in all large provincial towns, to which manufacturers would speedily resort.

Very large quantities of potatoes in excellent condition have come forward during the month. This is the most convincing proof that we could offer of the correctness of the views we have so long entertained respecting the yield of last year's crop. That it was by far the largest and best on record, does not admit of a doubt; and that the losses by disease were trifling must be evident. The prices obtained for all kinds, however, have been very low—lower, indeed, than for a series of years past; but the immense abundance of the crop must have compensated in some measure for a limited price.

The guano trade has been heavy for home use; but over 6,000 out of the 20,000 tons imported have sold for the continent.

In Ireland and Scotland all farm labours are sufficiently forward; and our correspondents state that the crops are looking remarkably well. The shipments of produce to England have fallen off.

THE REVIEW OF THE CATTLE TRADE  
DURING THE PAST MONTH.

Notwithstanding that somewhat increased supplies of fat stock have been on sale in our leading markets during the month just concluded, and that their condition has been tolerably good, the trade has ruled brisk, and prices have rapidly fluctuated. Sheep, especially prime breeds, have realized unusually high rates, and most other stock has produced full currencies. Not a few of the breeders and feeders have expressed their surprise at the present high value of beasts and sheep, whilst graziers almost generally have felt much difficulty in effecting purchases of store animals—which are commanding greatly enhanced quotations—under the impression that present rates cannot be maintained, because they argue that we shall receive very large supplies from the continent. It is necessary, therefore, that we should explain the causes which have led to the present high value of stock, and offer an opinion upon its probable future range. It cannot, we think, be doubted for a moment that the consumption of food in this country—we mean both corn and butchers' meat—is in excess of the supply; and this fact is more strongly shown, both by the state of the trade and the prices realized. An import, in order to supply actual wants, becomes more and more apparent; for every day's experience proves that even the rapid increase in the soil's productions has not kept pace with the enormous improvement in the commercial operations of the world, and which tend to benefit our industrial population—by far the largest consumers of food as a class. Had there been no competition for stock on the continent, we should unquestionably have received ample imports from Holland and elsewhere; but the extraordinary impetus given to commerce in France since the year 1853 has had the same influence there as in this country, that is to say, both bread and meat have risen in an equal ratio. The various classes of artizans have received higher wages, under the influence of full employment, and have become large customers both to the butcher and baker. France has imported immense supplies of all kinds of food; and yet scarcity, with an increasing and pressing demand, actually exists in many departments; indeed, in some of them meat has become a luxury, and can only be purchased by those who have tolerably good incomes. This, then, is the competition we have had to contend with; in other words, France has succeeded in buying up from 120,000 to 150,000 head of stock in Holland, Belgium, Spain, and Portugal, which, had not severe continental pressure been felt, would have been sent to England. The question to be de-

termined, then, is—what influences are likely to have any depressing effect upon our prices? Those must of necessity be regulated by supply and demand. Is there a prospect of the former exceeding the latter? We think not; indeed, when we fairly consider the extent of the commercial operations both of England and France, the enormous produce of the gold mines in Australia and California, the rapid increase in the circulation of the precious metals, and the wonderful state of trade generally, the prospect appears favourable to great firmness in price. Both Holland and Spain are still producing large quantities of stock; but our readers may rely upon it that the dearest market, and that only, will receive the largest amount of supply.

The Norfolk season for beasts is now drawing to a close. During its continuance the metropolis has drawn from that county an immense amount of valuable food—valuable both to the butcher and consumer. It has, also, been a profitable one for the graziers, who, however, have had to pay very high rates for cakes, and who have had to contend with a great scarcity of winter food. With all this, however, they have forwarded both beasts and sheep—especially the former—in the finest possible condition. The produce of lambs appears to have been a full average one.

The annexed return shows the imports of foreign stock into London:—

	Head.
Beasts .....	747
Sheep .....	2,239
Lambs .....	89
Calves .....	481
	-----
Total.....	3,556

In the corresponding month in 1855 we received 7,103; in 1854, 4,708; in 1853, 13,007; in 1852, 8,506; in 1851, 9,214; in 1850, 6,060 head. These figures tend to illustrate the remarks offered above in reference to demand.

