Jn Blackie

THE FARMER'S MAGAZINE.

VOLUME THE TWELFTH.

(SECOND SERIES.)

JULY TO DECEMBER, MDCCCXLV.

LONDON:

OFFICE, 24, NORFOLK STREET, STRAND.

MAY BE HAD BY ORDER THROUGH ALL BOOKSELLERS.

LONDON:
PRINTED BY JOSEPH ROGERSON,
24, NORFOLK-STREET, STRAND.

THE EMBELLISHMENTS.

THE FARMER'S MAGAZINE.

JULY, 1845.

No. 1.—Vol. XII.] [Second Series.

PLATE I.

PORTRAIT OF MR. BLACKER, OF ARMAGH.

PLATE II.

PLAN OF FARM BUILDINGS.

(*For description see page* 6.)

BIOGRAPHICAL SKETCH OF MR. BLACKER, OF ARMAGH.

Mr. Blacker, of Armagh, the subject of the present memoir, is descended, as appears from "Burke's History of distinguished Commoners," from an ancient and highly respectable family, settled for many centuries in the county of Armagh, in the north of Ireland.

We are not acquainted with his early pursuits, but his writings inform us he has been for several years past occupied in the management of the extensive estates of the Earl of Gosford and Col. Close, in which capacity he has become known from his exertions for the agricultural improvement of the small farms committed to his care, and the judicious plans for the accomplishment of that object to which he has been the means of calling public attention, and at the present moment there are, perhaps, few private individuals with whose name and character the public are better acquainted throughout the United Kingdom, as well as a considerable portion of both Europe and America, through which his writings have circulated.

His first publication, entitled, "An Essay on the Management of Landed Property in Ireland" (generally known under the name of the "Prize Essay," from its having gained the prize offered by the Royal Dublin Society, for the best essay on that subject) published in the year 1834, took the public by surprise, and turned the attention of landlords to matters of the highest importance to their welfare and happiness, which it was only astonishing they had so long remained inattentive to.

In this publication, the folly of landed proprietors handing over the entire management of their affairs to persons who often had no better recommendation than being a younger branch of the family, or some distant connection, was forcibly exposed, and had the effect of inducing many to consider the necessity of selecting persons with qualifications better suited to the efficient discharge of so important a trust than the class of individuals alluded to were generally found to be possessed of, and we believe, at the time, no more essential service could have been rendered to the aristocracy of Ireland. The duties of a land-agent in Ireland to a nobleman or gentleman of large landed property, are, like many other things in that country, little understood on this side the channel. The land-agent is there, in some degree, the representative of the landlord, is generally a magistrate, serves on the grand jury of the county, and is admitted into the first society on terms of perfect equality; a thing quite unknown, generally speaking, in England, though some few instances of it may, perhaps, be pointed out.

But the good effects of this small treatise was not confined to drawing the attention of landlords to the qualifications of those they employed; it likewise drew the attention of the public to the important subject of the reclamation of waste lands as a means towards tranquillizing the country, by giving employment to the population, and raising as preservers of the peace a class of persons that had something to lose, to be a connecting link in society between the higher and lower classes, and pointed out a practical mode of proceeding, which, with such modifications as local circumstances rendered necessary, has been extensively acted on.

In this publication, his address to the small farmers on the estates of Lord Gosford and Col. Close, on the improvement which might be made in the cultivation of their holdings (which had previously obtained but a local circulation amongst those to whom it was addressed), was first alluded to, and immediately attracted the attention of the public, as an important part of a specified plan for the general introduction of agricultural improvement throughout Ireland, in which the information therein conveyed, the oral and practical instruction afforded by the agriculturist*, the influence of the agent, and the assistance of the landlord, were all made to co-operate in stimulating the occupiers of the soil to greater exertions, and to point out the way to make those exertions most available for the amelioration of their own circumstances, and the comfort and beneficial employment of their families.

In consequence of the notoriety thus given to it, this short address has gone through several editions of many thousand copies each, and its circulation is now no longer confined to the locality for which it was intended, nor yet to the limits of the kingdom at large; many English landed proprietors having distributed copies to their tenantry, and some few are beginning to adopt the plan of engaging agriculturists so as to carry out the system in all its parts, in districts where improved cultivation has hitherto made the least progress, and with the most encouraging prospect of success.† The arguments urged in the little treatise here alluded to are so well adapted to make an impression on the class of persons to whom they are addressed, that we think it will be conferring a benefit on the public to introduce here the extract therefrom, copied into the *Journal of Agriculture* of the *Royal Agricultural Society of England*, which is as follows:—

"The only way, in my mind, to accomplish this, is, by introducing such a system of agriculture as would bring the entire of the small farmers' holdings into a productive state, in place of allowing nearly half their farms to remain nominally in grazing, but in reality producing nothing; and as this cannot be done without manure, and manure cannot be had without stock, the consideration naturally arises, how can the greatest quantity of stock be most economically maintained, and under what management can the largest quantity of manure be derived therefrom?

"Now, by referring to the experience of all good farmers, in all countries, and under all circumstances, it is ascertained beyond dispute that by the practice of sowing green crops, such as clover and rye-grass, winter and spring vetches, turnips, mangel-wurzel, &c., the same ground which in poor pasture would scarcely feed one cow in summer, would, under the crops mentioned, feed three, or perhaps four, the whole year round, by keeping the cattle in the house, and bringing the food there to them; and the manure produced by one of these cows so fed and well bedded, with the straw saved by the supply of better food, would be more than equal to that produced by three cows pastured in summer and fed in winter upon dry straw or hay, and badly littered. Here then are two assertions well worthy your serious attention—first, that three cows may be provided with food in the house all the year from the same quantity of ground which will scarcely feed one under pasture for the summer; and secondly, that one cow so fed in the house will give as much manure as three fed in the field. I call these important assertions; for if they are really founded in fact, then any of you who may now be only able to keep one cow would, by changing his plan, be able to keep three, and each one of these producing as much manure as three fed in the way you have hitherto been accustomed to adopt, the result would be that you would have nine times as much manure by the new method as you have hitherto had by the old. Now, as I do not think there can be a single individual among you so blind as not to see at once the great advantage it would be to have such an immense addition to his manure-heap, it appears to me that the best thing I can do is, in the first instance, to endeavour to impress firmly upon your minds the conviction that this fact, so much entitled to your attention, and yet so little attended to, is in reality a truth that may be relied on, and may be practically adopted without any fear of disappointment; it is upon this foundation that the practicability of almost every improvement I mean to suggest in the cropping of your land must ultimately depend, and it is therefore indispensable to the success of any arguments I may offer, to place it before you in the

* This is a name given to the agricultural instructors recommended by Mr. B., to be employed for the instruction of the tenants on different properties, whose duty it was to go day after day round the farms, and point out what was necessary to be done and what should be avoided, and where assistance appeared to be necessary, to point it out to the agent or landlord, in order to secure compliance on the part of the tenant with his directions.

† Lady Basset, of Tehidy Park, in Cornwall, we believe has the merit of setting the example in this respect, which we understand has been attended with the greatest advantage not only in the better cultivation of the small holdings of the miners on her ladyship's estates, but also in the general improvement of the agriculture of the neighbourhood.

clearest point of view, and to remove from your minds every doubt whatever upon the subject. To draw the necessary proof, therefore, from what comes under your own observation, I may say, every day of your lives, and which must therefore have more weight with you than anything else I could say, I refer you with confidence to the exhausted miserable pasture upon which your cattle are now almost universally fed, 2 to 3 acres of which are often barely sufficient to keep one cow alive for the summer months, but by no means to afford her a sufficiency of food. Now, 1 acre of good clover and rye-grass, 1 rood of vetches, and 3 roods of turnips, making up in all 2 acres, which are now allotted for grazing one cow in summer, taking a stolen crop of rape after the vetches, will afford ample provision for three cows the year round—for you all know that an acre of good clover will house-feed three cows from the middle of May to the middle of October; and with the help of a rood of vetches you will be able to save half the first cutting for hay to use during the winter; then when the first frosts, about the middle of October, may have stripped the clover of its leaves, the early-sown rape, which ought to be put in, ridge by ridge, as the vetches are cut, and the land well manured (if the seed has been sown by the middle of July), will be ready to cut and feed the cattle until the turnips are ripe. Here then you have plainly provision secured until the middle of November; and we have to calculate what remains to feed the cattle until the middle of the May following—for this purpose there is a rood of turnips for each cow. Now, an acre of the white globe and yellow Aberdeen turnip ought to produce from 35 to 40 tons per acre; but supposing one-half to be of the Swedish kind, let us calculate only on 28 tons to the acre, which is not more than an average produce, even if they were all Swedish, and see what that calculation will yield per day for 190 days, which is rather more than six months. If an acre yields 28 tons, a rood will yield 7 tons, which being brought into pounds, will amount to 15,680lbs.; and this divided by 190 days will leave 83lbs. of turnips for each cow every day, which, with a small portion of the hay and straw you are possessed of, is a very sufficient allowance for a common-sized milch cow; and, over and above all this, you have the second growth of the rood of rape coming forward in March and April, which would feed all the three cows much longer than would be necessary to meet the coming clover crop, even in the latest season.

"Here then the facts of the case are brought before you for your own decision; and I fearlessly appeal to yourselves. Is it true that 2 to 3 acres (I make my calculation on 2 only) are frequently allotted to graze one cow during summer? and again, is it true that an acre of clover and grass-seed, a rood of vetches, and 3 roods of turnips, with the stolen crop of rape after the vetches, will supply food for three cows the year round? I defy any one of you to reply to either of these questions in the negative. The straw of the farm in any case belongs to the cattle; but in the latter case, where turnips are provided for food, it is chiefly used for bedding; and the additional quantity of grain which will be raised by means of the increased quantity of manured land will always keep pace with the increase of the stock, and provide the increased quantity of bedding required. I think, therefore, I am warranted in considering my first assertion proved, namely, that the ground generally allotted to feed one cow will in reality supply food for three; and have now only to offer some calculations as to the accumulations of manure, which I hope will be considered equally conclusive.

"During the summer months your cow, which is only in the house at milking-time, and perhaps not even then (for the practice is sometimes to milk her in the fields), can afford little or no addition to the manure heap, being upon the grass both day and night; and even in winter and spring, whilst there is any open weather, they are always to be seen ranging over the fields in search of food; so that I think you cannot but admit, upon a calculation for the entire year round, the animal is not in the house more than eight hours out of the twenty-four, and it is only the manure made during this period which can be reckoned upon; therefore, upon this supposition (which I think is sufficiently correct to show the strength of my argument, if there is any truth in arithmetic), one cow fed, as I calculated on, in the house for the entire twenty-four hours will yield as much manure as three cows that are only kept in the house for eight hours (the quality of the food being supposed the same in both cases, and this would manifestly prove my assertion); namely, that one cow fed within would give as much manure as three fed without; and, therefore, when three can be kept in the one way, as I have already shown, for one kept in the other, it is as clear as three times three make nine that the result of the calculation will be just as I have stated, namely, that the farmer will obtain by the change of system nine times as much manure in the one case as he would have had in the other. Now, if after all that has been said, which seems to me at least quite convincing, any of you should be so astonished by the quantity of the manure thus proved to be gained, as still to have some misgivings on the subject, and be inclined to think that matters would not turn out so favourable in practice as I have shown in theory, I would wish any such person to consider one very material point, which I have not yet touched upon, for in the foregoing the argument is founded entirely on the time the animals are kept within, viz., it is stated that one cow kept within for twenty-four hours will give as much manure as three cows which are only kept in for eight hours (the food being assumed to be the same in both cases); but it is quite evident that if the cow kept within should be fed with turnips, and bedded with the straw which the others are fed upon, leaving them little or no bedding whatever, that the calculation must turn decidedly in favour of the animal which is well fed and bedded, both as regards the quantity and quality of the manure; so that it appears the estimate I have made is decidedly under the mark."

The services rendered to the agricultural classes of Great Britain and Ireland by Mr. Blacker, have not, however, been confined merely to the points just alluded to. During the agricultural distress in the spring of 1836, he published "The Claims of the Landed Interests to Legislative Protection," and in his evidence before the agricultural committee of that year, strongly supported the justice and sound policy of a *fixed* duty of not less than 20s. per quarter on foreign wheat; to which although both then and since public opinion has been most strongly opposed, yet experience, which tests the truth of all opinions both public and private, has proved Mr. Blacker to be right.

He *then* stated, and in sundry letters since published, that in all seasons of scarcity the price at Mark Lane, minus this duty, would be the best market to which the surplus of the continental grain-producing countries of the continent could be sent to, and that under such circumstances the duty would fall on the foreign producer and not on the British consumer. This theory has now been brought to the proof by the present tariff; for when the appearance of the market affords no prospect of bringing the article into consumption at a lower duty, *then* the existing *rate* becomes practically a *fixed* duty, because it cannot be avoided. Let the merchants at Mark Lane be then called upon to say who paid the duty of 20s. per quarter in the latter part of the year 1842, or who pays the duty of 20s. per quarter now.

It will perhaps be asserted that if this duty was not chargeable, the public would be supplied so much cheaper; but let the columns of the *Mark Lane Express* be referred to, and add the quotations of the price of the best wheat free on board in July, 1842, when the duty in Great Britain was only 8s. to 9s. per quarter, and add that duty to the first cost, and the article will be found to stand in London 13s. per quarter higher than the duty of 20s. added to the first cost in the close of the same year.

		per qr.
For example, July 25th, 1842, the quotation from Dantzig, in *Mark-Lane Express*, was		59s.
Add duty		8s.
Price it stands		67s.
But take the quotation in *Mark-Lane Express* of December 26, 1842, and the quotation from Dantzig will be found to be only	34s.	
To which add the duty then payable .	20s.	
		54s.
The freight and other charges, being pretty much the same, need not be included.		
Difference		13s.

Thus proving the very reverse of what the public suppose to be the case, and which is thus explained by Mr. Blacker, in his evidence: namely, that where there is an open communication between any two markets, the only difference of price which can exist between them, in regard to wheat or any other article, can only amount to the cost of transport from one to the other, and the merchant's fair profit. If, therefore, the article can be sold so low in Dantzig as to afford the payment of a 20s.-duty in London, this 20s. so paid is only increasing so much the cost of transport from the Dantzig market to the London market; and the price in Dantzig will only be kept 20s. lower than it would be if that duty was not chargeable: and the prices in the Dantzig market in the middle and close of the same year, 1842, and in all other years where imports have taken place under the sliding scale, will bring practical proof of this assertion. From this it will appear, that if Mr. Blacker's evidence in 1836 had been acted on ever since, the treasury would have received as many millions sterling as there have been quarters of wheat imported, and the public would have had the markets kept down by the foreign importations coming regularly into consumption as they arrived, instead of having prices advanced by their being kept back, in the expectation of a low duty. It is impossible to deny the truth of this, because facts prove it, and will prove it again and again, that whenever the duty rises, wheat will in consequence fall at the continental shipping port in the same or perhaps greater proportion. The committee not being able to see the truth of this doctrine, and not agreeing upon any report, the chairman (the present speaker) addressed a letter to his constituents, recommending an 8s. duty on wheat, the same as proposed by the late government. This letter was immediately reviewed by Mr. Blacker in a pamphlet, which is generally considered to have satisfactorily shown the impolicy and insufficiency of such a duty; which would in all bad seasons be more than countervailed by the superior quality of the Dantzig wheat, compared with our averages.* Since this period, Mr. Blacker has pursued his useful career, by advocating the appointment of agriculturists in all the poor-law unions of Ireland; by which means agricultural instruction would be brought within the reach of the most remote inhabitants of the kingdom; and by the reports of the annual agricultural meetings at Market Hill, has continued to keep alive the subject of agricultural improve-

* These pamphlets are to be had at Mr. Groombridge's, Paternoster Row, and will be read with interest whilst the corn laws continue a subject of discussion.

ment, and to excite the landlords of Ireland to perseverance in their endeavours for the improvement of those under them.

Without neglecting, however, this his main pursuit, Mr. Blacker has of late years taken part in the discussions on the currency question, in regard to which he has followed the plan of grounding his arguments upon the foundation of fixed principles which cannot be disputed.

In the second edition of his pamphlet on this subject, which has lately issued from the press,* he lays down the principle—which we believe will be universally assented to—that "the circulating medium ought to vary according to the capital and commercial transactions of the country, or, in other words, according to the wants of trade;" from which he deduces the important conclusion, that no article possessing in itself any intrinsic value can ever be made the basis of *a perfect currency*, because being, in that case, an article of commerce, it must vary according to its own supply and demand, and therefore never can conform to the principle laid down. This principle completely excludes the employment of the precious metals; which, as being articles of commerce, and subject to the same laws as other articles of commerce, must fluctuate according to their own supply and demand, and never can be made to conform in their fluctuations to the wants of trade. This seems undeniable; and yet public opinion is decidedly at present in favour of the metallic basis; but it remains to be seen how far future experience will confirm its correctness; for whilst the exchanges continue favourable, this principle cannot be tested.

Mr. Blacker argues that an inconvertible paper currency, under the regulations he lays down, cannot be over-issued, and must prove a self-regulating currency, conforming in all respects to the wants of trade; and quotes in the appendix the bullion report of 1810, in proof of the correctness of his doctrines, which with his observations on the Bank Charter Bill, and his plan of weekly return to be made by the commissioners of issue, will be found well worthy of perusal. We shall only further observe on this subject what we should think "every one" will be ready to admit, that if Mr. Blacker's opinions should hereafter turn out to be correct in a matter which has exercised the talents and occupied the attention of the public for so many years—and this cannot be ascertained whilst the exchanges continue favourable—we may fairly claim for him to rank among the most distinguished men of his day: and the mode he has adopted in the discussion of the subject, by dividing it into separate questions, each capable of receiving a determinate answer, and involving the most important conclusions, seems to us by much the most favourable to the establishment of sound principles. For example: "Ought a perfect circulating medium to fluctuate in amount according to the wants of trade?"—"Can any article whatever, which is an article of commerce, serve as the basis of a perfect currency?" And again, which seems the most important of all in a practical point of view—"Can any circulating medium, convertible or inconvertible, be over-issued subject to the rules laid down for its regulation?"

Any one at all acquainted with the subject will see the important bearings of such questions as these, and we therefore earnestly recommend them to the consideration of the public, it being a very general opinion, that monetary convulsions must again take place whenever any long-continued, unfavourable state of the exchanges, or any other cause, may produce a drain on the Bank of England for specie, which must inevitably be attended with a *denial* of *discount*, and of course with mercantile embarrassment, and all its usual train of consequences. We have already extended this article much beyond our usual limits; but we must, nevertheless, further allude to the evidence given before the Irish Land Commission, in which Mr. Blacker again insists upon the principles of currency and taxation he had formerly advocated, and shows most forcibly how injuriously those now acted on bore upon our national welfare and prosperity, and points out a plan to provide food and employment for our increasing population by the co-operation of the legislature, in facilitating the raising of money to be exclusively employed in thorough draining the lands of the United Kingdom, which would at once set to work every able-bodied labourer, and at the same time increase the produce of the soil, so as to make us independent of foreign importation, and prevent the exportation of gold to purchase this supply, which would thus be secured from our own soil and our own labour. The details for carrying out this measure, cannot be fully stated in a publication of this kind. We must, therefore, content ourselves with referring to the plan as given in Appendix No. 9, of the first volume of the Land Commission Evidence, merely adding, that in order to avoid the charge of calling upon Government to raise money for the improvement of private properties, which some were inclined to make, though without just cause, he has since suggested what we consider to be a great improvement; namely, to place the management of all the pecuniary concerns in the hands of the Bank of England; so that the proposition now stands thus:—That when

* Published by Mr. Pelham Richardson, 23, Cornhill.

the landlord and tenants on any estate requiring drainage agree to assess themselves in the annual payment of five per cent. on the amount necessary to thorough drain the property, the legislature should make this voluntary assessment binding on the parties, and to be paid by the tenant *as long as his rent was not advanced,* and by the landlord when *that* took place; the landlord to pay this to the collector of the district, like the land-tax or quit-rent, and the collector to remit it to the Bank of England, to be placed to the credit of a drainage account; and Government should be no otherwise concerned than to guarantee the payment (*by the Bank of England* out of this fund) of three per cent. interest on debentures, to be issued by the Government Commissioner, after the work had been duly executed and inspected, which debentures would be given in payment to those who had made the drains. In this guarantee no risk could be incurred, as the five per cent. assessment would be a *first* charge upon the property to be improved, leaving therefore a surplus of two per cent. to liquidate the loan as a sinking-fund. Persons who feel interested in the subject, will do well to consult the original document referred to: for our own parts, we shall only say that we can see no good reason why the legislature should not act on the plan proposed, as it must inevitably benefit *all* parties concerned, and cannot, in our opinion, injure any; and, therefore, most cordially recommend it to the favourable consideration of the government, the legislature, and the public.

Mr. Blacker is still, we believe, resident in his native county of Armagh, in the north of Ireland, and continues his praiseworthy exertions for the improvement of those committed to his care—by which he has so highly raised himself in public estimation—with unabated ardour and energy; and for his entire and complete success in this useful and honourable employment of his time and talents, we think we may safely promise him the best wishes of all who have the true interests of Ireland or the United Kingdom at heart.

EPIDEMIC AMONG CATTLE.—We regret to understand that the murrain, which we lately stated had been prevalent in the western district of this county, has been spreading, and that it has appeared in several neighbouring parishes. One farmer near Aberdalgie has lost seven out of nine cattle affected, of which some died in about twelve hours after being seized, and others lingered six or seven days. The symptoms are precisely the same as those which characterised the disease in England, and following generally upon the cattle being put to pasture during the cold and parching droughts of May, is supposed to be induced by the comparatively dry and sapless herbage. In this event, the rapid improvement in the quality of the pasture consequent upon the change of the weather, will, it is expected, check the progress of the disease.—*Perth Courier.*

PLAN OF FARM BUILDINGS.

BY CHARLES MILES.

The proposed plan attached to this magazine, for a farm of 600 acres, with residence, is from one of the drawings which was accompanied by a paper entitled "A Review of Buildings and Mechanical Appliances for Agricultural Purposes," submitted to the Royal Agricultural Society, read at the meeting of the council on Wednesday, June 11th.

It will meet with a ready acknowledgement that agricultural buildings have not advanced with the improvements in land cultivation, and that the erections and mechanical appointments of a farm ought to be adapted to the culture which, under particular circumstances, it may be found desirable to follow. It is to be understood therefore that this plan is not proposed as a model, or stereotyped form for exact imitation; but to illustrate certain principles, which principles have formed the basis of the annexed arrangement.