The total supplies of home and foreign stock exhibited in the great metropolitan market have been:—

	Head.
Beasts.....	18,995
Cows .....	495
Sheep and lambs ..	119,640
Calves.....	1,260
Pigs .....	2,545

COMPARISON OF SUPPLIES.

	May, 1853.	May, 1854.	May, 1855.
Beasts .. ..	21,346	20,831	19,847
Cows .. ..	500	576	410
Sheep and lambs	122,250	124,824	113,600
Calves .. ..	2,341	2,146	2,470
Pigs.. ..	2,700	2,435	2,590

The arrivals of beasts from Norfolk, Suffolk, Essex, and Cambridgeshire have been 10,200 Scots and Shorthorns; from other parts of England,

2,500 of various breeds; from Scotland, 2,320 Scots; and from Ireland, 398 Oxen *via* Liverpool.

Beef has sold at from 3s. to 4s. 10d.; mutton, in the wool, 3s. 10d. to 5s. 8d.; out of the wool, 3s. 6d. to 5s. 4d.; lamb, 5s. 4d. to 6s. 6d.; veal, 3s. 10d. to 5s. 6d.; and pork, 3s. 4d. to 4s. 8d. per 8lbs. to sink the offal.

#### COMPARISON OF PRICES.

	May, 1852.		....	May, 1853.	
	s. d.	s. d.		s. d.	s. d.
Beef, from	2 4	to 3 10	....	3 0	to 4 6
Mutton	2 6	3 10	....	3 4	4 8
Lamb ..	4 2	5 4	....	5 0	6 4
Veal ..	3 0	4 4	....	3 10	5 0
Pork ..	2 4	3 6	....	3 0	4 4

	May, 1854.				....	May, 1855.			
	s.	d.	s.	d.		s.	d.	s.	d.
Beef, from	3 2	to 4 10	....	3 0	to 4 8				
Mutton	3 4	5 0	....	3 2	5 0				
Lamb ..	5 4	6 8	....	5 2	6 10				
Veal ..	4 2	5 8	....	4 0	5 4				
Pork ..	3 6	4 8	....	3 0	4 4				

The supplies of both town and country-killed meat on offer at Newgate and Leadenhall have been very moderate; and a fair average business has been transacted, at high rates. Beef has realized 2s. 10d. to 4s. 4d.; mutton, 3s. 2d. to 4s. 6d.; lamb, 4s. 10d. to 5s. 10d.; veal, 3s. 8d. to 4s. 10d.; pork, 3s. 2d. to 4s. 8d. per 8lbs. by the carcase.

## AGRICULTURAL INTELLIGENCE, FAIRS, &c.

**CAWDOR TRYST.**—A large show of stock, comprising a number of excellent lots, on the ground, and prices ruled high—there being a great many dealers in attendance, who seemed eager to buy, and thus raised the expectations of holders. Indeed, this eagerness was so manifest that several lots changed hands before they reached the stance; and there is no doubt that there was a large amount of business transacted during the day, while it is admitted on all hands that this was the dearest and best selling market that has taken place at Cawdor for many years past. It may be stated that, on an average, the rise in the price of cattle at this market over that immediately preceding was from 10 to 12½ per cent.

**DERBY FAIR.**—The show of cattle was about the average of previous years, but the business done was very limited. For good milking cows and heifers high prices were asked, so high indeed as to prevent many sales being effected. Fresh barren things were enquired for, but here again the price asked checked business transactions. A good supply of young stock, but the business amongst them was not so brisk as is usually the case at this fair. A few good horses were exhibited, which realized remunerating prices. Altogether the cattle fair was considered to be a very flat one.

**EXETER FAIR.**—The attendance of dealers was exceedingly small, and not much stock was exhibited for sale. Beef fetched from 11s. to 12s. per score; working oxen, £30 to £40 per couple; cows and calves, £10 to £14; barreners, 5s. 6d. to 7s. per score.

**GROOMBRIDGE FAIR** was unusually thin and dull, the attendance of our farmers scanty, and not more than one-third of our usual supply of stock. Beasts of superior quality were soon sold, but lean stock hung on hand. Of horses the supply was liberal, but little business done. Pigs were very dear, and but few sold.

**HAWICK FAIR.**—The show of cattle was limited, consisting principally of milch cows, a few two-year-olds, and several stirks. For the best description of cows and young cattle, the demand was fair, but inferior lots were late in being disposed of, and several remained unsold. Prime short-horns brought 14*l.* to 20*l.* 10*s.*; Ayrshires, 8*l.* to 12*l.*; furrow and early calved cows, 5*l.* to 7*l.*; two-year-olds, 9*l.* 5*s.* to 9*l.* 10*s.*; stirks, 5*l.* to 8*l.* 10*s.*

**HENLEY-ON-THAMES FAIR.**—An unusually large supply of cattle and sheep, and the trade may be characterized as very dull and dear; the supply in both descriptions consisted of store kinds, fat beasts and sheep being very limited in number; milch cows made from 14*l.* to 18*l.* each; barreners, from 10*l.* to 14*l.*; and yearlings, from 5*l.* to 8*l.* each; in the sheep trade, couples made from 42*s.* to 60*s.* per couple; lambs, from 18*s.* to 27*s.* 6*d.* each; the few fat sheep made (out of wool) a price equivalent to 5*s.* 4*d.* per stone; for ewes there was a good demand; of horses there were but few, and good ones were especially scarce and dear.

**HEREFORD FAIR.**—Business was brisk in all depart-

ments of the cattle market, without much change in recent prices. Fat cows sold readily at 7½*d.* per lb., calves at 7*d.*; for lean stock there was not so much demand, but those which were disposed of, for the most part sold well. In the sheep market a good trade was done, a trifle over 8*d.* per lb. being obtained for fat wethers in the wool. Most of the stock in the fair had been through the hands of the shearer, and consequently were sold from 9*d.* to 1*s.* per stone less than their more thickly-clad neighbours. The late genial weather has improved the pasture lands, and keep being more plentiful, a more ready sale was found for lean stock. In the horse fair, too, the same activity prevailed, and really good and useful horses of any kind met with a ready sale.

**MAENCLOCHOG FAIR** was held on the 22nd instant, and was well supplied with cattle. There was a good attendance. Horses were selling well at very high prices. Cattle were also selling for high prices, but the trade was not so brisk as in horses. Although this is generally a great fair for sheep, yet very few were sold, and at a very low figure. Pigs were commanding high prices.

**ROTHWELL FAIR.**—There was but a scanty supply of store beasts, which met a ready sale at exorbitant prices. There was a fair show of horses, some of which were poor lean animals; but the prime sort found ready purchasers at high sums. The show of sheep was good, and realized a considerable price.

**RUDGWICK FAIR.**—A good supply of lean stock, and things in fresh condition sold at full prices. The others were not so much called for. A short supply of beef, which sold from 4*s.* 4*d.* to 4*s.* 8*d.* Mutton out of the wool, 5*s.* to 5*s.* 4*d.* per score. Togs, 28*s.* to 35*s.* per head. A short supply of horses, and little business done. Pigs were to be bought on easier terms.

**SPILSBY STOCK MARKET.**—The supply of sheep was not large, but the trade was brisk, and good prices were obtained—as good as at any market during the season. There was a tolerable show of beasts, and in consequence of the abundant rains which fell on Sunday, and the favourable change in the weather, they sold readily at prices higher than had been obtained since Boston fair.

**ST. AUSTELL FAIR.**—Business was very dull, few cattle being offered for sale and buyers scarce. Fat bullocks fetched from 60*s.* to 63*s.* per cwt.; sheep 7*d.* per lb.

**ST. COLUMB MARKET** was well supplied with cattle. Beef sold at from 3*l.* to 3*l.* 3*s.* per cwt., and mutton at 7½*d.* per lb. The quality was very good, and a great many sales were effected to numerous dealers.

**STRANRAER MARKET.**—Few distant buyers were present, and the market ruled rather heavy, a number of the best lots being driven off the field unsold. Stirks were selling at £4 10*s.* downwards; two-year-olds ranged from ten guineas down to 5*l.* 12*s.* 6*d.*

METEOROLOGICAL DIARY.