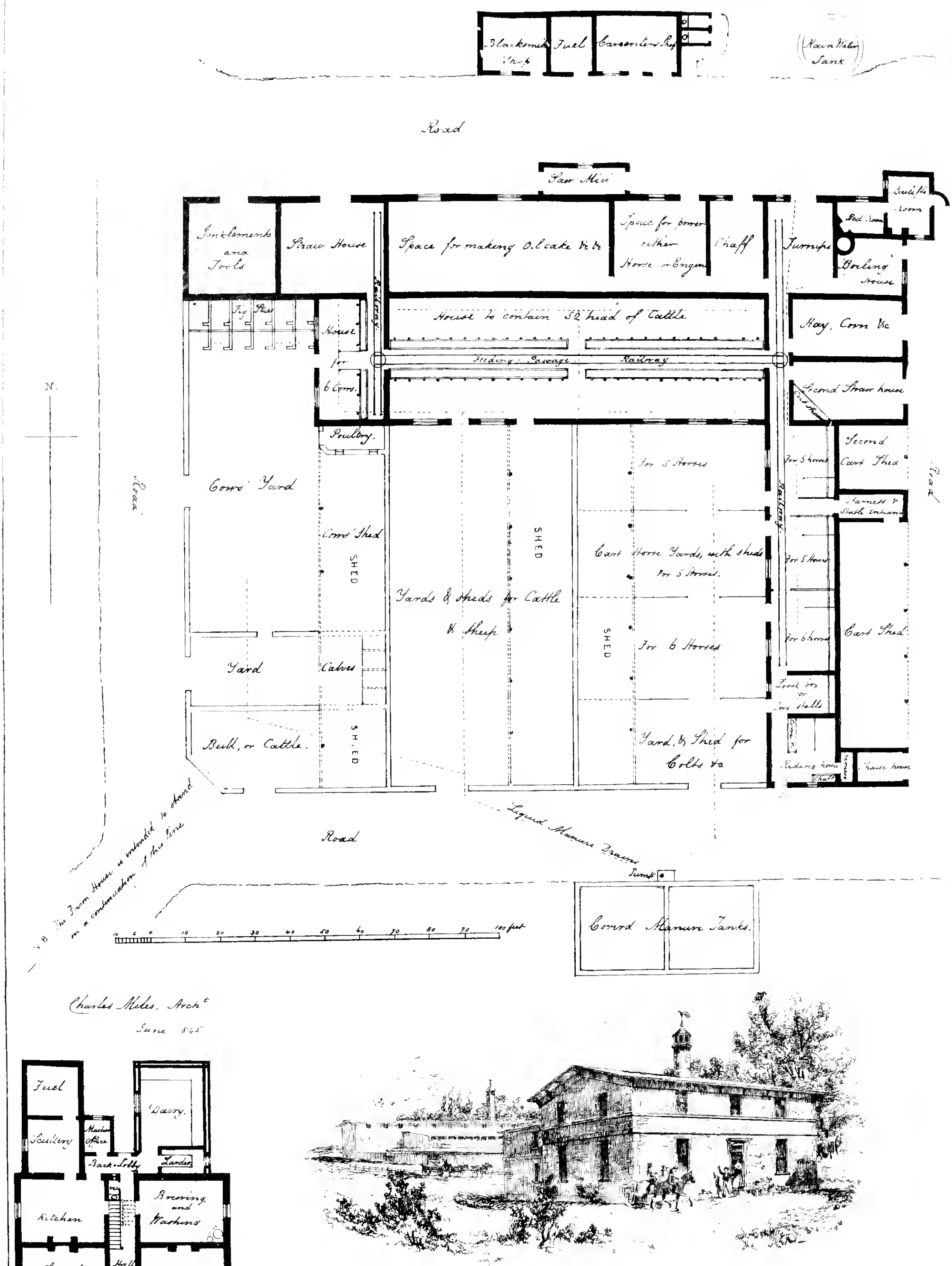
It is not intended to enter at all minutely into the detail, but simply to call attention to certain proposed points of improvement upon the generality of our farm steadings.

I. The first principle being to keep the stable and cart-shed as distinct and separate from the cattle, sheep, and pigs, as may be compatible with a convenient and compact arrangement; whilst the departments for storing, for the supply of straw, and for the operations belonging to the preparation of food, should be easy of access to both, yet distinct from either.

II. The adoption of that form for arranging the buildings which, while it affords a shelter from the north and east, will be open to the warm influence of the south and west.

The formation of this arrangement of buildings in a double line, is rendered practicable by a new method of treating the grain with the straw. The advantage gained is a great saving of constructive material. The outer line being devoted to storing and to the mechanical operations, is made to form towards the cold quarters, a shield or protection to the inner, which is occupied by horses and fattening cattle.

III. The proposal of a new mode of storing and separating grain, by which the ear will be separated from the straw, the former only being conveyed into the granary, which may occupy the first floor of the northern front, and where the ear which is the smaller and more valuable part will have all the protection that a fire proof structure can afford, and the advantages of air and warmth to dry and harden the grain when required. The ear, in the proposed state will be in a more fit condition for avoiding the waste which belongs to the present system of thrashing, and the straw being deprived of the



PROPOSED FARM BUILDINGS (ADAPTED TO ABOUT 600 ACRES) WITH RESIDENCE

t
d
p
t
s
tl
h
w
tl
q
o
d
o
n
o
is
w
d
w
ri
m
b
p
P
w
fc
se
a
b
o
re
tl

n
a
ir
w
es
fe
a
ta
b
Ir

d
b
b
n
ha
di
li
th
E
p
M
d
p
th
p

valuable grain not being so attractive to the incendiary, might be formed in stacks on the fields, or wherever may be more convenient. It is intended, also, to prevent the waste of grain, arising from the making up into shocks or sheaves on the fields, from its conveyance to the stack, and its casualties there; and lastly, from its final removal to the barn. The ancient and general custom of a laden waggon or cart discharging its load in the barn, and passing through the cattle yard to the disturbance of the reposing or feeding stock, would be completely avoided by such arrangements.

IV. To secure proper ventilation and warmth in all situations where required, these conditions being regarded as lessening the cost of stall feeding, and in sustaining health.

There can be no question of the importance of giving ventilation to buildings in which animals are confined; and there can be no doubt that in our climate it is impossible to give this condition without artificial warmth.

In the appointments of the civil engineer, and in the warmth and ventilation, the proposed plan is provided for in accordance with the suggestions of Mr. Sylvester, Great Russell-street.

V. A line of rails laid down along the feeding passages &c., properly placed with regard to the stores and straw, might by the assistance of a waggon of suitable construction, enable a man to supply the cattle, cows, and horses, with food and straw in a very expeditious and simple manner.

VI. Providing by a very inexpensive asphalte composition a lasting and watertight floor throughout the buildings, &c. The advantage derived would be immense, from its warmth, comfort, and cleanliness, by its non-absorption, thereby not allowing the valuable manure to waste, saturate the ground, and create a noxious atmosphere to the injury of the stock.

By the formation on the site of a cheap and durable concrete, moulded to form the walls of the buildings, so constructed as to give the advantage of insulating the interior from the exterior surface, not giving less but greater strength than a solid wall of the same weight. This material, which is not open to the same objections as clay lumps, and mud walls, may be recommended where good brick and stone cannot be supplied on very reasonable terms.

By a new construction of weather and fire-proof roof, which may be nearly flat, and by that means effect a very considerable saving in the quantity of material and of walling, at the same time that this roof will protect the interior of the buildings and sheds from excessive heat and cold—will project boldly at the eaves for the sake of shelter to the face of the wall beneath and for effect; it will not be more expensive than a common roof.

VII. The provision for the cows and additional cattle, of sheds, which are capable of division, and are not less in width than 18 feet, and for horses, of about 15 feet wide, all provided with yards of suitable dimensions.

The provision of a roadway to surround the buildings will be an indispensable convenience, shown to be so by regarding the nature of the plan.

Of suitable space for the power, whether water, horse, or engine, the power to be applied to as many purposes as the circumstances will admit of.

Of deep and efficient drainage throughout the whole of the steading, desirable for health, comfort, and warmth.

Of covered manure tanks, so constructed as to admit of the entrance of a cart. Of a rain-water tank, to collect the roof drainage, and retain it below the surface of the ground, as a supply of water the most desirable for all purposes.

Of two rooms for a bailiff or trustworthy farm-servant, placed in the opposite angle to that which is distinguished by a line showing the direction of the farm-house, which house is intended to command the view of two sides of the farm-steading, while the bailiff's room will command the remaining outer lines of the buildings. The bailiff's entrance door, which is of a novel construction, will allow of ingress and egress, with ventilation, but without draught, and affords a shelter to those outside whilst waiting for admittance.

VIII. In the farmer's residence the object has been to provide for all the rooms a proper aspect for their several appointments; the dwelling-rooms are of ample dimensions, and every accommodation is fully provided for the domestic management of the farm; the situation being studied with regard to the cows, pigs, and poultry, and not inconvenient for the riding-horse stables, &c. A construction of the chimnies, for the whole of the buildings, is proposed to be carried out, by which the present mode of sweeping them will be avoided, and one substituted, allowing this duty to be performed by the farm-servant, and saving the soot, &c., to be applied to the land. The possibility of the annoyance occasioned by smoky chimnies, in any situation, will be fully guarded against; while the proper ventilation of the rooms will be perfectly attained.

In concluding these very brief remarks, it only remains to be said, that Mr. Hastings and Mr. Cambridge, experienced Norfolk farmers, have kindly given and enabled the writer to obtain that information of the present system of operation in their part of the country, which can only be derived from the practical farmer.

ON RENT.

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

(*Continued from page 494.*)

The payment of a fixed rent in money, is evidently attended with the great disadvantage, that the price of agricultural produce is subject to great fluctuations, while its cost of production does not so materially vary. The fixed rent of land, payable in money, for a considerable term, cannot therefore but at certain periods bear but little proportion to the value of the harvest. If the cost of production and the fertility of the soil remained always the same, and moreover, if the price of corn rarely altered, then a fixed money rent would be simple and unexceptionable in its principle. But how far this is from being found to be the case in practice, the well known steadily increasing produce of the land is a sufficient answer; while the strangely varying average value of corn may be readily seen from the following Statement of the Decennial Fluctuations in the Price of Wheat, from 1646 to 1815, from 1816 to 1828, and from 1829 to 1842; exhibiting the Highest and Lowest Annual Average in each Decennial Period, and the Per-centage Amount of Difference.—(*Parliament Paper* 1843.)

Periods.		Annual Average Price. Highest.		Lowest.		Per-centage Difference.
		s.	d.	s.	d.	
1st Period	1646 to 1655	77	10	23	9	227.
	1656 — 1665	67	9	37	1	82.
	1666 — 1675	62	10	33	0	90.
	1676 — 1685	55	0	34	9	58.
	1686 — 1695	61	11	23	0	169.
	1696 — 1705	65	5	26	11	141.
	1706 — 1715	71	11	23	9	202.
	1716 — 1725	44	0	31	9	40.
	1726 — 1735	49	11	24	4	105.
	1736 — 1745	46	5	22	9	104.
	1746 — 1755	40	10	29	8	37.
	1756 — 1765	55	0	27	7	99.
	1766 — 1775	59	1	41	10	41.
	1776 — 1785	54	3	34	8	56.
	1786 — 1795	75	2	40	0	87.
	1796 — 1805	119	6	51	10	130.
	1806 — 1815	126	6	65	7	92.
2nd Period	1816 — 1828	96	11	44	7	117.
3rd Period	1829 — 1842	66	11	51	7	29.

And these are not the only fluctuating expenses to which the cultivator is liable. The cost of labour bestowed upon a given extent of land not only varies according to times and seasons, but it seems, from the following statement of the average amount of labour per acre on a farm in west Norfolk, in periods of five years from 1785, that the value of the labour bestowed upon the soil has long been progressively on the increase (Bacon's "Norfolk," p. 145):—

	s.	d.
13 years ending in 1785	6	9
5 ,, ,, 1790	7	2
5 ,, ,, 1795	8	2
5 ,, ,, 1800	11	0
5 ,, ,, 1805	15	6
5 ,, ,, 1810	19	6
5 ,, ,, 1815	22	4
5 ,, ,, 1820	23	9
5 ,, ,, 1825	21	0
5 ,, ,, 1830	24	0
5 ,, ,, 1835	23	2
5 ,, ,, 1840	26	7

It was to meet the difficulty of adapting a fixed rent in money to the strange variations of the grain markets, that corn-rents were invented. By this contrivance the rent is payable in so many bushels of grain (or their value) per acre; and thus the farmer pays less money, but the same quantity of corn, when the markets are low, but increases his money payments when the markets are raised.

This plan has been adopted in many countries, and in different ages, but rarely with complete success; for, notwithstanding its apparent fairness of operation, it is based upon an erroneous supposition—that, notwithstanding prices fluctuate, yet still the amount of produce does not vary. This is, however, a very false presumption: since the experience of all periods has pretty well proved that prices are regulated by the supply. And thus the operation of a corn-rent upon the farmer is sometimes oppressive; since, in bad seasons and years of scarcity, when, owing to the scantiness of his crop, he is least able to bear increased outgoings, then it is, that, under the corn-rent system, his rent is increased. To guard in some degree against this evil, it is usual, in such agreements, for the security of both landlords and tenant, says the editor of the "British Husbandry," to fix a *maximum* or limit beyond which the rent shall not be suffered to rise, and a *minimum* beyond which it shall not be allowed to fall. This restriction, it is true, guards against the extremes; but the *medium*, which such plans are introduced to attain, will perhaps be as well attained by a fixed sum.

The attendant difficulties upon the corn-rent system are pretty clearly expressed by a writer in the late Mr. Bacon's "Report upon the Agriculture of Norfolk," p. 69, where he says (and he also adds a plan of his own which is an evident improvement upon the old corn-rent system):—

"In the greater than usual uncertainty from apprehended legislative measures, I cannot see how arrangements can be made for letting and hiring farms, except upon such a system as may in some measure meet the circumstances under which we may possibly be placed. This must be something of a corn rent—something that will reduce the rent, with the decrease of the occupier's ability to pay and increase it with his more ample means. There must be a give and take plan, otherwise agreements will never bind but one party, and the party not securely bound will be the more reckless in taking land without any or with but little consideration or calculation as to rental value. The plan of a corn rent is not so simple as may be imagined, if it is to be such as will suit all circumstances. So much corn, such as a coomb of barley per acre, or three bushels of wheat per acre, appears a reasonable plan; but it by no means settles the question on an equitable basis, because in the case of a coomb of barley per acre as the rent, in one year it might take one-sixth of my barley crop, and in another one-ninth: or in one year I should pay 18s. with a short crop, and seed and horse corn higher for that reason; and in another 14s. with the total produce sold realizing more money, and the lowest rent to pay; that is, taking the price to be ruled by the general productiveness of the crops. Notwithstanding this, we must in a great measure found the system of shifting rents in the price of corn, as we know by experience that when corn has been low, there has been a great pressure for abatements, and that they have been conceded; and with high prices, from whatever cause, no reduction has been required, and certainly no advance given. If we could take all farm produce into account, and render for rent a certain portion of that produce (one-fourth or one-fifth, or one-sixth, as the case might be), it might come near the required mark; but as this would make it necessary to keep and render an account of every thing in every year to allot the landlord's share, it will never be adopted, and can never be proposed.

"In considering the matter for the purpose of striking out some plan likely to be satisfactory to both parties interested, I have found it necessary to adopt the price of corn to govern my scale, and at the same time holding to a fixed rent, as far as there is a fair chance of standing by it. The plan which follows will more clearly explain my meaning. The rent to be governed by the price of a coomb of wheat and coomb of barley together, thus—one coomb of barley 15s., one coomb of wheat 27s.=42s. The two being 42s., the rental value of a farm is estimated at £500. It shall remain at that rent, except the average of the year ending 1st October shall be less than 39s. or more than 45s. for a coomb of each, as shown in the scale below. The average for the year ending 1st October to govern the rent due the 11th of the same month of October, and to be taken at the local market; here it would be at Lynn."

When above 51s. £650.

When above 48s. and not above 51s. £600.

When above 45s. and not above 48s. £550.

When above 39s. and not above 45s. rent to remain as first fixed—say £500.

When below 39s. and not less than 36s. £450.

When less than 36s. and not less than 33s. £400.

When less than 33s. £350.

By the general custom of England, rent is commonly payable at two periods—Michaelmas and Lady Day; the first payment commencing six months after the farmer enters upon the land. In Scotland, however, they are Martinmas and Whitsuntide, or Whitsuntide and Martinmas; the tenant being allowed twelve months' credit for the first half of the rent in the one case, and in the other eighteen. It was formerly the custom to pay what was called *forehand* rents: that is, paying the half, and, in some cases, the whole, years' rent as soon as the farmer entered upon the farm. This practice, entirely disused in England, is nearly exploded in Scotland and Ireland.

By the custom of different counties, the farmer is liable to various restrictions and impositions. Thus in Norfolk the farmers hold chiefly by leases of 7 or 14 years, some for 21; and they enter at Michaelmas. They generally covenant to farm on the four-course system, and are often restrained from sowing above a certain number of stones of oats; this crop being considered to be much more impoverishing to the land than barley. They are not allowed to sell either hay or straw. The outgoing tenant either threshes his harvest himself, or he agrees with his successor, who carries out the corn and keeps the straw and chaff. The incomer pays for the growing crops on the ground, but not for the labour: thus if the turnip crop fails, he receives nothing for the labour betowed in sowing, harrowing, &c. The incomer sows the wheat crop; but he cannot enter the farm before Michaelmas. To do this, without leave, he has to pay for the hay on the farm; but he takes the dung free.

In other districts the custom varies. These and other matters of a similar kind, however, more properly belong to the question of leases, which will form the subject of a future paper.

HINTS ON THE EDUCATION OF YOUNG FARMERS.

AN ADDRESS DELIVERED TO THE FRAMLINGHAM FARMER'S CLUB, ON TUESDAY, THE 27TH OF MAY, 1845. BY WILLIAM EDWARDS, ESQ.

The importance of the subject proposed for this evening's discussion is so great, that it would have been gratifying to myself, and more advantageous to the party met together, for its consideration, if some one more capable than myself had been called upon to introduce it: but, as you have thought fit to request me to undertake the task, I have applied myself to it with some deliberation; and I have to crave your indulgence whilst I, at some length, lay before you my views upon the "kind of education best suited for young farmers."

In considering this subject, it appears to me necessary to compare the former with the present condition of the cultivators of the soil.

Anciently they were mere serfs, or as they were called, "villians," attached to the land, and passing with it upon every transfer of ownership by the same means, and with the same facility as the other live stock upon the farm. The modes of cultivation were simple, and confined to few objects; little was raised upon the land beyond what would supply the necessities of those engaged in producing it, and pay a rent in kind to the lord of the soil: and this produce was so uncertain, that years of comparative plenty were followed by seasons of extreme scarcity, amounting often to absolute famine, attended by all the horrors of pestilence, and death by starvation, to thousands.

The intercourse between the distant parts of the empire was so restricted and difficult, that whilst some counties had plenty, others were without adequate supplies; and prices in some parts of the kingdom were three and four times what could be obtained in others; and this state of things continued till the middle or latter end of the sixteenth century.

During these times, ignorance prevailed; the arts of civilized life were rarely cultivated. Learning, even in any moderate degree, was attained by very few; whilst the general population of the country was overwhelmed by ignorance and superstition. Mental darkness, of which in the present day we can hardly have a conception, then overshadowed the land: few could even read and write. And whilst this was the case even in the higher classes, it should excite no surprise to find that the lower—for there was hardly, as now, a middle class—should have been in the most debased and degraded state, both socially and morally; then, indeed, the want of education was not felt, and, if felt, it could not be supplied.

Gradually, however, a happier day dawned; and with the firmer settlement of political and social relations, education advanced, sciences were introduced, and their benign influence extended, and by degrees spread through the several classes of society, of which, then that which is called "the middle class," sprang up, and proved to be, as it still continues, the pride and protection, the support and safety of the state.

The cultivators of the soil partook of these advantages, and improved in moral and social condition, till they attained that position in society which we see them now hold—a position amongst the most valuable and important to the well-being of the country—a position in which their influence can but be great for good or for evil—for the advancement or retarding the general character and condition of mankind throughout the empire and the world.

But now that education is becoming so generally diffused in all classes, from the highest to the lowest, and in none with greater zeal, and I hope I may add with more decided prospect of advantage, than in the lowest: it is absolutely necessary, that to enable the farmers to maintain their position in society, and still more to advance it, they should avail themselves of all the means which are offered for obtaining that information which is requisite, not only for the advantageous prosecution of their business, but for their mental improvement, and consequent happiness and usefulness; and this, not only with reference to their present condition and mode of life, but as a preparation for those changes, whether of prosperity or adversity, which may await them.

It cannot, I think, be denied, that a good education not only renders more valuable the blessings of prosperity, but renders the evils of adversity more tolerable in themselves, and frequently affords the means of avoiding, and where they cannot be wholly avoided, of alleviating them.

The condition of man, especially in early life, is rarely stationary; and no man desires that it should be so. "Forward" is always his motto, his hope, and his endeavour. No man with a small farm rests satisfied with the prospect of always being a small farmer; he hopes for a larger occupation, and he strives for it. If all were disposed to abandon such views, men would, in body and mind, become careless and indifferent, dull and stagnant, like a muddy pool, receiving no benefit, and bestowing none; but, with the natural desire of advance, man more resembles the lively, running stream, which in its current receives contributions from the neighbouring waters, carries fertility through its course, both ornamenting and enriching the country through which it flows, and, if I may so say, increasing the bulk of the ocean of national prosperity.

Such a strong desire for advance is not only natural to man, and whilst kept within due bounds, and prosecuted by due and proper means, is not only allowable, but has the unfailing promise of His blessing, who has said, "That the hand of the diligent maketh rich."

If a young farmer contemplated taking only a few acres of land, and living upon them as his remote ancestors did, in vain should he urge upon him the advantages of education: but seeing that he naturally and laudably looks forward to extending his business, becoming the adviser, the agent, or the steward of others, and possibly anticipates the necessity of seeking a livelihood in other climes as an emigrant from his native fields and much-loved home, then are we fully justified in urging upon him the necessity of forwarding these hopes, and meeting this necessity, by endeavouring, in his early days, to obtain such an education as may afford the most suitable means to such desirable or inevitable ends.

This brings me to the consideration of that kind, and those branches of education which appear to me to be necessary and best suited for young farmers.

Convinced as I am of the necessity for, and the benefits and happy consequences of a good education, I may be tempted to open a wider field than may have engaged the contemplation of many to whom I now address myself: but I trust that the reasons which I shall endeavour to lay before you for what I may recommend, will justify my urging it upon your most patient and attentive consideration.

It will not be made a question that reading, writing, and arithmetic, are essential; but these are not education—they are but the *tools* with which the work must be taken in hand.

Passing reading and writing, with the simple recommendation that they should be studied with such diligence as may insure, if not perfection, great readiness, fluency, and correctness, I proceed to arithmetic.