BAROMETER.			THERMOMETER.			WIND.		ATMOSPHERE.			WEAT'R.
1856.	8 a.m.	10p.m.	Min.	Max.	10p.m.	Direction.	Force.	8 a.m.	2 p.m.	10 p.m.	
	in. cts.	in. cts.									
Apr. 22	30.10	29.99	37	55	38	East	gentle	fine	sun	fine	dry
23	29.97	29.94	31	59	48	East	gentle	fine	cloudy	cloudy	dry
24	29.92	29.88	41½	59	46	E. by S.	gentle	fine	sun	fine	dry
25	29.77	29.61	42	70	58	S.S.E.	gentle	haze	sun	cloudy	rain
26	29.54	29.52	47	61	53	S. West	airy	fine	sun	cloudy	rain
27	29.49	29.60	42	42	39	E.N.E.	brisk	cloudy	cloudy	cloudy	wet
28	29.61	29.60	34	54	38	North	airy	fine	sun	fine	dry
29	29.60	29.61	32	52	43	N. West	gentle	fine	cloudy	cloudy	dry
30	29.61	29.61	37	55	40	Every way	calm	fine	fine	fine	showery
May 1	29.51	29.70	34	43	35	N. by E.	brisk	cloudy	cloudy	clear	dry
2	30.00	30.00	34	55	40	N. West	airy	fine	sun	clear	dry
3	30.04	30.10	34	43	40	North	brisk	cloudy	cloudy	cloudy	showery
4	30.12	30.10	37	50	38	N. by W.	gentle	cloudy	sun	clear	dry
5	30.10	30.10	29	50	40	N. East	gentle	fine	fine	cloudy	dry
6	29.99	29.63	37	51	43	East	brisk	cloudy	cloudy	cloudy	rain
7	29.41	29.60	39	41	39	N. East	violent	cloudy	cloudy	cloudy	rain
8	28.81	30.11	39	46	42	N. East	airy	cloudy	cloudy	cloudy	dry
9	30.20	30.13	38	49	44	N. East	gentle	cloudy	cloudy	cloudy	dry
10	30.05	29.95	42	62	49	N. East	gentle	cloudy	sun	fine	dry
11	29.95	29.85	45	67	56	N. East	gentle	haze	sun	fine	dry
12	29.80	29.73	48	57	53	S. East	gentle	haze	cloudy	hazy	rain
13	29.70	29.66	50	62	48	Variable.	var.	haze	fine	fine	rain
14	29.59	29.59	43	60	47	S. West	gentle	cloudy	fine	fine	dry
15	29.59	29.46	43	59	46	S. by W.	gentle	cloudy	cloudy	cloudy	showery
16	29.45	29.65	43	62	52	W. by N.	gentle	fine	sun	fine	dry
17	29.70	29.67	45	59	45	S. West	brisk	cloudy	cloudy	fine	showery
18	29.60	29.60	44	58	44½	W.S.W.	forcibl.	cloudy	cloudy	fine	showery
19	29.61	30.02	42	60	48	West	lively	fine	sun	clear	dry
20	30.11	30.10	42	64	49	W. by S.	gentle	fine	sun	fine	dry
21	30.02	29.82	40	68	56	S.S.E.	airy	fine	sun	cloudy	rain
22	29.71	29.65	43	61	50	S. West	gentle	cloudy	cloudy	fine	rain

ESTIMATED AVERAGES OF MAY.

Barometer.		Thermometer.		
Highest.	Lowest.	High.	Low.	Mean.
30.38	29.160	70	33	54

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
55.9	40	47.1

WEATHER AND PHENOMENA.

April 22, 23, 24. Three fine days.—25, 26, 27. Three wet days, wherein my gauge measured 0.745 inch.—28, 29. Dry, cold, overcast.—30. Showery; 0.194 inch.

LUNATION.—Last quarter, 27th, 11h. 26m. P.M.

May 1 to 5. Low temperature, rather overcast.—6 and 7. Rainy.—8 to 11. Four days more genial, but little sun.—12 to 18. Wet, with only two days dry; in this period I register the rain-fall as 1.686 inch.—19, 20. Most beautiful and sunny

days.—21. Fine forenoon, but rain set in at night.—22. Showery, and a fall of 0.558 inch. gauged.

LUNATIONS.—New moon, 4th, 2h. 42m. aft.; first quarter, 11th, 8h. 45m. aft.; full moon, 19th, 11h. 56m. aft.

REMARKS CONNECTED WITH AGRICULTURE.

The meteorological reader will perceive at a glance that the temperature has been low—beneath the usual average. Some frosts have occurred, but none to effect any mischief, excepting the one of May 5, about sunrise, which certainly brought down numbers of the young gooseberries. The rain-fall of the two months has somewhat compensated the deficiency of the second and fourth months. I noticed one shower of hail; but generally the spring rains have proved most refreshing and benign. Corn is beautiful, and wheat will soon exhibit its ears. The ground is covered with verdure, and the promise of hay-grass very great.

Croydon.

JOHN TOWERS.

## REVIEW OF THE CORN TRADE. DURING THE MONTH OF MAY.

The month of May commenced with cold, ungenial weather; and though a moderate quantity of rain had fallen in April, the severe frosts that followed began to give a yellow appearance to many of the fields of wheat, even where the plants were strong, while on poor soils they looked thin and unpromising. This weather lasted till the middle of the month, when the temperature became raised and copious showers fell; since which, notwithstanding the unsettled character of the season, a marked and general improvement has ensued, and with a few weeks' warm sunshine the harvest may yet reach maturity about the average time. On the whole there seems a fair prospect, much beyond last year; and spring corn, which was backward, has greatly revived, with a regularity of plant indicating the favourable seed-time.

The markets have exhibited little variation since last month's report, being characterized by steadiness, the tendency being towards lower prices. The ratification of the treaty of peace, with more promising appearances, seems to have occasioned more liberal supplies in the country markets than expected; the present month's published sales having exceeded all before them this year, the last week being the highest, viz., 126,236 qrs. Foreign arrivals have moderately increased, and the permission to export from the Two Sicilies at a duty of about 9s. per qr. is calculated to insure their continuance. The free use of the thrashing machine is considered to have greatly reduced stocks in the country; and as another rise has taken place in France, in consequence of the scarcity of wheat in the departments, especially of fine quality, we may have a close run on the eve of harvest, with higher rates. The first Monday in London commenced with the appearance of a rise in wheat of 1s. to 2s. per qr., which was actually reported in some instances, though not justified by the state of trade. The English supply was good, and the foreign liberal, though consisting mostly of inferior kinds; there was, however, a fair quantity of useful quality from the Baltic and Hamburg. The most that could be said was that fine red samples brought full rates. Many of the country markets, influenced by the favourable London report, noted a similar rise, but fell back again in the course of the following week. At Liverpool an advance was attempted, but did not succeed. The Scotch advices reported a better business, and Ireland quoted an improve-

ment in some instances. The second Monday was scarcely so well supplied, especially with foreign samples, though there was a good show from Essex. Higher prices were soon found to be impracticable, the millers steadily pursuing the hand-to-mouth system which their experience has justified, and a good quantity was left unsold. This was slowly quitted on the following market, and the week closed with a somewhat firm aspect, though the country reports were many of them cheaper. Liverpool reported no change; Spalding, Wakefield, and Bristol were 1s. lower; Birmingham, Lincoln, and Norwich, with others, making the decline 2s. Scotland reported barely the former rates, but the scarcity of supplies in Ireland produced [a further slight enhancement. The third Monday was well provided, partly from over-left Essex samples, with a fair addition from the same county and Kent. A few picked parcels early in the morning obtained the prices of the previous week; but the Kentish factors having consented to a reduction of 1s. to 2s. on all sorts in order to clear their stands, those of Essex had most of their bulk unsold. Foreign samples found a retail inquiry at a trifle below the previous quotations. The country markets throughout the week were influenced by improved weather and town advices, and were all either dull or about 1s. cheaper, though fine wheat scarcely sustained a reduction. With large supplies at Liverpool, inferior qualities were 2d. per 70 lbs. lower, and business only in retail. With a fair supply from Kent and Essex on the fourth Monday, the town trade was very dull and 1s. per qr. cheaper for English samples, with a very slow foreign trade.