ARITHMETIC is the only introductory kind of knowledge, or education, which teaches a man to think. Mere imitations here will avail him nothing. He must work for himself; he must think; and the more the power of thought is exercised, the more it can be concentrated, the greater will be the effect with which all the powers of the mind and of the body will be brought to co-operate, and the greater will be the advantage of him who thinks for himself, over him who, with blind and dull submission to the pride and assumption of others, proves, by his own inferiority, and by abandoning the great and important prerogative which distinguishes man, the noblest of God's works, from the beasts that perish.

The practical advantage, as well as the intellectual pleasure, of arithmetical knowledge is obvious. The necessity of keeping correct and clearly-arranged accounts, even of the transactions of a small farm, cannot be disputed. How great then is the necessity for them in larger concerns, and more especially when a man is entrusted with those of others.

On these grounds do I most strongly urge the study of arithmetic, even to the highest attainable branches of the science, for strengthening and improving the powers of the mind, and for the attainment of that practical accuracy in accounts, without which no man can safely be entrusted in the affairs of others, nor have a well-grounded confidence in the stability of his own.

The study of LANGUAGE if not equally necessary, is to a high degree desirable: without it we cannot accurately communicate our thoughts to, nor avail ourselves of the learning or advice of others. That a man may avoid running into many errors himself, or being led into them by others, it is absolutely necessary that he should have a good knowledge of his mother tongue—a knowledge which shall have been obtained through diligent study, careful observation, and judicious, well-selected reading.

Nothing so quickly or so decidedly marks the difference between a man of education, and one whose education has been neglected, as the difference between their modes of expression.

First impressions are strong; and it is every thinking man's desire that the first impression which he makes upon another should be favourable; and correct speech is, in this respect, like a cheerful and pleasing countenance. Every one is disposed to judge favourably of a man's intellect, when he is heard to express himself correctly, whether it is in the ordinary intercourse of life, in the social meeting, at the parish vestry, at the board of guardians, or at the farmer's club.

To ensure this advantage the young farmer must learn GRAMMAR. I have often heard the question asked—What has a farmer to do with Grammar? what good will it do him? My reply is—All, and more than all that I have said upon this point of my subject; and if my assertion as the general result of some experience were insufficient, I could readily adduce many instances of persons of what is generally called "a good education," who have been suddenly and irretrievably put at a disadvantage in the estimation of others, by their defects in grammar, or the improper use of even concise words.

If you will admit the propriety of any observations in this respect, you will ask me how this grammar is to be most easily attained. To this I would reply—let the young farmer learn LATIN. Latin for a young farmer!! To this oft-repeated exclamation I venture to affirm, that the most ready way of learning English is to learn Latin; and I believe that all who have a knowledge of both languages will admit the truth of the assertion, so generally is it now acknowleged, that English grammars are out of fashion, and Latin is regularly taught in all good schools, for girls as well as boys. For myself, I never learned a lesson in *English* grammar, nor do my children. They learn Latin for the sake of learning English, and it is done in much less time, with much less labour, and at no greater expense than must be incurred if the object is to learn the English language, by means of English grammars only. Besides which, there are so many words in the English language derived from the Latin, that it is quite impossible to have a correct knowledge of the English language as now established, but through some knowledge of the Latin.

The same observations would apply, though not in the same degree, to the study of the GREEK; but fast as it is proceeding, "the march of intellect" is not yet sufficiently advanced, to justify my detaining you with any further remarks upon the Greek; were I to do so I should probably, and not unreasonably, be told, that indeed "the schoolmaster was *abroad*."

But I cannot abstain from recommending the study of the FRENCH LANGUAGE; it is extremely easy, and soon acquired so far as reading it is concerned; and this, if the study were carried no further, would open many and valuable sources of instruction.

Should the young farmer at any time emigrate to Lower Canada, he would find a knowledge of the French language absolutely necessary; and should he be induced to cross over to France or Belgium, to purchase seeds, or oil cake, or to study the culture and manufacture of flax, he would find that his time had not been ill-spent in learning French. This I would, therefore, recommend, though not with the same earnestness with which I venture to urge the study of Latin.

If the place and home of the young farmer were to a certainty unchangeable, my next observations might if not altogether spared, be of much less importance; but he may find it desirable, or he may be compelled to resort for his livelihood to far distant climes; should this happen he will rejoice that he has studied NATURAL HISTORY, including GEOGRAPHY, and the varieties of ANIMAL and VEGETABLE LIFE. He would then much sooner become as it were acclimated, and would much sooner derive advantage from his new position, in rendering serviceable to him the soil, the cattle, and indeed all the natural productions, as well as the means of cultivation, intercourse, and communication to be found in his new home.

Amongst the acquirements which afford the greatest pleasure to an intelligent and cultivated mind, though possibly not the greatest profit to the man of Business, is DRAWING.

I do not think it necessary to detain you with any observations as to the pleasures derivable from this art, great as they are, making every walk in the fields productive of interest, and proving the difference between "EYES, AND NO EYES;" but I must remark that a practised eye, an eye accustomed to the investigation and contemplation of the various objects of nature, in their most perfect forms, will more readily than another, perceive and appreciate the peculiar defects or excellencies of grazing on other cattle; indeed some of my friends who are considerable graziers, and allowed to be remarkably good judges of stock, have shewn and cultivated a taste for drawing, and have found it beneficial in this branch of their business.

If a young farmer should be called upon to repair, alter, or re-arrange buildings, to lay out gardens or more extensive tracts of land, or merely to superintend such alterations, whether for himself or others, he will find that the practice of drawing, leading him to the study of form, proportion, and harmony of composition, and arrangement, will enable him to perform his duties with greater facility, as well as with greater advantage, not only as regards appearance, but positive utility and economy.

MECHANICS cannot be considered useless to the young farmer; on the contrary, the construction of his implements and the setting up and repair of buildings will be rendered more easy and effectual, for the objects to be attained, by a knowledge of the mechanical powers, by which a waste of time, of material, of labour, and expense may often be avoided.

All the implements in use by the farmer are, or rather ought to be, constructed on scientific principles, and those who have long passed out of the class of young farmers, will readily call to mind how clumsy and inartificial were, when first introduced, some of the most important and valuable instruments now in common use.

If in any thing, most certainly as regards mechanics, must be admitted the absolute truth of the maxim, that "knowledge is power!"

The necessity of a good knowledge of MENSURATION, including that of land, timber, hay, manure, thatching, ditching, &c. must be impressed on the young farmer. Whether he buys or sells, employs or is employed, without such knowledge he can have no certainty that he does justice to others, or is himself safe from imposition or fraud. Why should not the young farmer measure off half an acre of turnips, calculate the quantity in his heap of manure, and the quantity of land it will cover? Why should he not ascertain the quantity of clay, sand, or gravel, dug from a pit, or be able to judge of the proper cost of repairs by measurements, instead of depending upon the help of others? That help cannot always be readily obtained, and if obtained can be had, generally, only at an expense which would if it occurred but a few times, much more than cover the cost of securing the ability to work out such things for himself. He would besides, in possessing this ability, get rid of the humiliating sense of inferiority and dependance.

It may be objected that more time and greater expense must be employed in acquiring the various branches of education, which I have ventured to indicate as desirable for the young farmer, than the "old gentleman" can afford; but I am bold enouga to assert that the time usually employed on a boy's education, from the age of ten to sixteen, is abundantly sufficient for all, and much more than all I have noticed, and that all this is to be obtained, if not at the same schools, yet at the same expense at which (from a mistaken but I hope a fast vanishing and soon to be exploded belief, that farmers do not want to be *high learnt*) a very superficial and inferior education is obtained.

But if it should be true, which I doubt, that for such an education as I have suggested more expense would be incurred, I have a firm conviction that it would be abundantly repaid, not only by the greater happiness it would produce in the individual possessing it, but be more than compensated in a pecuniary point of view, by the after saving of charges for the help of others, and more especially by the constant occupation of mind it would afford; for a man at all impressed with the value of knowledge, is never satisfied with his own acquirements, but is continually striving to increase his store; he is like "the leech which cries 'give, give,'" and whilst he is striving to obtain knowledge, he will be to a great degree preserved from those dangerous associations and vicious indulgences which are the refuge of ignorance, and which, whilst they debase more and more an uncultivated mind, ruin the health, drain the pockets, and destroy all hope of respectability, independence, and comfort, in whatever grade of society they are indulged.

The adage that—

"When house and land are gone and spent,
Then learning is most excellent,"

may be true, and to a great extent it is so; but why should we wait till house and land are gone, to enable us to put its due value upon learning. Learning well obtained and well applied, tends often to the procuring, and when not to procuring, to the preserving both house and land, as well as to advance the moral character and personal self respect and general estimation of its possessor.

There are other points of a good education beyond those of the general boys' school, the importance of which I cannot pass over, and which a youth not only at little expense but with positive economy, (from the causes I have before alluded to) will be able to attain after he has left school, without in any degree interfering with his active duties on the farm, when he has rejoined his father's fire-side and began to be, and to be called "The young farmer," and for those winter evenings, "Evenings at Home" afford the most favourable opportunities.

Let him then study the General History of Nations, and more especially that of his own. Let him in that history learn the constitution of his own country; then will he learn to value, and having learnt to value, will strive to maintain its institutions, and will rejoice that his lot has been cast in that part of the world in which is enjoyed the greatest degree of personal and political freedom—in which honest industry rarely fails of its due reward—in which though widely differing grades and ranks of society do and must exist, the highest stations and offices are open to all whose talents and industry, combined with a really good education and correct moral conduct qualify for such positions.

Let him, in this manner, study so much of the Laws of his Country as will enable him to understand, and perform with ease and credit, the duties of those offices to which the young farmer must look to be called — as churchwarden, overseer of the poor, surveyor of the highways, assessor of taxes, poor-law guardian, and juryman: the duties of these offices, though apparently humble, are important, and their due performance tends greatly to the peace and comfort of the society by which the young farmer will be surrounded. If those duties are well performed, then may the young farmer feel fully confident that he will be able to perform those of higher offices and more important stations, if he should be called to occupy them.

To the young farmer, Chemistry cannot be considered a useless or unnecessary study. So much has public attention been of late drawn to this subject, that the connection of chemistry with the arts and sciences, and particularly with agriculture, and its importance to the latter, are fully acknowledged, even when not well understood.

The nature of soils, and the applicability to them of the various kinds of manure, can only be ascertained or perfectly known by a good practical chemist; but such a general knowledge as may enable the young farmer to ascertain whether he is proceeding upon sound principles, or is a blind follower of the blind, is within his reach, and this he should endeavour to obtain or he will soon find himself far behind his fellow labourers in the field of competition, and will regret that he has neglected to avail himself of valuable information by the study of the general outlines at least of a most interesting, instructive, and valuable science. This knowledge is to be obtained from books of easy access, written in a popular style, and adapted to the wants of the practical man of business.

The general Manners, Habits, and Wants of his neighbours, and more particularly of his labourers and other dependants, should be well observed and well understood by the young farmer: he may often be called upon to advise and assist them—to praise or to reprove; and here it is that the character, both moral and social, of the young farmer will be most beneficially or most unfavourably displayed.

Every man has more or less influence, and every man is bound to use his influence for the good of his neighbours, and more especially of his dependants. And who, allow me to ask, in proportion to the extent of his business, has so many persons dependant on him or exposed to his influence as the farmer?

It is as a master that he will be a blessing or a curse to those around him; it is as a master that practical wisdom and a benevolent disposition can be most advantageously employed in the exercise of small but oft-repeated kindness—not calling for much expense or time, but by which the social condition of inferiors may be greatly improved, and a greater blessing imparted even to him who gives than to him who receives.

There is one other subject to which it is necessary I should refer — little competent I must necessarily be to give any practical advice upon it. My observations must therefore be considered rather as theoretical than experimental, except so far as they are applicable to every other business or profession equally with that of the farmer.

In whatever profession or business a young man is to be placed, he must begin to work at it as soon as possible after he has acquired such general education as is considered proper to qualify him for the occupation. If he is the son of a farmer, his observations will from a very early age, have been directed to farming operations, and he will by imperceptible degrees, and without having made them the objects of particular study, have laid a good foundation in the store of facts acquired.

But when the young man, with such a course of previous training as I have detailed and recommended to your consideration, begins to *learn his business*, then let him BEGIN AT THE BEGINNING: he must not only understand theoretically, but be able to perform all the practical operations of the farm. Without this he will have the knowledge but not the power of the farmer. This is more obviously necessary if he is to be a small farmer, or a working farmer; but it is equally essential if a larger occupation is to engage his capital and his talent, and probably even more so.

The larger his occupation the more individuals he must, to a great—not to a certain, but to a most uncertain—extent, be dependant on, and that daily and hourly in operations most important to his success in life, and which when done cannot be undone.

The master who does not understand his business from first to last, both theoretically and practically, is at the mercy of his servants; and the more he has (and the less he understands his business the more he will have) the greater will be his discomfort and his loss; for it is undoubtedly true that nothing tends so much to make idle, careless, and dishonest servants as ignorant masters.

The young farmer should not only be able to order his servants, but to show them how to do their work; without this, he will not be able to get it done well, and if done well, not with the reasonable expenditure of time and money.

An ignorant or unskilful master will be despised by his more skilful servant, and then he stands, indeed, one of the most unhappy and desolate of men—without authority, and without confidence or self respect, he will show but a fearful account when he comes to examine the state of his farm and of his books, and will then be compelled to bear witness against himself that he has had, possibly a large store of head knowledge without the absolutely necessary accompaniment of manual dexterity and operative skill.

"Whatever is worth doing, is worth doing well," and therefore, should the young farmer not only have a good head knowledge of the best mode of managing his farm, but he should be the best ploughman, the best drillman, the best pitcher and loader, and, in short, the best workman on his farm.

With this combination of theory and practice, with a strict attention to the due performance of all his social and relative duties, may he confidently look forward for prosperity in his business; to the esteem of his friends and neighbours; to a life of activity, peace, and comfort: and to declining years of cheerful retrospection upon time well spent; and the satisfaction of having enjoyed and turned to good account "The kind of Education best suited for young Farmers."

The way and means by which such a preliminary education as I have advised can best be obtained, it is not so easy to point out as it is to insist upon the necessity for it. The existing schools are generally and notoriously inadequate. In most branches of business, regular training is deemed essential to success, but it is too true that any man of desperate fortune and superficial acquirements may *set up for a schoolmaster*, and by means of a well-written, and probably well-paid-for prospectus, obtain that confidence which too commonly those who bestow it are incompetent to judge, even by the event, whether it has been well or ill placed.

Whilst proprietary schools and colleges are established for the education of the clergy, surgeons, lawyers, engineers, designers, and various other classes, I see no reason why the intelligent and active farmers of England should not have their agricultural colleges for the education of their own sons. Such colleges should be conducted by masters well selected and properly paid for instructing in the purely literary branches of a liberal education. The establishment should have appended to it a farm of sufficient extent to show all the necessary operations in the various modes of cultivation, in which the pupils *should take a part*, and so from their entrance combine practice with theory, and be in the daily habit of applying in the field what they learn in the house.

The farm attached to the school if managed judiciously, under the direction of a well skilled and intelligent farmer, would, it is to be hoped, yield a profit, and if the establishment were large, the individual expense ought not to be greater than that of schools wholly insufficient for young farmers, and to which they are too frequently sent to learn a *little* of *many* things, not *much* of *any*, and *none well*.

I am not aware of the details of any such college, though I believe that some such are in course of establishment, and therefore I thus shortly allude to them, rather with a view to draw your attention to the subject, than as prepared to give any distinct or confident opinion upon them.

I believe the establishment of Mons. Fellerbery, in Germany, embraces not only the various operations of the farmer, but those of almost all kinds of trade, greatly to the advantage of the pupils, who are thus more quickly and more decidedly qualified for the kind of life for which they are intended, but obtain, at the same time, such a general education as may enable them to adopt, after leaving school, any business or profession for which they may be thought suitable, although its more peculiar studies may not have been prosecuted with the same care as if their future professions had been already fixed.

It is undeniable that the public schools and the Universities of England need allow the palm of superiority to none in Europe, but, at the same time, it cannot be disputed that the general schools of England are inferior in the variety and extent of information afforded to the pupils to those of most parts of continental Europe. Why should this be? Shall it be said that England, wealthy beyond all the nations of Europe, cannot afford for her rising generation the expense of a good education? Shall it be said that England is so proud of her standing among the nations of the world, that she does not desire to advance her character for learning and general education? Or, as respects English farmers, shall it be said that they are so well satisfied with their condition in the world and with their standing in society, that they are content to remain as they are, with education insufficient for their peculiar station and business? No! This cannot—must not be said. But that hitherto the English farmers have not duly considered the importance of their occupation, and of their position as a class of society, but that they are now resolved to obtain for those who must follow them such intellectual acquirements and such professional knowledge as is necessary to render their occupation as agriculturists agreeable to an educated mind, profitable to themselves, and advantageous to society and the nation in general.

EVERGREEN SHRUBS.

The progress of the last winter—its peculiar effects upon some of the most beautiful subjects of the plantation and shrubbery—claim an inquiry into the habits of the shrubs which offer peculiar advantages, or are liable to sustain injury from the inclemency of winter to which these climates are occasionally exposed.

We find, and the complaint is pretty universal, that the common laurel (*Prunus lauro-cerasus*), native of the Levant, the laurestine (*Viburnum tinus*), the sweet bay (*Laurus nobilis*), the arbutus (*A. unedo*), have been severely assailed. Some, particularly the two last-named, are either destroyed or killed to the ground.

The common laurel is a great favourite with many; but on three occasions since 1837 its younger branches have suffered mutilation, and thus the trees have been disfigured. It forms a good hedge speedily; but, as it casts its leaves abundantly and during a long period of spring, it causes much litter; and, at the best, the leaves when collected do not yield good mould for the gardener.

The *Laurestine* is a beautiful shrub; its cymes of lovely clear white, dotted with pink, are among the choicest ornaments of winter, but it is still more tender than the laurel.

The *Bay* is a fine evergreen of dark hue, the leaves imbued with an odour of peculiar fragrance; it is, however, so susceptible of injury, that, once attacked by frost, if it indeed survive, the figure can rarely be restored.

The last winter—and those of 1837, 1838, and 1840—taught us that we are not to depend upon shrubs natives of Italy or the south of Europe, or, indeed, as it appears, upon the *Arbutus*, though a native of Ireland; therefore, if we wish to secure intact the evergreen character of the shrubbery and winter garden, recourse must be had to other species whose constitutional hardihood is such as to guarantee the fulfilment of the planter's expectation.

First and foremost among beauties of modern introduction I reckon *Berberis aquifolium* (holly-leaved ash-barberry), a native of north-west America, as high as Nootka Sound. Its foliage is of a rich, deep, shining green, becoming purplish-red in winter; its flowers yellow, in pendulous racemes, succeeded by fine clusters of dark blueish-black berries; by which, and also by layers of the young low-placed wood made in autumn or early spring, the plants can be propagated.

The evergreen oak (*Quercus ilex*), native of the south of France, and the live oak of America (*Quercus virens*), are superior evergreens; and these, so far as I have observed, are not injured by the great severity of February, when, after a fall of snow, then a full power of scalding sun, a frost of 26° or more succeeded.

These alternations warn the gardener to take the advice so strongly urged by the late Gilbert White, of Selborne—to the effect that after every fall of snow the evergreens should be shaken or cautiously moved about by poles, to disturb the snow before it be melted off by scalding sun, and then frozen upon the spray. The scarlet oak, imported from America in 1691, though not evergreen, is a charming tree for large expansive lawns: its leaves are of a full size, change to a beautiful scarlet in autumn, and remain firm till near Christmas, unless the frost be very severe.

The true or common holly (*Ilex aquifolium*), native of Britain, with all its varieties—plain and variegated leaved, yellow or red berried, silver-edged and gold-edged: these varieties are perfectly hardy and extremely ornamental, either as single shrubs or in hedges.

Portugal laurel (*Prunus lusitanica*), which though, as its name imports, from a warm country, is still found to resist the severest winter much better than the common laurel; it is also a free blower, and retains its leaves well.

Phillyria: most of the varieties are rich evergreens; to which, also, I may add *Aucuba japonica*, a plant cultivated for a time in stoves and plant-houses, but found hardy enough to sustain twenty degrees of frost.

Evergreens are the chief ornaments of our winter gardens; and it is with much pain and regret that we observe the destruction—or, at least, total disfigurement—of fine shrubs that have been trained with the utmost care.

Fortunately, we have choice; and to our catalogue it would show ungrateful negligence not to add most of the hardy rhododendrons. These plants do well in loam as well as heath-mould, and support winter without injury to either foliage or bloom. J. T.

IMPROVED METHOD OF MAKING BRICKS.—N. J. Wyeth, Cambridge, Massachusetts.—The object of this composition is, to produce bricks which will admit of driving nails into them, to avoid the necessity of introducing in walls what are known amongst mechanics as "wooden bricks." This composition consists of clay, mixed with either sawdust, charcoal, peat, or tan-bark, after it has been used by the tanner. The proportions may be varied, but the patentee recommends three parts of clay to five parts of either of the combustibles above-mention.—*Claim*:—"I do not claim mixing combustible materials with clay for making bricks, but I claim mixing them in such proportions as will produce bricks possessing the above-named properties."

ON THE CULTIVATION OF THE TURNIP.

BY THOMAS SULLIVAN.

(*Concluded.*)

When the land has been sufficiently pulverized and cleaned, and the proper seed-time arrived, the drills* or ridgelets are formed for the reception of the manure and seed. After the ground has undergone all the necessary preparatory tillage, it will be in a loose friable state to a considerable depth, and the drills are then formed with comparative facility; but should the under soil be in any degree compact, or the surface very cloddy, the most experienced ploughmen find it difficult to form neat, well-finished drills. The process of drilling may be performed either with the single or double mould-board plough, the latter being commonly used on light and well-reduced soils; while on stiff clay, which is seldom very finely pulverized even after the most laborious tillage has been bestowed upon it, the former is most generally preferred and employed, as the drills are formed by it with greater facility and in a neater and more perfect manner than could be accomplished with the other. On the lighter class of soils, the double mould-board plough is, no doubt, well adapted for this operation, inasmuch as it forms a drill at a single turn; but this can also be effected with equal facility and despatch by the common plough in the hands of an expert workman, as shall hereafter be shewn. It is not an uncommon practice in some localities to form the whole or greater portion of the field into drills before depositing any of the manure; but the propriety of this mode of proceeding is at all times very questionable, and it is obviously most injudicious in dry weather. When this method is pursued, light soils and also clay soils not finely pulverized, are liable to be deprived of a large proportion of the necessary moisture they contain, by the evaporation which always proceeds in the droughty weather usually experienced at turnip seed-time, and in consequence of which the ground is rendered very unfit for promoting that rapid germination of the seed, and vigorous growth of the young plants, so essential in securing the crop from the ravages of insects. Hence the formation of the drills should not long precede the deposition of the manure and the sowing of the seed; in fact, these operations should always be performed in close succession, especially in droughty weather, when the loss of a whole crop may be the consequence of neglecting this precaution. It is necessary, however, to form twelve or fourteen preparatory drills before commencing to distribute and cover in the manure, in order to prevent any subsequent interruption of the work.