The month's supply into the port of London has been, in English wheat 31,224 qrs., in foreign 45,931 qrs.: of this about 12,000 qrs. have arrived from India, of low quality and wholly unfit for the town trade: the exports were 1,218 qrs. The London averages showed a steady advance in price till the last week, owing more to the superiority of the quality received than the state of the market. The lowest was 68s. 6d.; the highest 72s. 2d.: the general averages through the month have varied from 66s. to 68s. 9d. The foreign arrival into the principal ports for the last four weeks was 215,503 qrs.

The foreign trade has presented some difference in the several markets, those of France having risen in spite of forced sales by auction

from the great reduction of stocks and partial damage by floods. Those of Spain have also improved from the same causes; and offers which were making thence, have ceased; the prices of flour in Santander having reached 51s. 6d. per sack, white wheat at Seville being quoted at 82s., and the ports being declared open in consequence. At Paris flour has risen from 89 francs per 157 kilos (equal to 57s. per English sack) to 92 francs, or 59s. per English sack; this has brought over some French millers, who have taken mixed Spanish at 75s., cost and freight included, for Normandy, while 69s. and 70s. have been paid for English red. Belgium, as well as Holland, is also dearer, as well as Hambro, though rates have little altered in the Baltic, whence but small supplies can be expected. American slowly gives way; low quality flour is about 2s. per barrel cheaper, but the best qualities are still worth 9 to 10 dols. per barrel (equal to 53s. to 58s. 6d. per English sack) free on board. In Southern Russia the bulk of supplies is nearly limited to the Sea of Azoff, where the failure of lighters makes shipments difficult, and arrivals must be late. In the Danube prices have receded, and some quantity is stored at Galatz and Ibraila; but three months must elapse before free imports can come to hand, and the continued closing of the Mahmoudieh canal in Egypt must retard considerable arrivals thence. Prices, however, have fallen seriously for merchants there, the present quotations for future contracts being 22s. 3d. per qr.: by this time the canal is expected to have opened, and large supplies were looked for.

The flour trade, always influenced by that of wheat, has been remarkably steady under large arrivals, only evincing a decided decline, and that but a moderate one, at the close of the month, to the extent of 1s. to 2s. on Norfolk and country sorts, and 1s. per barrel on American. The month's supply has been 62,916 sacks country-made, 8,455 sacks mostly Spanish, and 27,424 barrels of American. The exports were small, viz., 133 sacks.

Barley, as might have been expected at this period of the year, has been receding in value, the maltsters having ceased from steeping.

A summary of the month's decline may be given by noting a regular weekly reduction in value of 1s. per qr., the last Monday excepted, when prices were firm. Distillers have been freely using Egyptian wheat, as better answering their purpose than paying very high rates for this grain; lately, however, the foreign supplies from Denmark have increased, and all descriptions have been plentiful, but less in request. It seems probable, as a good deal of Indian corn is coming from America and other parts, the price may yet further recede. The arrivals for the last four weeks in English were

8,383 qrs.; in foreign 16,040 qrs., making a weekly average of 6,100 qrs.

The supplies of oats have increased as regards foreign and Irish qualities, but there have been less British, the stock being reduced, and prices somewhat discouraging. The first Monday being under the disadvantage of a glut, consisting in all of 46,500 qrs., a slight reduction was submitted to on even the best qualities in good condition; but among the arrivals were many cargoes in a bad state, which it was difficult to get rid of at 1s. per qr. abatement. Ever since then the market has presented an unusually steady appearance, closing with an advance of 6d. to 1s. per qr. on the last Monday on sweet parcels of foreign, as well as Irish and British. The present rates seem calculated to increase the consumption with the return of peace; and the Irish markets have had a firmer appearance than that of London. The month's arrivals have consisted of 2,956 qrs. British, 29,100 qrs. Irish, and 74,258 qrs. foreign; making the weekly average quantity 26,600 qrs. The exports during the month have been 603 qrs.