Raised drills are formed with the common plough in the following manner:—Three or more poles are set up in a right line, at a distance equal to the breadth of six or seven drills from that side of the field, parallel to which the drills are to run. A light furrow-slice is then drawn along the line of the poles, and on reaching the end of the field, the ploughman returns by the same track, turning over another light slice in the opposite direction. On arriving at the headland at which he first entered, he turns to the left, and passing up at the distance previously determined upon for the breadth of the drills (say twenty-seven inches) from the centre of the hollow just formed, turns over a furrow towards the undrilled portion of the field. On reaching the headridge, the ploughman again turns to the left, laying over a similar furrow-slice, and so proceeds, always turning his horses to the left at the headlands, and working round the first-formed drills, until the space included between the *feering* and the adjoining ditch or fence has been formed into drills. Twelve or fourteen preparatory drills are thus opened before any are reversed or split, which will be sufficient to allow the work to proceed without interruption. The covering in of the manure and the formation of the drills for its reception are afterwards carried on simultaneously: a drill is opened by the plough in passing up contiguous to that last formed, with the mould-board inclining towards the level land, and on reaching the headridge, the ploughman turns his horses to the left, passes down the preparatory drill adjoining the fence, turning over about two-thirds of the raised soil, to cover the manure previously deposited in the hollow, and thus forms a new drill, in which the seed is sown. In this manner the work is proceeded with until the whole, or the required portion of the field is completed. When the soil is naturally of a light friable description, or has been finely pulverized by the preparatory tillage, the formation of drills in this way is attended with little difficulty; but when the ground is very cloddy upon the surface, or not sufficiently loosened beneath, it requires all the skill and dexterity of the best ploughmen to make them in a satisfactory manner. As nothing appears so unsightly as crooked, ill-formed drills, it should be the ambition and constant endeavour of the industrious ploughman to excel in this department of his art. More than ordinary care is required in the formation of drills for the turnip crop, as they should be exactly at equal distances apart, to suit the sowing-machine. Some turnip-drills, it is true, are so contrived as to accommodate themselves to the sinuosities and varying breadth of the ridgelets, always depositing the seed near the centre of each; but in the majority of the machines in general use, the seed-coulters are fixed to a certain limited breadth. At all events, the plants come up in very irregular rows when the drills are imperfectly formed; and when the intervals are unequal in breadth, the operation of horse-hoeing, which is so essential in cleaning the land, and promoting the vigorous growth of the crop, cannot be properly performed without constantly altering the implement.

Sometimes drills are formed with a *bout*, or two turns of the common plough; and in this way they are certainly made with somewhat greater neatness and precision than could be accomplished with only a single turn; but it must be remembered that the former method requires double the time and labour of the latter, which, it will be

* It may, perhaps, be necessary to mention, that in the following remarks, the term "drill" is applied to the ridge-drill in which the seed is sown, not to the machine by which it is deposited.

admitted, is no trifling consideration; besides, the drills formed by an experienced ploughman in the manner just described, though not perhaps so perfectly finished, are by no means inferior to the others, either in point of appearance or utility, after the sowing-machine has passed over them to deposit the seed. The ultimate form of the drills is precisely the same in both cases; but in drilling with a double turn of the plough, the mould-board is inclined towards the drills; while in the single method, it is always inclined towards the level portion of the field in opening the drills. Whatever mode may be adopted, the utmost care must be taken by the ploughman to cover in every particle of the manure, and to place the finest of the mould upon the top of the drills. These objects may be effected by taking a good depth of furrow, and holding the plough in a particular position, by which means the coarse dry earth and small stones on the surface of the ground are rolled over by the mould-board into the interior of the drills, and the fine most soil raised to the top; thus affording a most favourable bed for the germination of the seed. The depth of furrow by which the drills are formed depends in some degree on the kind of manure to be applied to the crop. In the case of farm-yard dung, and especially in droughty weather, the drills must be opened to a considerable depth, in order to have the manure properly covered in; but the same depth is not essential when bone-dust, or other extraneous substances, used in small quantities, are applied.

Some diversity of opinion exists in regard to the kind of manure best calculated for the production of turnips. Numberless specifics have been of late brought under the notice of agriculturists, all of which are of course expressly adapted for this, as well as other crops, according to the advertisements of the manure-venders. By chemical analysis we ascertain the nature and proportions of the different inorganic constituents of which turnip bulbs are composed; and as these are abstracted from the soil and manure, it is obvious that both in conjunction must contain a due supply of those particular ingredients which are essential for the perfect development of the plants. Hence the propriety of applying such manures as furnish to the crop the greatest quantity of the inorganic constituents of which it is composed. But in determining, in a purely practical way, the kinds of manure best adapted for the turnip crop, we have to consider what substance, or combination of substances, is best calculated—first, to furnish immediate nourishment in order to push forward, the young plants into rough leaf, so as to evade the attacks of the fly; secondly, to sustain and prolong the growth of the bulbs to the latest period of the season; and thirdly, to contribute towards the permanent fertility of the soil, so as to leave it in the best condition for the production of succeeding crops. Whatever substance, or combination of substances, natural or artificial, answers these conditions to the greatest extent, is unquestionably the best adapted for application to the turnip crop.

Until within a comparatively recent period, farm-yard dung and bones were the only manures employed in raising turnips; but the substances now presented to the notice of the farmer under the special name of "fertilizers" are exceedingly numerous—so numerous, indeed, that he must be somewhat puzzled which he had better select, the pretensions of all being so high. Many of these portable manures, it is admitted, have been found to succeed wonderfully in raising turnips at comparatively little expense; and they are, no doubt, very valuable auxiliaries, when the supply of the farm-yard is inadequate; but when a sufficiency of good "muck" can be produced on the farm, the fertilizers of commerce should be but sparingly used. The manure of the farm-yard is confessedly a very bulky article, requiring much labour in its preparation for, and application to, the land; and it must, therefore, undoubtedly be regarded as a great boon to the farmer to be furnished, at reasonable expense, with a substance containing in small compass all the valuable ingredients usually contained in well-prepared dung. Now this desideratum (if it can properly be called one) is precisely what each of the manure venders pretends to have succeeded in supplying; but, with the exception of genuine guano, the efficacy of which as a manure is now beyond a doubt, comparatively few of these so-called "fertilizers" are found to stand the searching analysis of the chemist or the more decisive test of experience. But eve'n admitting that those substances possess all the fertilizing properties ascribed to them by their respective manufacturers, still the propriety of using them to any great extent is very questionable. The necessity of resorting largely to extraneous manures on a farm, under a mixed system of husbandry, speaks rather unfavourably, I should think, for the propriety of the mode of management pursued; for I do not hesitate to say, that, in ordinary seasons, every farm might be enabled to produce almost the whole of the requisite quantity of manure, by the consumption of its produce by the domestic animals. And if this can be done, as assuredly it may to a very great extant, by judiciously economising and appropriating the large quantities of valuable substances now suffered to run to waste from the farm yard, or to lie in a state worse than useless, it is pretty obvious that the large sums of money annually paid for extraneous manures are needlessly expended. But owing to the very negligent and extravagant mode of managing the fertilizers of the homestead, which so generally prevails throughout the kingdom, and which is perhaps in some degree perpetuated by a dependence on extraneous matters, comparatively few farms are enabled to supply themselves; and when this is the case, some of the portable manures, the efficacy of which is most satisfactorily ascertained and established, must be resorted to in order to supply the deficiency.

It is not advisable, however, in my opinion, to use any of these substances for the turnip crop, without at the same time applying at least one-half of the usual allowance of well-fermented farm-yard dung. The propriety of this is obvious. One reason in support of the practice is, that although an extraneous manure may contain many substances necessary for the growth and perfect development of the turnip, yet some of the essential inorganic constituents may be a wanting or deficient, and which the dung would probably supply; and another is, that, though guano, and some other substances of an equally evanescent nature, furnish almost immediate nourishment to the young plants (which is an important matter, inasmuch as it forces them forward beyond the most critical period of their existence), it is found that the growth of the bulbs becomes less vigorous towards the end of the season, while those manured with farm-yard dung are still increasing in size. Hence the importance of having a supply of the latter substance in the soil, whatever else may be superadded, to prolong the growth of the turnips, and leave something behind for the benefit of the succeeding crops of the rotation.

Farm-yard manure should be well fermented when applied to the turnip crop. It is supposed by many farmers that long, rank dung is favourable to, or harbours, the beetle or turnip-fly; at all events, it is necessary, with the view of preventing or mitigating the ravages of this destructive insect, that the plants should be forced as quickly as possible beyond that stage of their growth in which they are most liable to be attacked; and this can only be effected by minutely pulverizing the soil, sowing abundance of seed, and having the manure properly fermented previous to its deposition in the drills. In order to secure the latter desirable object, as well as to economise time when the period of active labour arrives in spring, the dung should be removed from the yards, as suitable opportunities for doing so occur, during the winter and early spring months, and stored up in one or more oblong heaps, in some convenient situation in the fields to which it is to be applied. About a month before being required for application to the land, the dung-heap is to be turned over, to accelerate the fermentative process. In performing this operation, the manure should be carefully broken and divided, and all parts of a different quality or degree of fermentation carefully intermixed. While the dunghill is in course of being turned, the sides and top ought to be covered with a light coating of earth taken from the adjoining ground, in order to protect the manure from the influence of the sun and winds, and also to absorb and retain the gaseous exhalations emitted from the heap during the process of fermentation. A second turning is sometimes, but not always, required, to bring the dung to the proper state of decomposition; and when this is necessary, the heap is again turned, a week or ten days previous to its application to the soil.

When the proper season for sowing the crop has arrived, and as many preparatory drills formed as will allow the work to proceed without interruption, the manure is conveyed from the heap to the drills in one-horse carts, and hauled out in every third interval by a man furnished with a dung-drag. It is proper, of course, in order to insure the equal distribution of the manure, that the loads should be of uniform size. Each cart load is divided into ten or more equal portions, the distance between which must be regulated according to the entire quantity of dung allowed per acre. The quantity of farm-yard manure necessary to apply to the turnip crop is dependent, in a great degree, upon the condition of the soil, the variety to be grown, and the quality of the manure itself; for one load of well-decomposed dung, produced on a farm where the cattle are plentifully supplied with turnips, oilcake, or other nutritious food, is more valuable and enriching, and will manure a greater extent of land, than probably twice the same bulk of an inferior article. All dung should be well fermented for turnips; in fact, the better decomposed it is before application to the land, the more immediate and beneficial are its effects upon the crop. From thirteen to fourteen tons of manure of this description are considered amply sufficient for an imperial acre of Swedes, twelve tons of the same or of equal quality for yellow turnips, and from ten to eleven tons for white globes. A good crop of turnips would no doubt be raised with a smaller application of manure; but the preceding quantities are not deemed too much to supply nourishment to the different crops grown during a rotation. Even the produce of the turnip crop itself very materially depends on the quantity and quality of the manure applied with it. The farmer ought, therefore, to supply it as liberally as his resources will permit; too much can hardly be given; and increasing the produce of this crop is the most certain way of augmenting the home supply of manure. After the dung is deposited in the drills, it must be carefully parted and distributed equally in the intervals. This is a part of the process on which too much attention cannot be bestowed by the farmer; for unless the dung be properly broken and evenly spread in the hollows of the drills, the plants will neither vegetate nor grow with uniform vigour, and the crop will be unequal throughout the field. One great advantage arising from having the dung well decomposed is, that it can be equally distributed, after which it readily incorporates with the soil. The quantity of manure to be applied should, therefore, be accurately apportioned by the man that hauls it out of the carts, and then evenly distributed by a band of workers, usually consisting of three or four women and boys, sometimes assisted and superintended by a careful man. It is a point of the utmost importance, considering the droughty weather usually experienced at the period of turnip-sowing, to have the several operations of forming the drills, spreading the dung, splitting the drills to cover it in, and of sowing the seed, all performed in close succession, in order to retain as much as possible of the moisture of the soil and manure. Should the preparatory drills have been formed any length of time previous to the deposition and covering in of the manure, the ground will necessarily have lost, by evaporation, much of the moisture so essential for the germination of the seed; but it is of greater importance still that the dung should be covered immediately after being distributed in the drills, in order to prevent the dissipation of its most valuable constituents. A great difference has often been observed between the crops on drills sown immediately after covering in the manure, and such as had been left unsown in the same field until the following day. It is, therefore, advisable always to sow before night the portion drilled and dunged during the preceding part of the day.

Of the numerous extraneous manures now employed in raising turnips, bones and guano are justly entitled to the pre-eminence; the utility of the former being well-known and acknowledged, and that of the latter satisfactorily attested by repeated trials. I shall here offer a few remarks upon the application of these substances to the turnip-crop: commencing with

Bone-dust.—Until the introduction of guano, this substance was the principal adjunct to the manures of the farm-yard; and although the quantity of it used has considerably decreased within the last few years, it is still extensively applied in all parts of the kingdom as a manure for turnips, and almost invariably with the most beneficial effects. Many farmers who rather hastily abandoned bone-dust in favour of guano and other substances, are now returning to its use; indeed, it cannot be expected that bones in some form will ever be superseded by any extraneous matters of a different nature. This manure has hitherto proved an invaluable aid to the farmer as a supplement to dung, especially on light soils, and on all dry lands recently reclaimed; and he should not allow it to be hastily cast into the shade by new "fertilizers" of higher pretensions, but of less intrinsic value. It would be foreign to my purpose in this paper to enter into the general properties of bone-dust; my observations shall therefore be restricted to the modes of applying it to the turnip crop, to which it appears to be peculiarly adapted, containing, as it does, much of the food required by the plants, and being best suited for the lighter class of soils on which this root is most generally grown. Its portability and cheapness render it one of the most accessible of extraneous manures; and its use greatly expedites the labour of putting in the crop, especially in uneven situations.

One of the most remarkable circumstances connected with the action of bones as a manure, is that the maximum advantage is produced by a definite and very limited quantity. It is well known to practical farmers that when bone-dust is applied beyond a certain allowance to the acre, no corresponding benefit is derived therefrom, at least by the immediate crop. It is ascertained from experience that from sixteen to twenty bushels form as efficient a manuring for turnips as thirty bushels per acre: in fact, any addition to the former quantity produces scarcely any perceptive, at least no corresponding, improvement of the crop to which it is immediately applied. The finer the bones are ground, the more speedily and efficiently do they operate as a manure for turnips, as they become thus more intimately incorporated with the soil; and the food being presented in a minute state of division, acts more immediately and powerfully in promoting rapid vegetation. It is found, however, that the more finely reduced the bone-dust is, the more transient are its effects, the succeeding crops of the rotation not being so much benefited as when bones of a larger size are applied. But this disadvantage is more than balanced by the utility of the well-pulverized bones in starting the turnip plants; and it will be admitted that a vigorous healthy baird is one of the best securities for an abundant crop.

The quantity usually applied to the acre is from sixteen to twenty bushels; and, as already observed, it is a fact somewhat singular, that an increased allowance produces no apparent effect. Bone-dust is frequently used in combination with other substances, in which case a much smaller quantity than the above will suffice. When farm-yard manure has not been sufficiently fermented before being required for application to the land, or when the supply happens to be inadequate, bones are often added with advantage. Even when a sufficiency of dung is available on the farm, they may be profitably used occasionally in this way, on account of their phosphates and other valuable constituents. Five or six bushels of bone-dust, mixed with twice as much coal or wood ashes, and applied along with half of the usual allowance of farm-yard dung, are found to be a most efficient manuring for turnips. A common and a much approved practice in some parts of the country is to half dung the land intended for turnips, when giving it the first ploughing before winter, and to apply six or seven bushels of bones at seed-time. But a mixture of bone-dust and sifted coal-ashes or rich mould is frequently used uncombined with farm-yard manure, and generally with advantage. From eight to ten bushels of the dust, combined with twice that quantity of fine ashes or good vegetable mould, and allowed to ferment for some time before being applied to the land, are found to be equally efficacious as sixteen bushels of unmixed bones, besides being much more economical.

The application of bone-dust is effected either by the hand or by machinery contrived for the purpose. In many parts of the south of Scotland, this manure is scattered by the hand along the hollows of the drills, and covered in the same manner as farm-yard dung, the only difference being that the drills are not formed quite so deep for the former as for the latter substance. In other localities it is often scattered upon the level surface, and covered by the plough in drilling: in both of these methods the seed is subsequently sown by the turnip-drill. But machines are now employed in many parts of the kingdom, which deposit the seed and the bone-manure at the same time; and this is undoubtedly the most economical and judicious mode of application. The dust and seed are deposited with much regularity either in one continuous stream, or at proper intervals along the top of the raised-drills. It is well known that the nearer the bones are to the surface of the ground, the more immediate and beneficial is their action; and also, that the closer the seeds are to this manure, the more quickly do they germinate. The seed is often sown amongst the bones, not only with safety, but evident advantage.

Bone-dust prepared by maceration in sulphuric acid has of late been much used in various ways as a manure for turnips, and in the majority of the recorded instances with the most satisfactory, if not astonishing, results. The bones thus dissolved are brought into that minute state of division in which their most valuable constituents are directly available as nourishment for the plants. Economy is, the great recommendation of this preparation, only a few bushels of bones being used with about one-third of their weight of acid, and various proportions of water. The time and expense incurred in preparing and applying it, which are by no means inconsiderable, must likewise of course be taken into consideration in comparing this with other manures. But, notwithstanding the success which has hitherto apparently followed the application of macerated bones, farmers should be cautious in adopting this "important discovery," as it has been designated, except on a small scale by way of experiment, until its character is satisfactorily established, and placed beyond reasonable doubt, by numerous well-conducted experiments. The sulphuric acid itself is a useful ingredient in this bone-compost, it being found in the composition of turnip-bulbs; and partly to this circumstance, but chiefly to the minute state of division in which the food is furnished to the roots and fibres of the plants, may probably be ascribed the wonderfully beneficial effects of dissolved or macerated bones. Their influence does not, however, extend beyond the first year, the succeeding crops deriving scarcely any advantage from the application: on which account this preparation should be cautiously resorted to.

Guano is now, and has been for some time past, very extensively used in raising turnips; and the results of the various trials that have been made with it are conclusive as to its efficacy as a manure. It should not, however, in my opinion, be used by itself with the turnip crop. It is found to act more beneficially along with farm-yard dung, or in combination with gypsum finely sifted ashes, rich dry earth, or other matters of a similar kind, with some of which it should be carefully mixed previous to its application to the soil. In using guano it must be remembered that the seed should not be allowed to come into contact with it before vegetation has commenced, as the vitality of the seed is apt to be injuriously affected, if not totally destroyed by the peculiar pungent property of the ammoniacal salts of this manure. Many failures are known to have occurred from neglecting this precaution. The quantity usually applied per acre is from 2½ cwt. to 4 cwt. when used alone, but a much smaller allowance will suffice when combined with ashes or other materials. A mixture of guano, bones, and farmyard dung has frequently been used with the best effect for turnips; in fact, guano can be advantageously combined with most substances except lime. It has already been observed, that guano should not be applied in immediate contact with the seed: whatever mode of application therefore may be adopted, a portion of the soil must be interposed between the seed and manure. The guano may be scattered by the hand in the hollows of the drills, and covered in with a plough, as in the case of farm-yard manure, the seed being sown in the usual way. But some sowing machines are adapted for depositing the seed and guano at the same time, which is decidedly the most preferable practice, when the machinery is contrived to deposit the manure so much deeper than the seed as to allow a portion of the soil to be interposed between them.

Besides the substances now briefly adverted to, numerous other fertilizers and artificial compounds of various descriptions are constantly urged upon the attention of the farmer by manure-venders, but the number of these is now so great, and the results of their application to the turnip crop so contradictory and indecisive, that it would serve no useful purpose to notice any of them in this place. When the farmer is necessitated to have recourse to extraneous manures, guano, bones, or rape-dust, which is also frequently used with advantage, will certainly supply any deficiency. Other substances may, however, be occasionally used on a small scale, as experiments, which it is the duty and interest of every intelligent agriculturist to institute to some extent for the satisfaction and information of himself and others. The agricultural periodicals abound with reports of such experiments.

Lime is occasionally applied to turnips, but not so much with the view of increasing the produce of the crop, though it has undoubtedly some influence in this respect also, as to improve the texture and condition of the soil for the production of future crops. The lime is applied in various ways; sometimes it is spread upon the stubble, and ploughed under, when giving the first furrow before winter; but this mode of application is by no means the most judicious that might be adopted, as it is evidently improper to bury this substance to the depth to which it is advisable to plough stubble land in autumn. It must also be remembered that lime possesses a well-known tendency of descending gradually into the soil, often forming a stratum at a considerable distance below the surface. The most approved practice is to spread the lime upon the prepared land, and give it a slight harrowing immediately before forming the drills. It may also be applied at a subsequent period, after the plants have been singled out and have attained some size, when the frequent operation of the horse-hoe sufficiently covers and incorporates it with the soil.

The seeds are most generally deposited by a turnip-drill, or sowing machine, which sows two drills at a time, and is drawn by one horse, walking in the intervals of the drills. It is necessary that the soil should be dry on the top of the drills before sowing the seed, otherwise the damp mould is liable to adhere to the rollers of the machine, and thereby cause imperfect work and irregular sowing; but care must be taken not to allow the soil to become over dry. In addition to the fixed roller in front of the coulters, there is commonly another light roller attached to, and following the machine, which compresses the drills after the seed has been sown. Turnip seed is likewise occasionally deposited by dibbling, especially when bones or other portable manures are employed, and this practice is said to be an almost certain method of securing a good braird. The drills are formed in the same manner as if the manure and seed were to be deposited together by machinery; holes are then made at the proper intervals along the top of the drills for the reception of the manure and seed. An active, experienced man, furnished with an improved hand-dibble, will, it is said, go over an imperial acre in a day. A woman or boy follows the dibbler, putting into each hole the proper quantity of bones or other manure, when a third party introduces a few seeds, and covers in the whole with a little mould. Although this mode of sowing turnips may answer admirably on a small scale, and it doubtless effects a very considerable saving of seed and manure, yet it is evidently too operose and expensive for general adoption.

The quantity of seed sown should be liberal, but not excessive. A primary object with the farmer in cultivating this crop is to insure the rapid vegetation of the young plants, so as to evade the attack of insects. I have already endeavoured to point out the importance of finely pulverizing the soil, and applying well decomposed and enriching manures towards the attainment of this desirable object; and I may now observe, that thick sowing is another mean of securing a healthy and vigorous braird. It is an error, however, to sow too much seed, as, when the plants are forced into premature vegetation, they grow up very tender, are apt to remain in a languid state for some time after being singled out, and when the plants are unnecessarily thick, the process of thinning is more difficult to perform. In determining the quantity of seed to be sown, the nature of the soil and the variety of the turnip must be taken into consideration. It is obvious that light friable soils, which are naturally so well adapted to this crop, do not require so much as clay land, where many of the seeds do not germinate at all. The quantity should not be under two and a half, and need not exceed three pounds to the acre. The seed of the Swedish turnip being somewhat larger in size than that of the common sorts, it is necessary to sow a little more of the former than of the latter. Some persons recommend sowing from four to five, and even six pounds of turnip seed to the acre, but so large a quantity appears to me to be not only unnecessary, but injurious: it is not so much on account of wasting the seed, for this is not an expensive article; but the plants never grow so vigorously after being thinned, when too rapidly forced into vegetation, as they would otherwise do.

It may perhaps be considered unnecessary to observe here that the headlands should be cultivated, drilled, manured, and sown as soon as possible after the remainder of the field has been completed. The propriety and advantage of this will scarcely be questioned by any; and yet how frequently do we witness several yards of valuable land at the ends of turnip-fields, yielding nothing but detestable weeds! The soil must produce some sort of vegetation, and if useful plants are not raised upon it by the farmer, weeds will necessarily spring up and luxuriate. But this is not all: the ground thus left uncropped is not only unproductive for a year, but it is positively prejudicial as a nursery for weeds of every description, the seeds of which, on becoming ripe, are wafted away by the winds to contaminate the adjoining fields. The headlands, when properly managed, will undoubtedly produce as good turnips as any other portion of the field. It is admitted that in the after culture of the crop, a few of the plants contiguous to the extremities of the longitudinal drills are liable to be injured by the horse-hoe, and the animals' feet in turning at the ends; but when proper care is taken, comparatively little loss is sustained in this way, at all events, it is very trifling compared with what accrues from having the entire headlands uncropped. They ought in all cases to receive the same tillage as the other portion of the field, and immediately after the longitudinal drills have been formed and sown, the head-ridges should be again ploughed, well harrowed, and rolled, and, after being duly pulverized, formed into drills, manured, and sown in a similar manner.

The turnip crop seldom requires any attention from the farmer until the plants have attained a sufficient size to allow of the hoeing and thinning processes being commenced, but heavy rains sometimes occur shortly after the seed has been deposited, which, though generally grateful to the husbandman at this period, have frequently the effect of rendering the top of the drills so hard that the young plants are unable to protrude themselves through the incrusted surface. The writer has often observed this, especially on clay land, and has found that a single turn of the light harrows usually employed for covering grass seeds proves an effectual remedy by breaking the incrusted earth on the top and sides of the drills, and thus enabling the small cotyledon leaves of the plants to push through the surface, besides allowing the admission of air into the soil. This light harrowing cannot be injurious when performed shortly after sowing the seeds, but it would obviously be dangerous after the young plants have reached the surface. A light roller is frequently used for this purpose instead of the harrow, and it may be safely used even after the plants are brairded.

In ordinary cases, the turnip plants make their appearance above ground about eight or ten days after being sown; but much will depend on the quality and condition of the land, the state of the weather, and other circumstances. I have occasionally known Swedish turnips make their appearance in the course of four or five days, the soil being moist at the time of sowing, and the weather favourable for vegetation. Sometimes, however, a fortnight, and even a month, will elapse before they reach the surface. When the second, or what are termed the rough leaves are from two to three inches in height, the hoeing and thinning processes are commenced. The first cultivation which the soil receives, and a necessary operation preparatory to singling out the plants, is passing a horse-hoe or drill-grubber along the interval of each drill. The object of this operation is partly to destroy any weeds that may have sprung up between the rows of plants, but chiefly to pare away a portion of the earth from the sides of the drills, in order to facilitate the process of singling. The horse-hoes used for this purpose are of various kinds, the most simple consisting of a flat triangular or double-feathered share, with two lateral arms, adapted for contraction or expansion, and fixed to a beam and handles by three upright coulters of iron. Wilkie's horse-hoe and drill-grubber justly ranks amongst the most improved of this class of implements; it is made wholly of iron, and the coulters, which are peculiarly adapted for undercutting all weeds, are so inserted in the frame as to be capable of expansion and contraction, so as to suit the drills. The fore part of the beam is supported on a low wheel, which regulates the depth to which the coulters may descend into the soil. The first horse-hoeing is usually performed while the young plants are assuming their rough leaves, and it is then that the superiority of the raised drills over those formed on the flat surface is most apparent. When the latter mode of culture is adopted, it is obvious that the horse-hoe cannot be used without running the risk of burying the young plants with the earth from the intervals; whereas, when the seed is deposited in raised drills, or ridgelets, no danger of this kind need be apprehended.

After the first horse-hoeing has been completed, the turnip plants will be ready for being thinned out to determinate distances in the drills. This operation is usually performed by women and boys, it being rarely that men are employed at this business when any more laborious work remains to be done on the farm. Sometimes, however, it becomes expedient to set all hands to the singling, in order to have this important operation concluded in due season. The hand hoes commonly used consist of an iron plate, usually seven inches long by four in breadth, and attached to a shaft varying from three to four feet in length. It is not an uncommon practice in some parts of the country to set a number of children to single out the turnip plants to the proper distances with their hands, the older and more experienced persons following with hoes, to draw and push away the earth from about the plants, and to cut up any weeds that may have escaped the action of the horse-hoe. This mode of proceeding is adopted with the view of insuring that the turnips are left standing exactly at the determined distance apart, and it is certainly well calculated to effect this object; but, in my opinion, it needlessly increases the expense of the operation; as persons paying ordinary attention should become so expert in the use of the hoe after a few days' practice as to be able to single out the plants, draw away the earth, and cut up all weeds simultaneously, and without any danger of leaving the plants standing at irregular distances. There is an erroneous custom which prevails in many parts of the country, of placing persons of all ages and sizes indiscriminately at this work. It is true, no doubt, that bodily strength is not so essential for thinning and hand-hoeing turnips as care and dexterity, and that in the latter qualification young persons are often little inferior to adults; indeed, I have frequently found boys and girls, especially the latter, who, at the age of thirteen, could single out and hand-hoe turnips with equal accuracy and despatch as persons of any other age, however greatly their seniors. But nevertheless, it seldom happens that very young boys and girls possess that degree of care and attention which is so essential in thinning turnips in the best manner: at all events, there can be no doubt as to the impropriety of having experienced adult workers and mere children in the same band or company as is usually the case. It cannot be expected that the latter should be capable, for some time, of working with equal despatch as the others; they may, no doubt, attempt to do so, but in endeavouring to keep pace with the more experienced workers, the youngsters are too much hurried, and are, in consequence, apt to put out plants where they ought not, thus causing blank spaces, which of course materially affects the produce of the crop. It appears, therefore, both necessary and judicious, that for thinning and hoeing turnips, the field-workers, including persons of all ages from ten to fifty years, should be divided into at least two separate bands, the youngest and those who commence the process for the first season being placed in a company by themselves, in a different part of the same or in another field, where they can learn, while proceeding at more leisure, under the superintendence of an experienced person.

There are several modes of arranging the hand-hoers so that they may have sufficient room to work without impeding one another, or trampling the plants in the drills last done. The common practice is for each worker to take a row and proceed with the thinning one after the other on adjoining drills; but it is a much better arrangement to place the workers at intervals of two or three rows, which affords sufficient room for each to work with freedom; and some time is evidently saved in this way, as the workers are but seldom obliged to shift at the landends, their next drills being near at hand. Another useful method is to arrange the band in a semicircular order, those in the middle taking the the lead, and all following each other at a short distance apart, so that none interrupts the work of the other, or injures the plants in newly-thinned drills.

With regard to the distance at which the plants should be left standing in the rows, something will obviously depend on the quality of the soil and the variety of the turnip. It would of course be injudicious to single out the plants to as wide distances on inferior land as on land in a high state of cultivation, from which a much heavier crop may be expected; and it is equally evident that some varieties of turnips require wider spaces between them than others. It is often supposed that the wider the plants are apart in the rows, the larger size do the bulbs attain, and consequently the weightier the crop will ultimately become; but this holds true only on land in the best condition as regards fertility, for turnips never attain any considerable size on poor, worn-out, or very wet land, however wide they may be apart in the drills. Nevertheless it is evidently of the utmost importance, to afford ample room and every possible opportunity for the bulbs to increase in size, for even a half an inch added to the diameter of each very materially enhances the aggregate produce; hence there cannot be a greater error than to have the plants too close to each other on fertile and well-cultivated soils. This is especially the case in regard to the Swedish turnip, which, it is well known, increases in amount of nutritive matter in proportion to the size of the roots; whereas, the white globe and other soft kinds, when allowed very wide spaces between the plants, are apt to become so large in good land, that the nutritive juices are very deficient in proportion to the bulk of the crop. According to the analysis of Sinclair, 1728 grains of large-sized Swedish turnips afforded 110 grains of nutritive matter; whereas, roots of a small size only produced 99 grains from the same bulk. On the other hand, a bulb of the white sort, measuring seven inches in diameter, yielded only 72½ grains, while an equal quantity of roots four inches in diameter contained 80 grains of nutritive matter. Hence the propriety of the general rule, that Swedes should be allowed sufficient room in the drills to grow to the largest size attainable; and that the distance between the plants of the common turnip should be such as to allow the bulbs to grow to a medium size—the yellow and more hardy kinds being farther asunder than the white and its allies. It should always be remembered that very large-sized white turnips are incompatible with solidity of texture and good feeding properties. On land in a high state of cultivation, from eleven to thirteen inches is not too wide a space between Swedes, nine or ten may be allowed for yellow turnips, and eight or nine for white globes. It is evident however that no precise or fixed dimensions can be laid down, as so much depends on the condition of the soil and other circumstances.

It is perhaps unnecessary to observe in this place that the hoeing and thinning of turnips should be carried on only in dry weather, and when the ground and plants are dry. When the soil is saturated with moisture, it adheres to the hoes, and also to the worker's feet; by which it is injuriously consolidated and the plants themselves do not separate from each other so readily as when free from moisture. Thinning in very droughty weather is equally improper; as the plants are apt to remain in a languid state for a considerable time a medium state of the weather is consequently to be preferred. It is a great error in the culture of this crop to allow the plants to become too high and strong before singling them out. The work is not only more difficult and expensive to accomplish, but the crop may be seriously injured by neglecting the plants at this stage of their growth, for when the stems get over long and the leaves large, the plants become entangled in each other, and are singled out with considerable difficulty; besides, they never thrive so well afterwards as turnips thinned at the proper time. Five expert hoers are allowed to be able to go over a Scotch acre in a day of ten hours, the soil not being very hard, nor foul with weeds. This is for the first thinning and hoeing; the second course being much more speedily accomplished. In moist weather weeds will soon spring up both amongst the plants and in the intervals of the rows, which render it necessary to pass the horse-hoe or drill-grubber again between the drills, in the course of ten or more days, according to circumstances, after the first hoeing and singling, in order to destroy any weeds that may have made their appearance. As soon as the workers have once gone over the whole crop, and sometimes even before, the portion first thinned will again require to be hand-hoed; but at this stage it is only necessary to hoe the sides of the drills, to cut up any weeds that may have escaped, or had been out of the reach of the horse-hoe previously passed along the intervals. Any weeds that may have sprung up in the rows, as well as all superfluous plants, are pulled out by the hand wherever the hoe cannot be used with safety.

When the land has been properly cleaned before putting in the crop, it will not be a difficult task to keep it free of weeds during the summer months. Indeed, when the leaves attain such a size as nearly to cover the intervals, the weeds will be smothered, and perhaps converted into nourishment for the crop, or at least prevented from growing, by the luxuriant foliage of the turnips. But whether the land be clean or foul, there can be no doubt of the great importance of frequently horse-hoeing the intervals of the rows during the early growth of the crop: not only is the land thereby freed from weeds—the farmers greatest enemies—but the vigorous growth of the bulbs is in a great degree promoted. In fact, the soil cannot be too finely pulverized both before putting in the crop and during the period of its growth. It is of the first importance that the ground should be quite loose and friable, so as to allow the minute fibres of the roots to traverse the soil in every direction in quest of the peculiar aliment necessary for promoting and sustaining the healthy growth of the turnip crop. This, in fact, constitutes the great advantage which the drill possesses over the broad-cast mode of culture: the soil in the former case receives a long-continued course of tillage, from an early period of the season until the wide-spreading leaves of the turnip overshadow the ground, and put a stop to further cultivation; whereas, the horse-hoe is necessarily excluded altogether when the broad-cast system is adopted.

Should time permit, or weeds still make their appearance among the plants, a third hand-hoeing is bestowed, which generally concludes the after-culture of the crop. Sometimes, however, after the weeds have been thoroughly destroyed, the plants finally singled out to the proper distances in the drills, and the leaves nearly met in the intervals, the earth is laid up about the plants by a small plough, with two mould-boards. On undrained retentive land, this last operation is resorted to by the best agriculturists, in order to afford channels for the escape of surface water, and thereby keep the soil and turnips comparatively dry during the continuance of wet weather. Earthing-up the plants, as this operation is called, is also frequently performed even on dry land, in order to admit a free circulation of air between the rows; but where no danger need be apprehended of water stagnating upon the surface, it is certainly unnecessary as a means of facilitating the escape of moisture, as the rain will be absorbed by the porous soil as soon as it falls. It is not only superfluous, but highly objectionable, on light and well-drained lands, particularly when the crop is to be consumed upon the ground by sheep. There can be no doubt but that a slight earthing-up with a small double mould-board plough is beneficial on wet retentive soils, inasmuch as it facilitates the discharge of surface water; but its worse than inutility on naturally dry or well-drained lands is equally unquestionable. The intervals between the rows should always be sufficiently wide to admit of a free circulation of air without resorting to this practice.

It is not considered necessary to enter here into details regarding the consumption of turnips by cattle and sheep, for which they will be ready by the middle of October, or the beginning of November, when the pastures usually become bare and the weather rather cold for the stock to remain in the fields. White turnips are generally eaten on the ground by sheep, the yellow are used for feeding cattle in the houses, and the Swedish are usually reserved for spring feeding to succeed the softer kinds, when the latter are consumed or unfit for use. Swedish turnips are also occasionally given, either raw or cooked, to farm-horses, by which they are much relished as a wholesome and nutritious food. The process of taking up and storing a portion of the crop in the beginning of winter, with the mode of raising turnip seed, shall form subjects for a future paper, and need not, therefore, be further referred to in this place.

The turnip is subject to the ravages of various insects, the most formidable and destructive of which is that commonly known by the name of the turnip fly, or beetle. This creature makes its appearance, and commences its attack, just as the tender cotyledon leaves of the plants are reaching the surface, which varies from four to ten days after sowing. It frequently attacks the young seedling plants in great numbers, and with such voracity as in an incredibly short space of time to devour them altogether. The insect is unable, however, to injure the turnip after the second or rough leaves are developed; but during the brief period which elapses from the first appearance of the seed-leaves until the plants assume their rough leaves, the ravages committed by the fly are often so sweeping and complete as to render it necessary to sow the field anew.

"The eggs of the common striped turnip fly," observes Mr. Curtis, "are laid on the under side of the rough leaf of the turnip, from April to September; they hatch in two days. The maggots live between the two skins, or cuticles of the rough leaf, and arrive at maturity in sixteen days. The chrysalis is buried just beneath the surface of the earth, where it remains about a fortnight. The beetles live through the winter in a torpid state, and revive in the spring, when they destroy the two first leaves, called the cotyledon, or seed leaves, of the young turnip. There are five or six broods in a season. Their scent is very perfect: the beetles fly against the wind, and are attracted from a distance. Heavy rains, cold springs, and long droughts destroy them."

Various expedients have been resorted to, from time to time, for the purpose of preventing or mitigating the ravages of the turnip-fly; but the efficacy and results of the remedial measures hitherto tried and published are so contradictory, that we cannot consider that any really effectual method has yet been discovered for effecting the destruction of this pest, without at the same time injuring the plants intended to be rescued from its attack. The remedies resorted to are very various, and some of them have undoubtedly proved effectual in particular instances. Among the substances used for this purpose, quick-lime, soot, and sulphur have been strongly recommended, and are frequently applied with advantage. When lime is employed for this purpose, it should be in a state of dry, caustic powder, and must be dusted over the plants just as the seed-leeves are beginning to appear; but, unless the farmer be on the alert, and ready at the proper time, the watchful and assidious enemy will have secured the prey before he can apply any remedy, as it is just as the delicate, cotyledon leaves of the plants are protruding through the ground that they are most liable to be attacked and devoured by the fly. The quantity of lime usually applied is six or seven bushels to the acre, when the turnips are cultivated in drills; but a larger quantity may be used without injuring the plants. The lime should be made ready some time previously, and preserved in a dry state until required; and it is desirable that the weather and soil should be dry at the time of application, as the effects of the lime are considerably neutralized by moisture; a small quantity of flour of sulphur is often used for the same purpose; and this simple expedient has undoubtedly, on many occasions, proved an effectual remedy, numerous instances being known of the attacks of insects being thereby entirely prevented. The sulphur may be mixed with the seed in the autumn, after separating it from the flower-stems; or it may be sown along with the seed, which is perhaps the most advantageous practice. This substance is not found to be in any degree injurious either to the seed or the turnip plants; and it is probable that its efficacy as a remedy in this case is attributable to its highly disagreeable odour, and also to the circumstance of the juices of the leaves being rendered distasteful to the insects by the absorbtion of a portion of the sulphur. Sometimes radishes, white turnips, or some other seed of rapid vegetation, is sown along with that of Swedes, with the view of attracting the beetle to the former, and thus saving the crop; but this is by no means a judicious expedient, and cannot be recommended. Burning the surface of the land previous to sowing the seed is a sure, but laborious and expensive remedy; and, though recommended on the high authority of Sir John Sinclair, it is but seldom resorted to by farmers. The object sought to be attained by this means is the destruction of the chrysalis, containing the fly, or beetle, in its embryo state. Sir J. Sinclair recommends the burning of green weeds, damp straw, cuttings of hedges, cleanings of ditches, &c., on the ground, a short time before putting in the crop. These combustibles may also be subsequently burned in small heaps in the intervals of the drills, the smoke arising from which fumigates the atmosphere, and is supposed to be deleterious to the insects. The addition of a small quantity of sulphur to the burning materials may render the fumigation more certain in its effects. Various other expedients have been adopted by different parties—such as steeping the turnip seed for some time in water, or in linseed-oil, and afterwards drying it with powdered sulphur; others employ a net, by which it is said they succeed in capturing and destroying great numbers of the insects; some again draw a newly-painted board, or a stout canvas cloth, besmeared on one side with tar, over the affected plants, to which many of the insects adhere, and are thus removed and destroyed. Watering the young plants is also recommended as a remedy. All that can be said, however, in reference to these last-mentioned expedients is, that however efficacious they may have proved in a few isolated instances, they are too tedious, clumsy, and expensive to admit of general application; and besides, the certainty of their securing the object in view is very questionable.

The foregoing are some of the remedial measures commonly resorted to for the protection of the turnip crop from the ravages of the fly. Many of them have unquestionably proved more or less efficacious in particular cases, and almost the whole of them merit a fair and impartial trial; but the farmer should resort to preventive rather than remedial measures; and fortunately he has it in his power, by the adoption of a judicious system of cultivation, to destroy these insects in their embryo state, or to evade their attacks should they make their appearance.

It seldom happens that farmers on light, dry land have to complain of the ravages of insects; it being generally on the stiffer class of soils that they are most destructive, although, in some seasons, there is no kind or quality of land but what is more or less troubled by that unwelcome visitant—the turnip-fly. Deep and frequent cultivation, both previous to the sowing of the seed and during the growth of the crop, is an important mean of getting rid of this troublesome pest. The land should likewise be kept as clean as possible, by assiduously and timely attending to the destruction of all sorts of weeds, especially wild mustard, charlock, and other *Cruciferæ*, whose strong scent is supposed to attract the beetle, which derives its favourite food from that natural family of plants. It is evident, then, that, by sedulously attending to the destruction of the greatest robbers of the soil, we in a great degree facilitate that of the insects which prey upon this crop. The drill mode of cultivating turnips is incomparably superior to the broadcast system in preventing the depredation of the fly; and the reason of this is obviously that the former method affords so much better facilities for the continual cleansing and tillage of the soil during the growth of the crop. The rapid germination of the turnip-seed after being deposited in the ground, and the vigorous growth of the young plants from the time when the cotyledon leaves make their appearance until the second or rough leaves are developed, constitute the surest guarantee for the safety of the turnip crop from the attacks of its most formidable enemy.

There are other insects which infest this crop, such as the turnip saw-fly and the wire-worm, both of which are sometimes very destructive. In reference to the former, a scientific writer observes, that "the flies which appear in the early part of summer, and deposit their eggs on the young turnip plants, have probably survived the winter under ground in the pupal state, enveloped in their cocoon. Emerging from them, as soon as the weather is confirmed, in their winged state, the females immediately lay their eggs, after which they very soon die. In favourable weather they are hatched in a short time, and the young larvæ immediately commence their attack on the plant. At first these larvæ are of a deep black colour, and, of course, small size; but they grow rapidly, and in the course of a few weeks attain their full dimensions. The loss they occasion to the farmer is very considerable, but data cannot be easily obtained to form an estimate of its amount. In some instances the crop is wholly destroyed, and where the caterpillars are most numerous, the injury they occasion to the plant appear in the diminished size of the bulb, its vegetative functions being impeded by the partial consumption of the leaves." Brushing the caterpillars off the plants at certain periods is recommended as a remedy. This may be done by drawing a board over the turnips; and although they would not thereby be destroyed, they would be much annoyed, and rendered incapable of committing much injury. A copious fall of rain is a cheaper and more effectual means of destroying them.

The wire-worm frequently destroys the young plants after they have been singled out, by dividing the root from the stem. Heavy rolling before sowing the seed is recommended as a preventive, and for this purpose Crosskill's clod-crusher appears to be pre-eminently adapted. The application of saline substances is likewise occasionally resorted to, and, in some instances, with advantage. There are some other insects which prey upon the turnip crop; and it is also subject to a disease sometimes called "fingers and toes," which affects the plants soon after the first singling; but to enter further into details would extend this already lengthy article beyond due limits. Various remedial measures may be adopted by the farmer to arrest the ravages of insects, and to prevent the appearance of disease in his turnip crop; but judicious cultivation, and the application of a liberal allowance of enriching manures, constitute the only radical and effectual preventive.

With regard to what may be considered an average crop per acre, considerable diversity of opinion exists among practical farmers. Instances are recorded of from fifty to sixty tons and upwards having been raised on an imperial acre; but such extraordinary crops must have been produced by means of much larger applications of manure than are commonly given, or else the soil must have been naturally very rich, and in a high state of cultivation. There is no room for doubt, however, but that the produce of the turnip crop would be very materially increased beyond what is now regarded as an average throughout the country, by thoroughly draining the land, applying a liberal allowance of enriching manures, and adopting a more judicious system of cultivation. The writer is aware of several instances of from thirty-five to forty tons of Swedish turnips being raised on an acre; whilst, at other times, not much more than half this quantity would be produced. Very much will of course depend on the nature and quality of the soil, the quantity and kind of manure applied, and other obvious circumstances; but in general from twenty-five to thirty tons of Swedes may be considered a good crop per acre, from twenty-five to forty of yellow turnips, and from thirty to forty of white globes.