Alexandrian beans have increased in abundance, the month's supply being 12,515 qrs.; while the English supply has diminished to 2,000 qrs. The first Monday commenced with a firmer feeling on the part of sellers of Egyptian, which has throughout been maintained, prices in April apparently having seen their lowest; while on the third Monday English samples were 1s. per qr. dearer. On the last Monday both English beans and peas advanced 1s., but foreign were unaltered.

Peas have become quite scarce, the month only furnishing 257 qrs. to the London market; while in consequence of their being relatively dearer in the Baltic, 500 qrs. have been reshipped to that quarter. No variation has, however, taken place in their value, the liberal supply of foreign lentils having diminished their consumption as an article of food for cattle.

Linseed, contrary to expectation, has with good arrivals experienced a reaction upwards; crushers being low in stock, from the liberal exports and large consumption for feeding purposes, which has carried the demand for cakes quite beyond the usual time. During the month the advance has been 3s. per qr. Till Russian supplies come to hand there does not seem much prospect of lower prices; the East Indies alone, notwithstanding the increase thence, being insufficient to meet the consumptive and export demands. Mustard-makers being well in stock, this seed has been neglected. Canary has also been excessively dull, and somewhat easier. The prices of hempseed, as well as coriander, carraway, and other small kinds, have still found some inquiry, at unaltered rates. It

has turned out that the foreign supply of cloverseed has been quite equal to the demand, though but little is left over for speculative purposes. Dealers have complained of a considerably reduced inquiry this season for sowing. A good quantity of foreign spring tares being left over, they have fallen to feeding prices.

CURRENCY PER IMPERIAL MEASURE.

		Shillings per Quarter	
WHEAT, Essex and Kent, white, new	61 to 71 extra	—	74
Ditto, red, new	59 65	—	71
Norfolk, Line, and Yorksh., red, new	59 64	—	69
BARLEY, malting, new..	39 40	Chevalier..	40 42
Distilling....	36 38	Grinding .	33 35
MALT, Essex, Norfolk, and Suffolk...	73 75	extra	81
Kingston, Ware, and town made..	73 75	—	81
Brown.....	65 68	—	—
RYE .....	—	—	40
OATS, English feed..	22 23	Potato..	23 26
Scotch feed, new	24 25, old 27 28	Potato	25 26
Irish feed, white .....	20 21	fine	23
Ditto, black .....	19 20	—	21
BEANS, Mazagan .....	—	—	34 36
Ticks .....	—	—	33 36
Harrow .....	—	—	36 39
Pigeon .....	—	—	38 43
PEAS, white boilers	40 44..	Maple 40 42	Grey 35 36
FLOUR, per sk. of 280 lbs., Town, Households	59s., fine	62	65
Country	45s. 47s.	Households....	48 50
Norfolk and Suffolk, ex-ship	—	—	45 46

FOREIGN GRAIN.

		Shillings per Quarter	
WHEAT, Dantzic, mixed..	80 to 82 high mixed	—	80 extra 86
Konigsberg .....	78 80	—	81 82
Rostock, new .....	72 73 fine	—	76 84
American, white ....	64 70 red	—	60 64
Pomera, Meckbg., and Uckermk., red	76 77 extra	71	80
Silesia.....	72 74 white	76	77
Danish and Holstein .....	60 64	—	60 67
Odessa, St. Petersburg and Riga..	60 62 fine	64	66
Rhine and Belgium.....	—	—	old —
Russian.....	—	—	French.. none
BARLEY, grinding	30 34	Distilling..	34 36
OATS, Dutch, brew, and Polands	25s. to 26s.	Feed ..	21 23
Danish & Swedish feed	21s. to 23s.	Stralsund	23 25
BEANS, Friesland and Holstein.....	—	—	36 37
Konigsberg ..	35 36	Egyptian ..	28 30
PEAS, feeding .....	35 36	fine boilers	42 44
INDIAN CORN, white .....	32 33	yellow	32 34
FLOUR, French, per sack.....	—	Spanish	49 56
American, aour, per barrel (nominal)	33 35	sweet	36 39

IMPERIAL AVERAGES.