I could not, I conceive, better conclude this article than by recapitulating briefly what I deem the most essential points of turnip culture. First, then, complete drainage is of paramount importance, as being the basis of all good husbandry; and abundant crops of roots need not be expected while the soil remains under the influence of superabundant moisture. Subsoil ploughing may be regarded as an indispensable accompaniment to thorough draining, without which, indeed, its efficacy is comparatively limited on stiff retentive land. This operation may be performed with advantage immediately after the removal of the corn crop from the ground. The stubble land intended for turnips should always be ploughed as deep and as early before winter as possible, as nothing tends more powerfully to ameliorate the soil, and facilitate its subsequent preparation for the crop, than a lengthened exposure to the influence of the atmospheric changes which occur during the winter and early spring months. Before putting in the crop, the minute pulverization of the soil, and the thorough eradication of weeds, must be assiduously persevered in until the ground is rendered perfectly clean, and reduced to a fine tilth. Experience, as well as a knowledge of the nature of the turnip, have convinced us of the impropriety of sowing the minute seeds of this plant on imperfectly reduced land—a fine mould is the great desideratum; and unless this can be secured, a vigorous and healthy braird is but rarely obtained. The turnip should invariably be cultivated in raised drills, about twenty-seven inches apart. This mode of culture is immeasureably superior to the broadcast system, which it is now high time to see abandoned in all parts of the United Kingdom, as it has been for a length of time wherever agriculture has made any progress in the path of improvement. A liberal allowance of seed should be sown, sufficient to induce quick vegetation, and push forward the young plants beyond the most critical stage of their growth; but care must be taken not to sow overthick. The seed should be all of the same age, and either raised by the farmer himself, or obtained from a respectable seedsman; it might be useful to submit all seeds to a trial before sowing them for a general crop. The seed-time must be regulated according to the climate and elevation of the locality; too early as well as too late sowing should be guarded against. When farm-yard manure is employed for the turnip crop, it should be well decomposed, and as liberally applied as the entire quantity at the farmer's command will permit. It is advisable to use guano in conjunction with dung, ashes, or some other substance, rather than apply it alone; and care must be taken not to allow the seed to come into contact with unmixed guano. As it is of the utmost importance to retain as much as possible of the moisture of the soil, as well as to prevent the dissipation of the most valuable constituents of the manure, the formation of the drills, the application of the dung, and the deposition of the seed should be carried on in close succession. This precaution ought to be most scrupulously attended to in droughty weather, as many failures are known to have occurred in consequence of neglecting it. The plants should be singled out to the proper distances as soon as possible after the rough leaves have attained the height of two inches; and the thining process should not be carried on either in very droughty weather, or when the soil is saturated with moisture. The horse-hoe is to be kept in frequent operation during the growth of the crop, to loosen and pulverize the soil between the drills; and the destruction of all sorts of weeds should be sedulously carried on until the leaves of the turnips overshadow the ground and prevent their further growth.

DRAINING OF LANDS.

DURHAM FARMERS' CLUB—MONTHLY MEETING.

The monthly meeting of this club was held at Mr. Petch's, Half Moon Inn, New Elvet, on Saturday, June 8, when the subject of draining, which had been commenced at the previous meeting, was resumed. The chair was occupied by the Rev. J. Tyson, and the vice-chair by Mr. Gilbert Wood; and, in consequence of the rumoured intention of Professor Johnston to be present and deliver his opinions on the subject, the attendance was more numerous than usual. Among those present we observed F. D. Johnson, Esq., Aykley Heads; A. Smith, Esq., Langley Grove; J. Hutchinson, Esq., A. W. Hutchinson, Esq., and Messrs. T. and J. Crofton, W. Wetherell, W. Gren, H. Bell, — Shepherd, R. Stafford, J. Booth, C. Hunter, H. Newby, &c.

After partaking of an excellent dinner, the CHAIRMAN proposed in succession "The Queen," "Prince Albert," "The Queen Dowager, and the rest of the Royal Family," and "continued success to the Durham Farmers' Club."

Tht CHAIRMAN next said the time had arrived when they should proceed with the subject of that day's discussion—draining. Previous to doing so, however, he begged to propose the health of Professor Johnston. The toast was received with the honours.

Professor JOHNSTON, on rising, was received with applause. He spoke as follows:—Mr. Chairman and Gentlemen, I am exceedingly obliged to you for the honour you have done me in drinking my health. As I happen to be in Durham now officially, I thought I should not do, what I almost consider to be, my duty, at all events a gratification to myself, were I not to embrace the opportunity of your meeting to-day before leaving Durham, to spend one afternoon with you. And also, gentlemen, as from the situation which I hold in a neighbouring country (Scotland) it is my duty to go over a very large portion, especially of the northern end, of the island, I have had occasion to observe much that is interesting in connexion with agriculture, and I was desirous of offering a few observations to you which I thought might possibly lead to your advantage (*applause*). I am very happy to find that the subject which you had proposed for discussion to-day, that of draining, will lead me very naturally to make these observations. I think, Mr. Chairman and gentlemen, that the prospects of agriculture, the prospects of the agricultural community at large, is a subject which must very naturally engage your attention; it is one which, I know, does engage the attention of many of you; but I am satisfied from what I have seen in various parts of the island, that far too gloomy prospects are contemplated—too gloomy ideas are entertained by many farmers of the prospects of agriculture and of their own individual prospects as practical men (*hear, hear*). Now I was anxious to appear among you for the purpose, if possible, of saying something encouraging to you: and if you will permit me, I will offer a few remarks, which will, I hope, have something of that tendency (*cheers*). Gentlemen, there are two ways of looking at the prospects of agriculture. There is the way which many speculative men from the natural or acquired habits of their minds have adopted—the way of looking at the question in what may be called a theoretical point of view. The way they take is this. But here permit me to remark that the observations I am about to offer are not intended at all to be of a political character, and that the views that I am about to explain are not meant to be of a political tendency; though I shall take the opportunity of alluding to two extreme bodies of politicians—or what are considered politicians. Those who argue for the protection of the state to agriculture argue in this manner, and they take what I would call the theoretical view. They say our present price of corn is so and so per quarter—say 45s. per quarter for wheat. With that average, foreign corn can be imported, can pay a duty of 20s., and yet be sold to compete with us in our own markets. Now, it is said if foreign corn can pay a 20s. duty, and can yet come to market when the average price of home grown wheat is 45s., what would be the price if there was no duty at all on the foreign corn? Would it not fall to 25s. or 30s.; and how could we then live? I think, Mr. Chairman and gentlemen, that this is a very fair and legitimate mode of reasoning; but, then, it is what I call reasoning theoretically only. Observe it may be very well asked in reply by the other extreme party—and quite as legitimately asked—if it be so profitable to the foreign growers of corn to import it at this high duty, then, how does it happen that more is not imported? Or they may ask again, if so great a reduction is necessarily to follow the removal of the duty, how does it come that in the Channel Islands, where there is no duty whatever, the average prices are higher than they are here (*hear, hear*). Here, then, the practical farmer is mystified—plunged into a kind of metaphysical argument through which he cannot see his way. He hears what may be the truth from one party and from the other; yet he finds himself landed in a difficulty from which he cannot escape. This is the result then of the theoretical method of reasoning upon the farmers' prospects. It has tended rather to mystify the farmer than to clear up the case to the satisfaction of his understanding; inasmuch as he is met by the opposing arguments of the other party, and thus left unable to decide between them; and I am not astonished that the farmers of England who listened to this kind of reasoning should have had their fears awakened, and should have become so depressed as many of them really are (*hear*). But I do not think myself, after having seen what is going on in different parts of the island—I do not think that is the sort of reasoning upon which practical men ought to rely. I do not think it leads to the truth. If the facts of one of the party are true, the speculations of the other party must lead to a wrong conclusion. But trusting to their speculations, because they come from parties to whom he naturally looks up, and whom he has been accustomed to consider his best friends—how can a plain man help being depressed in mind and paralysed in his exertions. But there is another way of looking at the question, leaving the mode of new sowing already described altogether out of view—one which will lead us to better, because more satisfactory and encouraging results, and this is what I would call the practical method of viewing the prospects of the farmer. Now, observe first of all I put this question, not to you, but to myself. "You have gone over a great deal of the country, you have been in almost every county of the north, where the best farming is carried on, now tell me which class of men among the farmers in all these districts is making most money?" and I answer that question of my own without reserve, by saying that those farmers who are improving their land the most, are complaining the least, and are the fullest of hope (*hear and applause*). Now, what am I entitled to infer from that? Clearly that to improve the land generally will benefit the farming interest generally; and that is the leading result aimed at by the Association with which I have the honour to be connected—the Agricultural Chemistry Association of Scotland. Their great object is the improvement of the whole agriculture of the kingdom, not only in order to raise more, and consequently cheaper food for the people, but also to lay a broader and more lasting basis for the national prosperity. If these farmers are making most money, then I think there are better prospects for those who will look to practice, and ask of her what increased quantity of corn the land can be made to produce, than there are for those who merely speculate or theorize; they will come to a more satisfactory and consolatory conclusion than the theoretical mode of reasoning will bring them to. Now that, I think, is the easiest way of disposing of the theoretical mode of reasoning which so naturally depresses the farmer's mind, depresses his exertions, and prevents the introduction of those systems of improvement which would so materially benefit, not only himself, but the whole of the district in which he resides. If, by an improved mode of culture, he can at as little cost raise nearly twice as much corn, will he not be, in a degree proportioned to that increase, able to bear a diminution in the price—be independent of parliament, and their changeable fiscal regulations. I laugh at the discouraging predictions of those who would throw our poor lands out of cultivation, as if these fiscal regulations were the main element on which the progress of agriculture depended. I am satisfied on the contrary that, come what may of the Corn-laws, we shall live to see the rent of many of our poor lands rise. The next question, then, is, what are those improvements which are thus to better the farmers' prospects? The first improvement—that which leads the way to all others, is the one which you have this day met to discuss—draining—draining wherever drainage is necessary. And you ask, first of all, how it ought to be done in order to make it pay? That is the first question which a practical man will put. A farmer who has rent to pay must do everything with a view to remuneration. It is unfair to expect the tenant farmer to do anything to the land which is not likely to yield him a profit. The nation has no right to expect that an individual should injure himself for the benefit of the community. If it were necessary for me to give an answer to the question how the farmer was to drain in order permanently to benefit himself, I could not give you one which would stand scrutiny better than the answer which your Chairman has given to it by anticipation. [In the course of his opening remarks, the Chairman had stated that he had, some time before, drained a small close, previously unproductive, and that the close had subsequently yielded good crops. That the drains had since gone wrong, and the close had returned to its original state—a complete bog, on which nothing would grow; but that, by draining deeper, and getting to the springs, the land had been again reclaimed, and this year gave promise of an excellent green crop.] He has not given it to you in so many words, but his statement imports this—that in order to make draining pay the farmer, it must be done well—it must be done skilfully—it must be done properly (*hear, hear*). Now what are the methods which the most approved drainers are now adopting. First, as to depth. I have been in the habit of saying on all occasions, that no drains should be less than 30 inches deep when laid with tiles, and I say still, that none should be less; but the tide now seems to be running in the minds of the most intelligent, skilful, and practical men in different parts of the country, in favour of drains three feet deep. You cannot be too deep, then, if you go only 30 inches. It is now maintained by the best practical men, that three feet is the depth to which, in preference, the money-making man ought to sink his drains. Their opinion is deserving of your serious consideration. In regard to the distance, again, there are some men who argue for the three feet drain who say they can put them at a greater distance than under the 30 inches system. The old distance was 15 or 18 feet for a 30 inch drain. Now, they say with a three feet drain, they can put the drains 20 to 23 feet apart. I shall presently read to you a letter which I lately received from a practical man, upon this subject, whose opinion is worth much more than mine. I shall also state to you what has been done in other parts of the country in regard to that particular point. Then in regard to the mode of making the drain the question lies between stones and tiles. Now, where tiles can be got I believe they make the safer drains, not that stones are not quite as good, but because it requires that they should be carefully broken, and covered with more attention, in order that no water may get in from the top, to carry down mud and choke them up. It is an old prejudice that if you put drains into the furrows, you ought to make them very porous at the top, in order that the water may thus find its way to the drains. The best practical men now say "no" to this practice. The greatest improvement from draining will only be derived when the rain as it falls from heaven is enabled to sink right down through the whole of the soil and find its way laterally into the drains. When filled with stones, therefore, Mr. Smith and others say, they should be well puddled with clay. This is more necessary in the case of stones, as you will readily understand, than when merely tiles are put in. Then in regard to stones there is a danger that they may not be sufficiently broken. Mr. Smith, of Deanston, of whom you have all heard as a practical drainer, says, the stones ought to be broken to the size of road metal. As to the tiles again, the form is of some consequence. A question much agitated at present is between the common tile, with its sole, and the pipe tile. Economy is greatly in favour of the latter, but some doubt if they will be equally efficient. Then we have now not only the common round pipes, but pipes flattened on the one side, like this one on the table, to make them fit closer at the ends, and rest more firmly on the ground. We have not only 1, 1½, and 2-inch pipes, but we have them dovetailed into each other at the ends. That is the description of tiles for which Mr. Smith, of Deanston, has obtained a patent. The dovetailing keeps the ends together, and prevents them shifting. But that which staggers practical men is how a pipe of an inch in diameter should be sufficient to carry off the water from ordinarily wet land. Now, I must say that this was a point which, at first, staggered me a good deal, as it still does many practical men. There seems, however, little to be feared on this head, provided the leading cross-drains are not at too great a distance. Other objections are that it is difficult to have the pipes made so perfectly straight that they will lie quite flat; and to make the workmen lay the pipes so correctly that the water course may be uniform and continuous. However, my objections on these points have been very much done away with by the evidence of practical men. If proper care be taken to cut the drains little more than the width of the tile, there is no difficulty in making the tiles fit opposite to each other; and in order to secure that point more effectually Mr. Smith has contrived the kind of tile I have mentioned to you; I don't know that you have any of this kind of tile here. The only pipe tiles which I have seen in this part of the country are those made at Mr. Salvin's tilery, at Tudhoe, and those which I saw were, many of them, by no means so straight as they ought to be. Those tiles of Mr. Smith's require no confidential person to set them. But the great point which it is important to consider is the economy of these pipe tiles. It is said by Mr. Parker, who has inquired into the price for which they can be made in various parts of the south of England, that the person who makes them on his own estate can make them for 6s. a thousand. These, of course, are made either by Etheridge's, or Clayton's, or some other machine, which forces the clay through a mould and forms the tile. That charge does not include any profit to the maker or vendor. I was lately through Forfarshire, and near Arbroath I saw some of these tiles; but there a most extraordinary idea prevailed amongst the makers. They talked of charging from 20s. to 30s. a thousand—a price which put the adoption of them by the farmers, who are far from being generally persuaded of their superiority, out of the question, and which, even if they could be used in some cases with economy, would prevent their being employed to the extent to which it is to be hoped they will hereafter be used. You see, then, there is this very great difference in point of economy between 10s. and 20s., the price of pipes and common tiles respectively, and besides the pipes include both sole and tile. There is not only this great difference, which amounts to nearly £2 an acre, but then the carts can carry so many more at a time; and thus the expense is altogether so very much less, all which tends to reduce the cost of drainage a very great deal. I have very great confidence in those who state that the pipe tiles will act efficiently. Mr. Pusey has ordered 200,000 pipe tiles for the ensuing season; and that shows you what his confidence is in regard to them. I also know that people are putting them in to a very great extent in many other parts of the country.

Mr. Johnson: What size is most generally used?

Professor Johnston: I don't know precisely what size is most generally used; I should think an inch-and-half bore would be safe. I say this is a very great encouragement to entertain a favourable idea of those tiles: that they are so very cheap, and that they would therefore so much diminish the cost of draining. You ought, therefore, to consider maturely whether they are likely to be efficient; and, if so, how much more work could be done by them for the same money than by the common tile. This is all I need to say with respect to the mode in which draining ought to be done, to the fillings and material of which they ought to be made. I think there need be no hesitation as to the depth. You may safely go down three feet, if you can do it without much increase of cost. I do think, however, that with these pipe tiles thirty inches may be sufficient. The principle on which I satisfy myself in regard to the depth is this: I cannot determine the depth by theory; I know only that I need not go to seven feet if I can get the water drawn off at three feet; but I say, the deeper I can make my soil, the more valuable I make my land. It is just like deepening one end of my purse, and filling it up at the same time—the deep end and the shallow end—with money. You all know that you can go oftener to the deep end for money than to the shallow end without exhausting it (*laughter*). I therefore ask myself, "How deep can I at present go with our existing implements, so as to open up my land without incurring too great an expense? How deep can I go so as to make it pay?" The instruments we now use are the plough, the subsoil-plough, the trench-plough, and the fork, which last has lately been extensively introduced into the south of England and into Scotland. At present the subsoil-plough is made to go 22 inches in depth, in districts where they have begun to see that it is to their advantage to make the soil deep. I was the other day in Forfarshire, and went over the farm of one of the tenants of Sir John Ogilvie, who had told me that this tenant had begun to plough deeper. I went to him and said, "You are going rather deep." He said, "Yes, sir; this farm wod hae clean dune me if I had nae gane deep." Another farmer in the same district told me, in regard to subsoiling his potato land, and he had upwards of 60 acres of potatoes, "I am so satisfied with the importance and advantage of subsoiling for my potatoes, that I mean to subsoil it every time the potato crop comes off." These are the best proofs of the importance of deepening the soil. Now the subsoil-plough, as I have said, can go down 22 inches. If you put a drain down to the depth of 24 inches, and put in a tile as small as this, which will occupy three inches, its top will be within 21 inches of the surface; but if the tile and sole, as they usually do, occupy six inches, and you take that off the 24 inches, you bring the top of the tile to within 18 inches of the surface of the soil. Again, the subsoiling, to be effectual, should be done across the ridges; but it cannot be done across them to the depth of 22 inches without tearing up all the tiles. If, then, it be true that the deeper the land is, the better and richer it is, it is clear that, if land so drained is ever to be made as rich as it can be made, those tiles must be taken up and relaid. Now, if you subsoil your land to the depth of 22 inches, leave two inches clear of the tile, and to that add the height of the tile and sole, six inches; that brings you down to 30 inches as the depth to which you must dig your drains. This was the reasoning which brought me originally to see that drains ought to be 30 inches deep at least, in order that the tiles might not be disturbed by the subsoil ploughing. I mentioned the fork to you as another instrument now used for the stirring up of the land. The fork thus used is merely a three-pronged fork, made exceedingly strong This fork is employed to raise up the subsoil, instead of the plough. It is thus used: Three men go abreast across the field, taking about a yard together, and throwing forward the surface-soil to a depth of 10 or 12 inches. They then take the fork, and go down into the subsoil 12 or 16 inches more. The fork is thus used not to turn the subsoil over, but merely to loosen it. If it bring anything up, any stones, they are taken out, while lumps of clay are broken. This is done with great effect. Now, if at each digging the men turn up 12 inches in depth, that will make 24 inches, and if you allow six inches for the tile, it brings you to 30 inches, without any space to prevent the fork from going into the tile. A friend of mine in Ayrshire, who lately tried the use of the fork, found that his workmen went into the tiles the first drain they came to. Such occurrences as this have satisfied me that those men who see that drains are to be put three feet deep, have a great deal of reason on their side. I don't say that all of you should do it; but, I say that those who do it are laying up for themselves a store in the bank from which they will in time receive a full interest (*hear*). Now, how should the draining be done to make it pay? How does it come to pay? In regard to the way in which it ought to be done, I think I need add little to what I have already said. Besides being properly executed as regards the individual drains, it is true that they must be properly laid out, in such a way as to produce the greatest effect. The old plan was to carry the drain across the hill. The new method—that which is now pursued is, to carry them straight down the hill, the shortest way to the bottom. In many cases which had been drained under the old system the land has been obliged to be drained at right angles to the old draining, and it does not now seem wonderful that the plan formerly employed should not have been effectual in carrying off the water. But it is very difficult to remove old principles. I was, some time ago, going over part of a large estate, which the proprietor was about to drain. On one of those farms were some of these old fashioned winding ridges, which meandered beautifully down the slope of the hill; very pretty to the lover of the picturesque, but not so captivating to the eyes of the enlightened practical agriculturists. Though the fields, as I have said, was on the side or slope of a hill, we could not persuade the holder of that farm, though he was one of the proprietor's baliff's, and one of the men who was to advise the tenantry how the draining was to be carried on, that it would be better to carry the drains straight down the hill than in the winding furrows which I have described to you *(hear, and a laugh)*. We cannot expect men to give up prejudices all at once, and the only way to satisfy a man that a thing is wrong, is either to show him by experiment that what you say is correct, or to get him to try the thing on a small scale first, and observe the result. But then how is it that draining comes to pay? In the first place, all drained land, unless in very singular circumstances indeed, grows larger and better crops than before. Thus it comes to pay; in the first place, because the crops are better; in the second place, because the land is more easy to work. Every man who has drained strong clay land knows how much less it costs him to work it than it used to do before it was drained. Then it can grow better crops; it can grow turnips and potatoes, and other crops which it could not grow before. And you are aware of all the consequences that follow; that all over the island have followed the introduction of turnip husbandry during the last hundred years. Besides, you are not under the necessity of having naked fallows, as, in this neighbourhood especially, is too common under the three-years course of husbandry which prevails. This lying in naked fallow every third year is, in effect, the same as if one-third of the district were every year out of cultivation, and growing nothing at all *(hear, hear)*. Therefore, the additional value of the draining is that you get three crops where you only got two; and it is wonderful after knowing this that a man should find it profitable to have his land drained? Again, every man knows that on wet land manure does not produce half its effect. Not only is lime half thrown away, but farm-yard and other manures are also in a great degree lessened in their efficacy. A load of manure in some places will go three times as far on dry land as it would on the same land while it was in a wet state. All these are advantages to be had from draining. And here I may state to you that I wrote the other day to a gentleman of whom I daresay most of you have heard—Mr. Dudgeon, of Spylaw, near Kelso. I wrote to Mr. Dudgeon, asking him for some explanations respecting draining, and yesterday I received an answer, and with your permission I will read it to you; when you will see it is well worthy of your attention, but at the same time you will see there are some things in it which seemed startling to me.—Mr. Johnston then read the following letter:—

Spylaw, 5th June, 1845.

My landlords, the Governors of George Watson's Hospital and the Merchant Maiden Hospital, of Edinburgh, defray the expense of cutting, amounting to from 36s. to 42s. per acre, while the remainder only of the charge—the drainage being performed altogether with tiles upon soles—falls to my share, amounting, with filling in by the plough, to from 45s. to 50s. per acre. My proportion, however, I may state, is thus stated low, as the tiles are estimated at prime cost—being manufactured by myself—and no charge made in this price for the expense of the erection of the tile works. It will be noticed, also, that this work being on the farm, the expense of carriage of tiles is, to a great extent, saved. This explanation—when I have stated that the depth of the drains has been in every instance, when practicable, 3 feet from the bottom of the furrow—answers, I think, your second query; and I shall go on, therefore, to reply to the others in their order.

1st. I have now finished upwards of 550 acres in the manner above described, the total length of drains being 267,000 yards.

3rd. As explained, my drainage costs less than in ordinary cases can be calculated upon; and I conceive I can, with all safety, trust to being remunerated for my share of the outlay by the two crops first following the operation, viz., turnips and barley, or wheat, no doubt in many instances I derive more. But this depends so much upon the nature of the soil that a definite answer is not easily given. Upon obstinate clays, and lands rendered sterile by noxious elements generated by an impervious subsoil, the advantage of thorough draining is, I conceive, to more than double the value. Thus, such land in many instances rented at 10s. per acre would be better worth cultivating, subsequent to such an operation effectually made, at 20s., or even 25s. per acre.

4th. The nature of the soil on this farm varies very much, but in general it is what is popularly described as a free loam upon an indurated subsoil, in many parts altogether clay, but generally exhibiting, at frequent intervals, a free mixture of sand, which, being porous, renders the drainage less difficult; so that, in almost every instance, I have found the comparatively wide distance apart of 28 feet effect a most perfect purpose. This, however, is no doubt in part owing to the great depth. The average rent is 24s. per acre; average distance from market, if by this is meant expense of carriage of produce, I cannot call more than six miles. But as much of our barley especially, ultimately finds its way to Edinburgh, where, and in the Lothians generally, the prices upon an average are from 3s. to 4s. per qr. higher for the same quality (and the same may be said of wheat and oats in proportion), the difference of value of produce in the two districts cannot be estimated at less, in ordinary seasons, than 16s. to 18s. per acre, of the land under crop in each year.

5th.—As to my confidence in being able to meet a free trade in corn, it is not easy to say what would be the full effect upon prices of a total abolition of the corn-laws, and there are other considerations, besides mere price, which ought to have influence with the farmer, cheapness incident upon a full foreign supply of grain, being a different thing from cheapness as derived from the employment of additional labour and exertion at home. I, therefore, do not feel quite prepared to answer this question in all its bearings, but were the matter of additional supply, the only element to affect price, I must say, *individually*—having nearly completed my improvements, I would prefer an open trade with the continent; and the concomitant, as I should expect, of an arrest of ameliorations at home, to a full and perfect cultivation of the extensive breadths of neglected land in England; as the foreign supply I conceive would prove more scanty ultimately, and less elastic to our growing necessities than what we should derive from a free application of science and the modern principles of practical agriculture to our own soils.

I am, with great respect, dear sir,

yours faithfully,

John Dudgeon.

Now, I think that letter is a very curious and a very important one. In the first place it shows this—that where men are intelligent they do not hesitate to lay out large sums of money, at the rate of £3 an acre, which is a large sum for a practical farmer. It shews too, that intelligent men do not despair—do not allow their fears of foreign competition to tie up their hands. Mr. Dudgeon seems to fear no competition, so much as that to which he should be exposed were the whole land in the country brought into its highest state of cultivation, we should then, with our present population, have more corn than we could consume, and should have it to export. So I think; and I am very much supported by such considerations in the opinions which I entertain with regard to the prospects of agriculture—in thinking that the farmers have not that reason to despond which many persons would lead them to suppose. I don't think that men ought to be deterred from exercising that skill and ingenuity on the land which is likely to bring it into full cultivation, though the speeches of those who reason on theoretical principles I fear often deter the farmers from so doing. The man who cultivates his land now, and raises 15 to 20 bushels an acre, perhaps pays £1 rent per acre. He improves his land so that he raises from 35 to 40 bushels, and pays still £1 a year rent: whatever he cultivates is at a less cost; his manure goes further; he can raise crops which he could not do before; his harvest is more secure; his seed time more certain; he receives more than double returns, and yet he pays only the same rent (*hear*). Whether is this man, or the other who from fear carries forward no improvements, most likely to feel the ill effects of any alterations in our fiscal regulations in regard to the admission of corn? In which of the two lights, that of speculation, or of actual experiment ought the practical man to look at the prospects of agriculture in deciding which is the best course for himself to pursue? Looking at what other men are doing, looking also to the fact that those men who are laying out most money on their land are making the most money, I would say here is a reason why you should not take that peculiar heart-crushing view of the subject that some of you are inclined to take. Money is to be made by improving now; improve this now; drain, subsoil, manure highly, make money now; and if the evil day come you will be the readier to meet it. When a pestilence comes over the land, and the air is filled with noxious exhalations, the weak, the idle, the imprudent, and the dissolute are seized first; their bodily weakness and mental depression have prepared them to sink under it; while the active, prudent, industrious, and healthy escape. So it will be with you should any political epidemic make its way into the agricultural atmosphere. I have taken the liberty of adverting to these things, not in a political sense, but still in relation to the views taken by politicians, which I do not pretend to be. I believe men of all political opinions do desire to promote the one subject we have in view—the improvement of agriculture—and I am most happy to unite my exertions with those of any of them. Whatever may be the political opinions of any, in so far as regards the improvement of agriculture I sympathize with them all. You will, I think, grant gentlemen, that looking upon so much varied agricultural practice as I do, and being as it were an indifferent observer, having no pecuniary stake in the matter, I may be able to form a tolerably impartial opinion as to what will pay and what will not; and my firm conviction is that the more you improve, the more money will you make now; and, therefore, the better will you be able to resist any fiscal regulation or change affecting your interests, which politicians may introduce. You ought to consider whether anything can be done by yourselves, and in your own neighbourhood, and I put this question to you as gentlemen of the Durham Farmers' Club; because when in my official capacity I travel over other parts of the country, and see improvements carried on everywhere else, a soreness of the eyes does come over me every time I return to Durham, and see so much land upon which the foot of improvement has never yet left a trace (*hear*). I cannot go out of the town in any direction without witnessing the necessity for improvements. After some further observations on this subject, Mr. Johnston said, if you could tell me how I could reach the ears of the landlords of this district; how I could satisfy them it was for their benefit as well as for that of their tenantry, to drain the wet lands around us, or to remove those obstacles which prevent others from doing it. I hope either that the present holders of land will see the propriety of draining the land themselves or of offering their tenantry such encouragement as shall justify them in draining at their private cost.

Mr. Crofton said, he was sure they must all be obliged to Professor Johnston for his observations on the agriculture of this wide district. He was not at all surprised to hear of the wonderful improvements made in Scotland, for he had himself been an eye-witness of those improvements; neither was he much surprised that improvements should not be made in this neighbourhood—at least in the same proportion; because in Scotland the farmers had leases for twenty-one years, whilst here they were principally tenants from year to year—not one landlord in 20 granting a lease at all (*hear*). At the same time he knew that a tenant of Lord

Durham had drained to a considerable extent, at a cost to him of 10*l*. or 11*l*. an acre; and he would ask this question—Whether, with a less price for their produce, the poorer class of farmers, aye, or the better class of farmers, could go to any such extent? For himself, he should be willing to pay five per cent. on money expended in draining the land he occupied, or bear half the expense, though he was only a tenant from year to year. He had, in fact, himself laid out £7 an acre in draining, and that, he thought, was more than any tenant should do (*hear, hear*). There was a circumstance which had greatly tended to prevent money expenditure on their lands by the farmers: it was that uncertainty of which Mr. Johnson had spoken as attending the future price of corn. The tampering with the corn-laws which they had witnessed, and of which they did not yet know the end, naturally prevented the farmer from entering on any such speculations, for they did not know, if they increased their crops, whether they should get a remunerating price for that increase. The difference between 7s. and 5s. a bushel would pay nearly the price at which a farmer could afford to drain his land. It was his humble opinion that the cost of draining land fell within 2s. a bushel. (*hear, hear*), and the extension of drainage depends very much indeed on whether the present low price of grain was to be still further reduced or not (*hear*).

Mr. Johnson said, as Professor Johnston had mentioned his name, he would venture to offer a few observations to them with regard to the point to which that gentleman had alluded. He had certainly a very strong impression that the produce of this country might be immensely improved by the application of chemical science, improved implements, and money, to the cultivation of the soil. He believed by draining, deep ploughing, and the application of chemical manures, the produce of the country might be enormously increased, provided, of course, there were capital enough to be employed in thus tilling the land. But in order to induce parties who had capital to do so, they must first give them confidence in the future; because it was quite clear that those expenses were not returned at once (*hear*). They were only calculated to repay the enterprise of the individual in the course of time; and, therefore unless they could have confidence in the future, no practical man would lay out his money in improvements (*hear, hear*). He was inclined to have very considerable confidence in the maintenance of agricultural prosperity last year when he saw the steps taken by the agriculturists. He was then glad to see the farmers not neglecting, but taking part in, the politics of the country. He had then found them following the example of the manufacturing classes in attending to the political regulations relating to their own trade; and, therefore, he did hope by that sort of exertion they might protect their trade in the same way that the manufacturing classes were protecting trade (*hear, hear*). He might say, therefore, that he materially differed from his friend, Professor Johnston, in cautioning the farmer to abstain from all political matters, and that he would recommend them to follow the example of the manufacturing classes in that respect; because they always found the manufacturing and commercial classes attending very carefully to every political circumstance which could affect, however minutely, their trade (*hear*). No tax could be suggested, affecting the most insignificant trade, which was not met by meetings to consider their probable effect, even to their most remote results; and according as it might seem beneficial or injurious to those meetings, the opinion was immediately acted upon, either to promote that alteration or to repress it; and, therefore, he could not agree with his friend Professor Johnston that the farmers would be better by abstaining from questions of fiscal regulations. He would repeat, it was his opinion that they should in this respect follow the example of the manufacturing classes; and he certainly had always felt that the agricultural classes were very much neglected and despised by political leaders, because they did not attend to these points; and, therefore, he for one had been ever willing to stand forward and promote those views, and had joined in those efforts to promote their interests (*cheers*). In his opinion, he would be an imprudent man were he, under present circumstances, to lay out large sums of money in improving land, a return for which he could not expect to get for a long time. He concurred with Mr. Crofton, and thought that the speeches in the House of Commons during the present session had done more to stop improvements in agriculture than anything which had occurred during the last fifty years. He believed in this county there was a great disinclination to leases on both sides, in many instances; and that evil also arose from the want of confidence in public matters. What tenant would bind himself to pay a fair rent for land for 21 years, with a protecting duty of 20s., if he were inclined to suppose that within five or six years the duty might be abolished altogether? What man could venture to say that, with such a change, prices would not be immensely reduced? No prudent man, therefore, could take a lease for 21 years; and no landlord with any spark of feeling would think of exacting the terms of his lease, with such low prices, from any tenant who might be imprudent enough to take one (*hear, and applause*).

Mr. John Hutchinson drew attention to the presence of "buttercups" in fields. Many people thought these flowers an ornament to their fields, and thought it was a proof of the goodness of their land. He took a different view of it. All the ranunculus tribe of flowers required considerable moisture; and he looked upon a flourishing crop of buttercups as a sure indication of the land being too wet, as if it had been covered with rushes (*applause*).

The club was afterwards addressed by the Chairman, Mr. Martindale, the Vice-chairman, Mr. Crofton, Mr. Hunter, Mr. W. Wetherell, Mr. Smith, and Professor Johnston, the last-mentioned gentleman stating, in opposition to the opinions of some of the others, that he had seen some cold, thin clay yield good turnip crops by draining.

The party then separated. The subject for the next month's discussion is the best method of cutting and winning the hay-crops, and cutting wheat.

ON THE ADVANTAGES OF LEGISLATIVE PROTECTION TO AGRICULTURE.

BY GEORGE THOMPSON.

Legislative protection must ever be resorted to by old and wealthy communities, for the encouragement of certain native interests, where such communities wish to preserve their independence; and a sufficient argument in favour of it may be found in its absolute necessity, arising from circumstances over which neither nations nor individuals have the slightest control, namely, from the present constitution, condition, and situation of mankind. Whilst nations are subject to be in a hostile state, one with respect to another—whilst there is a perceptible difference in the habits and civilization of any two nations respectively—and whilst there exists variations in climate, fertility, and wants—there must be legislative protection for the preservation of certain interests. It is easy to assert that the abstract rules of right are opposed to any protection of particular classes; but this is no reason for the politician: he must prepare laws for the promotion of the happiness of mankind *as they are,* and not speculate impracticable theories for their guidance *as they are not.*

In all old-established communities, the circulating medium is depreciated in value comparatively with purchaseable articles; the habits of the people also become more expensive; moreover, as in Great Britain, heavy taxes become payable by the population at large for the preservation of national independence: all which circumstances are proportionately less oppressive on nations not so independent, or advanced in the possession of wealth and civilization.

Not only is this the case in reference to the people generally, but with agriculturists particularly; there exist other causes, demanding the especial protection of the government of any old community. Even supposing the average natural fertility of the soil to be equal in such nations to that of younger communities, still population is more dense, and poorer soils, on the average, are brought into cultivation to afford the means of subsistence. It would be therefore unjust in the extreme, that the member of an old-established community like Great Britain should be compelled to enter into open competition with those of younger nations, free from these disadvantages. Indeed, the member of such a community is *entitled,* as his undoubted right, to that degree of protection which will place him on a par with one of the same calling in a younger or less wealthy community. This is not, as some modern politicians have declared, robbery; but it is extending that protection to a member of society which is his just and inalienable right. Any individual remains a member of society, subjects himself to its claims, and holds himself amenable to its laws, so long as he receives the advantages thereof; but neither law nor reason calls upon him to remain a member of society longer than he receives equivalent advantages for such subjection.

Legislative protection, therefore, is, under certain circumstances, the *just right* of particular interests; but not only is it so, it is also productive of great advantages indirectly to all. The individual of any one class or interest is too prone to conclude that legislative protection extended to another class or interest, in the same nation, is so much against his trade or profession; whereas it is an axiom well worthy the attentive consideration of all members of society, that no productive interest can long flourish by any means whatever without affording *material* advantages. The prosperity of any trade creates industry and circulates wealth; and this is the case under all circumstances. That nation which has the greatest number of industrious, wealth-producing inhabitants, must inevitably be the most flourishing. Now, if any trade or branch of manufactures must, without legislative protection, fail, or be depressed in the slightest degree, the removal of that protection will be injurious to the nation at large. That this must be the case is clear, since depression in any one interest creates a glut in the labour market; or, what is a worse evil, an extended proportion of pauperism, which burden must be borne by the active and more flourishing interests.

In opposition to this theorem, it is contended that the cheapest market, whether home or foreign, is the best. A more ruinous, unsound, or indeed impracticable theory could not be broached; and yet, strange to say, it has numerous advocates amongst those very classes which would be the most seriously injured by its application—to wit, the manufacturing: affording a practical proof that it is too much the custom to make shallow observations, and act upon specious theories. The cheapest market to a nation and the cheapest market to individuals are often two totally different things. The *really* cheapest market is undoubtedly the best; but our modern political economists mean by it that market which will afford the article required at the cheapest rate nominally and immediately. In fact, the full practice of their theory would consist in purchasing serf and slave-grown articles of consumption, in preference to those produced by more civilized communities; and its complete fulfilment by the British people would necessarily involve the existence of an anomalous state of things, namely, the extensive consumption of manufactured articles by those who would receive little for their natural productions. But the cheapest and best market, *in reality,* is the home market—cheapest to the consumer, and cheapest to the producer. Why is this? Because the majority of consumers, being also producers, will again receive their quota of that which they expend; because the producer is enabled to obtain a greater proportionate consumption, and better remuneration, at home than abroad; and because the nation at large has the full profit of both transactions, instead of sharing it with another nation. Every producer in this kingdom, be he labourer or employer, is benefited by the full occupation of all other producers, because that raises the value of his productions, at the same time that it diminishes his national and parochial liabilities. Every consumer is benefited by the prosperity of his country, because that will diminish his burden of taxation, and, where he is a producer likewise, will raise the value of that he has to sell, which prosperity can only be ensured by the full employment of all the productive classes.

Of course individual consumers will naturally seek the cheapest market, and, if that be abroad, they will go there; but, by so doing, they remove so much wealth from the community; whereas if, by legislative protection, the foreign market is rendered dearest, they will supply their wants at home, and thus the wealth remains to the benefit of the nation. Nine-tenths of the people must ever depend on regular employment for the means of satisfying their wants; and it is upon the full occupation of this immense proportion, therefore, that the prosperity of every community must depend: that prosperity can only be permanently secured by the nation either supplying its own wants immediately, or, through interchange, indidirectly; since, if any of those wants are supplied directly by other nations, a corresponding proportion of the community must be without profitable employment, and thereby the nation's prosperity marred. Hence, legislative protection, extended to all interests which need it, is not only advantageous to particular classes, but to the nation at large.

In describing the advantages of legislative protection as enjoyed by *tenant farmers* and *labourers* in particular, we shall strictly avoid falling into that prevalent error of some political essayists of the present day—the abuse of classes. Great pains have been taken, and much expense incurred, in disseminating throughout the whole of this kingdom falsehoods, inconsistencies, and misapplications of truth, calculated to create disaffection between three classes, whose true interests are inseparable and reciprocal—we mean the *landlords*, *tenants*, and *labourers*. Truth needs no assistance, and all angry allusions, even if well founded, only injure its cause. We shall, therefore, make no charge of selfishness or robbery against any body of individuals whatever. We do not intend to offer any apology for landlords, or administer a rebuke to manufacturers: for all are *selfish*, and SELF-INTEREST rules all *individually*, more or less; but that one class necessarily has more of that innate principle than another, or that the majority of British legislators have at any time been ruled in their public conduct by self-interest alone, to the injury of any portion of their fellow countrymen, is too ridiculous, too ungenerous a conclusion to be entertained for one moment.

It will also be our object to place the landlord's interest as much as possible out of the question, and to represent the true situation of tenants and labourers, if the land were *rent-free*—in fact, to shew the advantages of legislative protection, so far as it affects them exclusively.

The advantages of legislative protection to tenant farmers and labourers are of two kinds—the *indispensable* and the *absolute*. The *indispensable* advantages are those which are necessary to their existence in this country, in their present state and proportions. For example: protection, on account of undue or extreme taxation, is an *indispensable* advantage. The *absolute* advantages are those which cannot be considered indispensable. For example: if we show protection to diminish fluctuation in price, that is an *absolute* advantage. Still all must be regarded as so many actual advantages conferred upon tenant farmers and labourers by legislative protection.

We shall estimate the indispensable advantages negatively, by enumerating the chief disadvantages under which they labour in comparison with foreign cultivators of the soil. It will be seen that these disadvantages amount to more than the existing protection: this furnishes a powerful reason for not estimating the advantages affirmatively, since, by this course, we shall not only show what *indispensable* advantages agriculturists already receive from protection, but also what more they ought to receive. In order to accomplish this, it will be requisite to reduce the estimated difficulties to that tangible form in which they can be made to serve the direct purpose we wish; it is necessary they should be reduced to the form of a *per centage*, whereby it may be seen at one view what the precise weight of those disadvantages is. It would be easy to recapitulate, one by one, the difficulties which beset the British agriculturist; but, by such means, the exact burden of one is forgotten as the next comes under consideration; we shall therefore bring them together in the shape of figures, thus enabling all to perceive readily the gross amount of protection to which the classes referred to are justly entitled, and which they must possess before they can be on equal terms with their foreign competitors.

There are numerous circumstances peculiar to all old-established communities; others, peculiar to this kingdom in particular, which render it indispensable to the great body of the tenant-farmers and labourers, that they should receive some protection against the unrestricted importation of foreign agricultural produce; indispensable to both, because the soil would be, in most cases, abandoned, if that protection did not exist. The first circumstance is, that *Great Britain has taken the lead in civilization, whereby the habits of her people are more refined, and their wants more extensive, than those of other nations.* This has been generally beneficial to all other native interests, for it has created a demand for manufactured and commercial articles that has employed a vast proportion of the people.* By this advancement of civilization, many luxuries have become necessaries; and it is from this that British agriculturists have become the British manufacturer's best and largest customers.† Without this, the British agriculturist would not consume more per annum of manufactured articles than him who cultivates the soils of Poland or Russia, instead of consum-

* The total value of manufactures annually reared in Great Britain, is estimated at	£180,000,000
The value of those exported in the average of five years, ending 1841, was	49,680,869
Leaving a home consumption of . .	£130,319,131

† The agricultural population being estimated at one-half, their exclusive consumption is £65,159,565.

ing, as he now does, probably fifty times the proportion. It is easy to particularize a few of the expenses referred to. For instance, the people of those nations which, but for legislative protection, would supply us with food, are clothed in the coarsest native fabrics which can be produced: the British cultivator wears his linen, his flannel, and his broad cloth. The former inhabits a hut with an earthen floor, and feeds on rye bread and water: the latter has a comfortable house, wheaten bread, and frequently malt drinks. The foreign producer has little or no furniture, and no luxury of any kind: the home producer has his house comfortably furnished, and enjoys many comparative luxuries;* and society at large receives the benefit of this refinement. The British agriculturist, therefore, must necessarily receive protection if he is to remain the prosperous member of a community so far advanced in civilization as ours is. Having become habituated to more refined and expensive habits than his foreign competitors; having to live in society which demands of him a greater expenditure of money, he should obviously receive some protection in return. And as those habits and wants operate beneficially upon all around, creating employment and circulating wealth, who shall presume to refuse him that just right? *Common sense* answers, None but the ignorant or the factious. It is not an unjust claim that the agriculturists urge, in demanding protection on the ground of more refined and luxurious habits: it is a claim which any class of producers whatever may fairly make, when other advantages do not supply an equivalent. Experience, moreover, confirms the principle. Hence we conclude, that even supposing all other circumstances affecting the producers of similar articles in different nations to be equal, still, if one nation compels its producers to more expensive habits than others, they may justly claim, and it is necessary they should receive, protection on that account.

Still this is not easily reduced to figures; it is difficult to estimate the precise cost of living, on the part of similar classes, in different countries: nevertheless, as we have endeavoured to shew, it is perfectly just that such an argument should be brought forward, inasmuch as it is a disadvantage to agriculturists, but an advantage to manufacturers. Advancing civilization, increasing refinement, creates a demand for manufactures, but increases the cost of agricultural productions; and, therefore, agriculturists are as much entitled to protection on this account as on any other. We have no reports of the condition of the tenantry of the continent of Europe, but we have of the labourers; and it appears that their wages average from 5d. to 6d. per day:† it furthermore appears that the average price of wheat in all parts of Odessa and Dantzic, in 1840, was 32s. per quarter;‡ whilst Mr. Alison informs us that wheat can be grown in Poland at 16s. per quarter;§ taking the mean as the price at which the continental labourer can purchase it, we have 24s. per quarter. Now, wages average, in England, nearly 2s. per day, and the average price of wheat in this kingdom, for one year preceding July 1843, was 49s. 8d. per quarter.* From these facts a calculation may be made, shewing that, after purchasing the same quantity of wheat as the *whole* wages of the foreigner will procure him, the British labourer has 1s. per day to spend in other articles, affording proof that the habits of the latter are more expensive, in proportion, than those of the former; and, as the British labourer finds his wages no more than sufficient, we are justified in estimating this as a virtual disadvantage of 50 per cent. Dr. Bowring, a free trade advocate, has confirmed these conclusions by giving returns of the proportionate consumption of luxuries by the British and foreigners respectively.† It must be perfectly just, and in strict conformity with the true science of political economy, then, to make some estimate of this disadvantage to the British agriculturist; and the foregoing statements warrant us in placing this at 25 per cent., which is merely supposing the British to spend one-fourth more of their income in comforts and luxuries than foreign agriculturists; a very low estimate, since we have previously proved it, from authentic returns, to amount in some cases to 50 per cent.