FOR THE LAST SIX WEEKS.

WEEK ENDING:	Wheat.		Barley.		Oats.		Rye.		Beans		Peas.	
	a.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
April 12, 1856..	68	7	39	0	23	8	42	4	41	4	37	10
April 19, 1856..	69	0	39	2	23	7	44	7	41	9	37	4
April 26, 1856..	67	11	39	11	23	4	40	3	41	4	39	2
May 3, 1856..	66	6	40	5	22	9	38	11	41	11	39	0
May 10, 1856..	67	7	40	3	23	10	43	7	41	3	38	5
May 17, 1856..	68	9	40	0	23	5	41	4	41	7	39	11
Aggregate average of last six weeks	68	1	39	10	23	5	41	10	41	6	38	7
Comparative avge. same time last year	70	8	31	7	26	4	40	5	42	3	39	5
DUTIES .....	1	0	1	0	1	0	1	0	1	0	1	0

COMPARATIVE PRICES AND QUANTITIES OF CORN.

Averages from last Friday's Gazette.			Averages from the corresponding Gazette in 1855.		
Qrs.	s.	d.	Qrs.	s.	d.
Wheat....	126,236	68 9	Wheat....	97,879	76 1
Barley....	17,166	40 0	Barley....	20,093	32 5
Oats ....	12,997	23 5	Oats ....	12,394	27 9
Rye.....	93	41 4	Rye.....	100	44 3
Beans....	4,718	41 7	Beans....	4,201	44 5
Peas ....	428	39 11	Peas ....	426	42 4

PRICES OF SEEDS.

BRITISH SEEDS.

Cloverseed, red, (per cwt.) .....	—s. to —s.
Ditto white.....	—s. to —s.
Trefoil, (per cwt.).....	—s. to —s.
Tares, winter (per bushel).....	7s. 6d. to 8s. 0d.
Coriander (per cwt.).....	20s. to 24s.
Carraway (per cwt.).... new	—s. to 50s., old
Canary (per qr.).....	58s. to 60s.
Hempseed (none) .....	—s. to —s.
Linseed (p. qr.) sowing	—s. to 63s., crushing 56s. to 58s.
Linseed Cakes (per ton).....	£13 0s. to £13 10s.
Rapeseed (per qr.) .....	new 88s. to 90s.
Ditto Cake (per ton).....	£6 10s. to £7 0s.

HOP MARKET.

BOROUGH, MONDAY, May 26.

The reports from the plantations are somewhat unfavourable: the bine is very weak and uneven. The market continues firm, with a fair demand, and prices are fully supported, at last week's prices.

POTATO MARKETS.

SOUTHWARK, WATERSIDE.

MONDAY, May 26.

The arrivals during the past week were moderate, both coastwise and by rail, but quite equal to the limited demand. The weather being now much milder lessens the consumption, and the trade has been very dull at the following quotations:—

	s.	d.	s.	d.
York Regents .....	50	0	to	100 0
Kent and Essex do. ....	60	0	70	0
Perth, Forfar, and Fifeshire Regents.....	40	0	50	0
Do. Reds .....	35	0	40	0
Aberdeenshire and North Country Reds .....	30	0	35	0

ENGLISH BUTTER MARKET.

MAY 26.

Trade opens with us very slowly to-day, at a reduction of 4s. to 6s. per cwt.

Dorset, fine .....	110s. to 112s. per cwt.
Do. middling .....	96s. to 102s. "
Devon .....	100s. to 104s. "
Fresh .....	10s. to 13s. per doz. lbs.

ENGLISH WOOL MARKET.

	s.	d.	s.	d.
Down tegs.....	1	4	to	1 5½
Down ewes .....	1	3	—	1 5
Half-bred wethers.....	1	3	—	1 4½
Kent fleeces .....	1	3	—	1 4½
Leicester fleeces .....	1	2	—	1 4
Half-bred hoggs .....	1	4	—	1 5
Combing skin .....	1	0	—	1 4½
Flannel wool.....	1	1	—	1 4
Blanket wool.....	0	9	—	1 2

END OF VOLUME XLIV.