The next disadvantage we shall enter upon is that of *the average inferiority of the soils, when compared with those of less thickly populated nations.* This it is which *originates* a demand for foreign agricultural produce, and it must exist before that can be brought in at a cheaper rate than the home produce can be sold at, other circumstances being equal. Even supposing that this kingdom had not naturally a greater proportion of inferior soils than many other nations have, yet the density of the population is such as to call into cultivation large tracts of that inferior land which need not be cultivated in other countries less densely populated. The population of Poland for instance, the greatest corn-producing country in Europe, is but one-fourth that of Great Britain, per square mile. Supposing then the lands of these two countries averaged each the same degree of fertility, still the produce of the latter nation could not be fairly thrown into open competition with that of the former, because the population being four times as great in proportion to surface, four times the proportion of land must be brought

* Alison's *Principles of Population.*
† *Farmers' Almanac* for 1842, and Alison's *Free Trade and Protection.*
‡ Alison's *Free Trade and Protection.*
§ Ibid.

* *Farmers' Almanac* for 1844.

	Great Britain.	State of Prusso-Germanic League.	France.
† Sugar consumed, per head . .	17.1 lbs.	3.9 lbs.	4.3 lbs.
Tea	1. ,,	$\frac{1}{4}$ oz.	
Salt	22. ,,	$16\frac{3}{4}$ lbs.	$13\frac{1}{2}$ lbs.
Cotton goods .	9.2 ,,	4.35 ,,	
Wool	4. ,,	1.67 ,,	
Woollen cloth .	$5\frac{3}{4}$ ells.	2.17 ells.	
Coal	$10\frac{4}{5}$ tons.	$1\frac{3}{4}$ tons.	

—Bowring's *Report on Prusso-Germanic League.*

into cultivation, three-fourths of which must necessarily consist of comparatively inferior soils. But Poland is the most thickly populated nation that would supply us with food under a free trade, it is therefore necessary we should include some others. The population of the United States of America is about 6 per square mile; Russia, 1.3; Denmark, 7; Poland, 52;* and Great Britain, 221.† The average of the four first named, in proportion to their several extents, is about 10 per square mile, or twenty-two times less dense than the population of Great Britain. It necessarily follows that twenty-one parts of twenty-two of the cultivated soils of this country are inferior to the cultivated soils of those nations; but, as the fact of their supplying us with food would necessarily involve the cultivation of a greater extent of soils, we will take the proportion at one-half.

Still, this is painting a picture against the British agriculturist; the soils of Great Britain *are not* of the same average natural fertility with those of other nations. The pastures and grain-producing soils of Northern Italy, Tuscany, Southern Russia, Poland, Prussia, Denmark, and North America, are far more fertile than the average rate of British soils.‡ It may be objected that the consumer ought not to be called upon to pay for the cultivation of inferior soils; and it may possibly be urged that this is a landlord's question. But we would ask manufacturers and other producers, not agriculturists, are they prepared to sacrifice the custom of the cultivators of all the inferior soils in this kingdom? It is estimated that one-half the British population is engaged in agriculture.§ Now, we have already shewn that more than one-half the soils of this country are naturally incapable of competing with the soils of other nations, and we find that this would be the case, after adding the cost of importation to the price of foreign produce, and deducting rent from the price of home:‖ thus, one-fourth the grass population of this country, or more than six millions, of people would no longer be purchasers of manufactures to any useful extent; many would remain, it is true, and drag out a weary existence in the land of their fathers, but even those would be unable to purchase common necessaries. Then, tenants and labourers, are six millions of you prepared to submit to this degradation and ruin? And, manufacturers, are you prepared to sacrifice the custom of six millions of your fellow-countrymen, realizing to you thirty-two millions sterling per annum?* If not, there must be legislative protection for British agriculturists, on account of inferior soils; and, as that disadvantage affects one-half the cultivated land, we may fairly estimate it at 15 per cent.

The third disadvantage under which British tenant farmers and labourers would compete with foreign, would arise from higher prices generally. There is an inevitable depreciation of money in all old established and wealthy communities compared with purchaseable articles: this is owing chiefly to its plenty. In all young, unsettled, or poor communities, money is scarce, and as a necessary consequence, prices are low; but in every old, wealthy, and prosperous community, money is plentiful, and prices are high. This is no evil; on the contrary, it is impossible that any nation can remain prosperous and wealthy, without an abundance of the circulating medium; and all experience goes to prove that every attempt to contract the circulation of *legitimate* money, has been attended by universal failures and insolvencies. Of course we are not now advocating or proving the necessity of an unlimited *credit* circulation, we confine ourselves entirely to *legitimate* money, or that which represents so much real value: nor do we state what that real value, or foundation of the currency, ought to be. An extensive circulation of money in old established and wealthy communities, we repeat, is indispensable; but it must be attended with legislative protection, particularly to the agricultural interest. The great necessary of life—food—is of course affected in the chief degree, because the value of other articles is regulated by that. But the *cheapest-market plea* may be again brought forward; in reply to which we would observe, that he who receives a low price,

* *Facts*, by Sir R. Phillips.

† Extent of Great Britain 120,928 square miles; and population in 1841, 26,831,687.

‡ Alison's *Principles of Population*, and Loudon's *Cyclopædia of Agriculture*.

§ *Reasons for the Formation of the Agricultural Protection Society*, by E. S. Cayley, Esq., M. P.

‖ It is now generally admitted, by the best authorities(*a*), that less than 56s. per quarter for wheat, or a proportionate price for other agricultural produce, would be non-remunerative for the average of British soils. Now, as the one-half above alluded to would necessarily be far below the average, they would obviously be thrown out of cultivation with less than the above rate of prices. It appears from Parliamentary returns, that 17s. 11d. is the average rent of land per acre in England and Wales(*b*); and, as the annual production is estimated at the equivalent of two quarters of wheat per acre(c), 8s. 11½d. may be deducted per quarter for rent. From the authority of an importer, quoted in the *Mark Lane Express* of January 15, we find European corn can be imported, all expenses included, at 3s. 3d. per quarter. The above item of rent will reduce the farmer's remunerative price to 47s. per quarter; whilst the foreigner is anxious to sell at an average price of 28s. per quarter, as appears from the authority above quoted: hence, foreign wheat can be sold at an average price of 31s. 3d., or 15s. 9d. per quarter less than the British tenant farmer can grow it, *rent free*.

(*a*) Sir Robert Peel's *Speech on the Corn Laws*, February 9, 1842. Alison's *Free Trade and Protection*. Cooke, *on Valuation of Land*.

(*b*) *Companion to the British Almanac*, for 1843.

(c) Alison's *Principles of Population*.

* The home consumption of manufactures is . . . . . . (*a*) £130,319,131
One-fourth of which is . . . £32,579,782

(*a*) Alison's *Free Trade and Protection*.

must of necessity pay a low one—the nation which sells its produce for little must spend little; and this could benefit none, but would seriously injure the produce of a highly-taxed nation like ours; because, taxes being fixed and unvarying, the higher prices are, the less oppressive are those taxes. Indeed, prices will rise in old and busy communities, nothing short of absolute despotism in currency regulations can possibly keep them down; and it is obvious to common sense that the greatest necessaries will be chiefly affected by this law. Hence, the legislature must either ruin the nation, by depressing prices; protect agriculturists; or dispense with their services, by supplying more than one-half the consumption of food from foreign nations. The first alternative is its own opposition; the last is impossible; hence the second must be adopted. Again, it is now too sure that, however much agricultural produce other nations are willing to sell us, they will not take manufactures in return; thus they will receive less than the home producer for their articles, and also expend a less proportion of that little in the purchase of British manufactures.* It is, therefore, to the interest of our manufacturers that the present proportion of consumption by the home agriculturists should be preserved, which cannot be without legislative protection. We estimate the disadvantage of higher prices at 10 per cent., as being below all suspicion of extravagance.

Taxation affords the most important argument in favour of the necessity for legislative protection, extended to tenant farmers and labourers, which we have to bring forward. It not only affords invincible reasons why these classes should receive protection against foreign agriculturists, but why they should receive even a greater protection than any other class of producers in the country. Mr. Cayley estimates the agricultural population at one-half the community;† the number of families in which would be about 2,683,000. The annual amount of taxation payable by every family in the kingdom, including local and general, is on the average, £13.* But the tenant farmers and labourers pay nearly six millions and a half more than other classes proportionately; consequently their amount is increased to £14. 4s. on each family, whilst that of other classes is reduced to £11. 16s.†

We find, therefore, that the British tenant farmers and labourers bear a taxation six times as heavy as those of Austria, Spain, or the United States; nine times those of Russia; four times those of Prussia; and twice those of France:‡

---

* Mr. Mc. Gregor stated that the Prussians would not have our manufactures. Mr. J. D. Hume observed that the foreign manufacturers had shewn that they could make our goods. Mr. Joseph Walker said, "I think the manufacturers of the Continent generally are competing with us." —*Report of the Import Duties Committee,* extracted from Mr. G. R. Robinson's pamphlet "Facts *versus* Theory."

	£	s.	d.	
The Russians expend	0	0	8½	each per annum
.. Swedes ..	0	0	9	in British manu-
.. Danes ..	0	0	10	factures.
.. Prussians ..	0	0	3½	.. ..
.. French ..	0	0	11	.. ..
.. Portuguese ..	0	0	8	.. ..
.. Spanish ..	0	0	8	.. ..
.. Americans ..	0	17	0	.. ..
.. British ..	5	0	0	.. ..

—Alison's "Principles of Population."

† "Reasons for the Formation of the Agricultural Protection Society."

* The national income in 1841 was £52,621,545(*a*)
The local taxation is estimated at 18,000,000(*b*)

£70,621,545

The estimated total number of families, allowing five persons to each family, is £5,403,911

(*a*) "Companion to British Almanack for 1843.

(*b*) "Facts," by Sir R. Phillips.

† The value of landed property assessed to the Poor Rates, in 1841, in England and Wales, was £32,655,137; that of dwelling houses, £23,386,401, one half of which being inhabited by agriculturists, would make a total of £44,348,337. The rate in the pound, on the annual value of property assessed in the agricultural counties, was 2s. 3d. The amount therefore paid by agriculturists was £4,989,188. The gross amount collected in 1841 being £6,351,828, it necessarily follows that agriculturists paid £3,626,548 more towards the support of the poor than the other half of the community; in other words, they paid four-fifths of the whole.—See "Abstracts of Parliamentary Documents, in Companion to the British Almanac for 1843.

The local taxes of the United Kingdom, including roads, poor, tithes, and local justice, are £18,000,000.—"Facts," by Sir R. Phillips.

Estimating tithes at one-half, which we deduct, being paid by landlords, we have £9,000,000 left, four-fifths of which are paid by the agricultural population.

Hence, the proportion of taxes payable by agriculturists above all other classes are, £7,200,000.

The Anti-Corn-Law League estimate the following as the taxes from which agriculturists are free (see "Dialogue on the Corn Laws between a Gentleman and a Farmer"):—

Horse tax	£500,000
Window tax	50,000
Servants	50,000
Duty on insurances	80,000
Auction duty, &c., not estimated by the League, but which we will place at	100,000
	£780,000

Leaving £6,420,000 as the amount to which agriculturists are taxed, over and above all other classes.

		£	s.	d.	
‡ Each family in	Russia pays	1	9	0(*a*)	Sterling annually in taxation.
.. ..	Austria ..	2	3	0(*a*)	
.. ..	France ..	6	1	0(*b*)	
.. ..	Prussia ..	3	6	0(*a*)	
.. ..	Spain ..	1	18	0(*a*)	
.. ..	United States	2	3	0	

(*a*) Including roads and poor rates.

(*b*) Including roads, poor rates, and tithes.—"Facts," by Sir R. Phillips.

whilst they also bear one-fifth more than any other class of producers in Great Britain!

If protection is of no benefit to operative agriculturists in any other respect, surely it is so in this. And if they can claim it on no other ground, surely the plea of undue taxation must have some weight in the minds of those who love justice. From the above-quoted facts it is manifest, that tenant farmers and labourers are not only entitled to protection, as members of a highly-taxed community, but that they are entitled to a greater protection than any other class, as the most highly taxed in the community. Still, it may be contended that high rents are the cause of the tenants' inability to withstand this pressure of taxation, and that the landlords have, as legislators, imposed these burdens upon their tenants and labourers, and afterwards passed protective laws to shelter them from the consequent injury. In reply to which, it would be sufficient for general purposes that we should observe, if landlords have had such disposition and such power, they might, *at once*, have imposed the heaviest taxation on other classes, and not on those whose ability to pay is alone consistent with their own prosperity. For it is evident that landlords must have acted in direct opposition to their own interests, if they imposed additional taxation on those dependant upon them, in order to screen themselves, and then gave protection by way of a *set off*. But it is indispensable that we should *prove* our arguments, and not take anything for granted. It is already well known, that if landlords have had the disposition, so far from having succeeded in legislating to their own advantage, their property pays the least of any kind whatever. Even their tenants have a far better return than they; for, whilst the tenant expects to, and generally does, receive his 10 per cent.,* the landlord never realizes more than 3 per cent.† Hence it seems ridiculous to talk of landlords having benefited themselves and injured their tenants, by legislative protection; nevertheless we prefer placing the tenant farmers and labourers in juxta-position with their competitors, *rent free*.

The estimated number of cultivated acres in this kingdom are 46,522,970,‡ one-fourth of which may be fairly estimated as woods, &c., not cultivated by tenant farmers; this reduces the quantity to about 35,000,000 acres. The estimated rent of land in the kingdom, on the average, is nearly 18s. per acre§ per annum, which would give a sum total of £31,500,000. But there are tithes, and other liabilities, to be paid out of rent, amounting to more than one-sixth, which reduces the landlords' receipts for rented lands to £26,250,000. Now we have previously shewn that the agricultural population comprises about 2,683,000 families, each of which pays, on the average, £14 4s. per annum in taxes. The average paid by the families of other nations appears to be, on the average, about £2 per annum; which leaves £12 per annum, as paid by each British agricultural family, over and above those of other nations; consequently British agriculturists pay an annual taxation of £32,196,000 more than foreigners. Thus, *if rent-free*, the British agriculturists would have to pay an annual taxation of £5,946,000 more than those of other nations, that is, supposing taxes to be deducted to the amount of rent. Tenant farmers and labourers must, therefore, have protection, even if they were rent-free, on the ground of oppressive taxation. Then how absurd to declare the landlord alone interested in legislative protection!

It is easy to reduce the burden of taxation to a tangible shape. Land valuers have generally agreed that the tenants' and labourers' portion of the gross produce should be twice the amount of rent; and as we have calculated this to be £31,500,000, their gross income may be put at £63,000,000. The amount of taxation payable by these classes over those of other nations, we have shewn to be £32,196,000. Hence, the disadvantage of taxation amounts to 51 per cent.

The last argument we shall cite, as showing the necessity of legislative protection, is, that without it the agriculturist must sacrifice the capital he has invested, on his faith in its continuation. It is useless arguing in opposition, that the protection might be *gradually* removed, so as to enable him to recover his capital; for there are millions of acres in this country that the capital sunk in could never be recovered from. Such are all those which must go out of cultivation without protection. That there are vast tracts of land so circumstanced has been already proved in a previous part of this essay; and it is still more clear such must be the case, from the fact that the foreign cultivator can undersell the home cultivator in his own market, if the latter is rent-free. Surely, then, the millions sterling that have been invested in the recovery of waste lands, and in the cultivation of otherwise barren spots,* should be taken into consideration, when dealing with that important question—legislative protection. The individual who has invested his capital in the cultivation of soils, solely upon his faith in the continuation of legislative protection, is as justly entitled to a return for that invested capital, as the fundholder or any other speculator. If the agriculturist is deprived of this protection, it is but fair that all others should; and such a system, generally carried out, must inevitably lead to the downfal of the British Empire.

The last disadvantage cannot be reduced to a per centage; and the four first are recapitulated below, showing what degree of protection is necessary to the tenant farmers and labourers, *exclusively*.

	Per cent.
More expensive habits	25
Poorer soils	15
General higher prices	10
Heavy taxation	51
	101

* "Cooke on the Value of Land."

† "Reasons for the formation of the Agricultural Protection Society," by E. S. Cayley, Esq., M.P.

‡ Porter's "Progress of the Nation."

§ "Companion to British Almanack," for 1843.

* "I say that the capital invested in the soil by farmers exclusively amounts to the enormous sum of £654,833,930 sterling."—Speech of the Rev. H. F. Yeatman, at Sherborne, February 8th, 1844.

In the foregoing recapitulation of actual disadvantages, no notice is taken of many others always attendant on more wealthy communities; nor are those enumerated taken at an extreme rate; on the contrary, they will be found to be far below the real evils themselves. Now, in return for their submission to this 101 per cent., agriculturists can justly claim protection to a like extent; precisely as in return for submitting to the law of the nation, they can justly claim the protection of that law. This, and this alone, is justice. We have written of their inability to compete with the foreigner rent-free; and here is proof of it. The rent should be, and generally is, one-half the labourers' and tenants' share; this would be 50 per cent. of their income. But the landlord has various claims upon him, which, if the land was rent-free, must fall upon the cultivators; these amount to one-sixth, which reduces rent to 42 per cent., and proves that *if rent-free*, the cultivators would still be at a disadvantage of 59 per cent. But it is absurd and unjust to look at the cultivators' condition if rent-free. The landlord is as much entitled to his rent as any other individual of the community to the interest arising from his wealth; and that rent ought to leave a net profit equal to the average return from funded property; but we have shewn it does not, and therefore landlords do not receive even so much as they ought.

The highest amount of protection to the tenant farmers and labourers, on any article whatever, is not more than 28 per cent., and on live stock it is not more than six per cent.;* thus these classes are even now struggling at a disadvantage of more than 70 per cent. in the cultivation of grain, and more than 90 per cent. in the production of live stock. It is necessary here to remind the reader, that the above 100 per cent. is the disadvantage at which the British agriculturist competes with the foreigner, and has nothing to do with the relative prices of home and foreign produce, inasmuch as the home producer must be protected to that degree before he can be considered on equal terms with the foreigner.† Even if the three first disadvantages be disputed, the last (taxation) affords incontrovertible proof that the British agriculturist needs a protection of at least 50 per cent.; whilst on wheat alone does the protection exceed half that proportion.

We have shown, then, from facts and figures, in the preceding portion of this essay, that protection is necessary to tenant farmers and labourers *exclusively*. And, by way of parenthesis, to those who doubt whether this is legitimately the subject for an essay on the *advantages* of legislative protection, we would observe that it would be but a poor production if it did not first show the necessity of that protection; indeed, the *indispensable* advantages are so intimately connected with their necessity, that we have found it impossible to treat the question in any other way.

We have proved, then, protection to be necessary to the classes referred to, exclusively, even if they were rent free. We have proved that landlords do not receive generally too high a rent. We have shown, moreover, that there is protection given to agriculturists, varying from 4 to 28 per cent., and consequently we conclude that tenant farmers and labourers receive *indispensable* advantages to that extent.

Independent of the *necessity* of legislative protection, it is productive of great advantages to farmers and labourers; advantages which cannot be considered indispensable, and which we therefore term *absolute*.

To the tenant farmer it is of great advantage, by preventing those extreme fluctuations in prices which must occur under a free trade, in any nation where population encroaches upon the means of subsistence; and which are so exceedingly prejudicial, by encouraging speculations of a gambling nature, and by rendering it impossible that the producer can calculate, with any degree of certainty, his probable income.

The fluctuation in the price of grain, from 1815 until 1838, was greater, by the following proportions, in the different places named, than in this country: Hamburg, 181 per cent.; Prussia, 72; Saxony, 129; and Dantzic, 95.* Again, it was greater by more than 100 per cent. in this kingdom, previous to the passing of the restriction law of 1815

* The following statement shows the price which it is necessary the British farmer should receive for good samples of the chief kinds of agricultural produce, together with the amount of protection upon each article:

	Average remunerative price.	Amount of protection.	Protection per cent.
Wheat .	56s. per qr.	16s. per qr.	28
Barley .	32s. ..	6s. ..	18
Oats . .	24s. ..	4s. ..	16
Rye . .	34s. ..	8s. 6d. per qr.	25
Beans .	38s. ..	4s. 6d. ..	11
Peas . .	38s. ..	4s. 6d. ..	11
Hay . .	£4. per ton	17s. 9d. per ton	22
Fat beasts	£18. each.	15s. each	4
Fat sheep	50s. ..	3s. ..	6

† As a proof how moderate our calculation of disadvantages is, we annex a comparative statement of home and foreign prices, whereby it will be seen that our estimate (100 per cent.) is far below the actual average difference.

	British price.	Price in America quoted from Mark Lane Express for May 20th.	Proportion per cent. in foreigner's favour.
Wheat	56s. per qr.	31s. per qr.	80
Oats .	24s. ..	7s. 8d. ..	220
Hay .	80s. per ton	20s. per ton	300
Oxen .	£14. each	£6. each	133
Sheep .	50s. ..	6s. ..	733
Pigs .	8s. per score	2s. 6d. per score	220

* *Speech by Mr. G. G. Day*, at Huntingdon, June 17, 1843.

than it has been since.* Indeed, it is only reasonable such should be the case, since, under free trade, importations would take place at certain times to a greater extent than at others, depending upon the supply abroad, and not, as under the present law, upon the necessity at home.

The beneficial effects of protection to the tenant are no less forcibly demonstrated by its prevention of that ruinous diminution in prices, which would inevitably ensue from a supply more than equal to the demand. It is found that an inadequate supply raises prices considerably more than proportionately;† and it is equally clear that a superabundant supply depresses prices more than proportionately. It would be only rational to suppose that abundance causes cheapness; but it has been also observed that continued and extreme abundance causes undue cheapness. Under present regulations the supply rarely exceeds the demand, or, if it does, one week's consumption serves to reverse it; but, under free trade, owing to the want of foreign markets on the part of other nations, we should have an uninterrupted abundance for two or three years, which would so diminish prices that they would descend far below even the *present* continental averages, and thus the home producers would be ruined. Then we should be dependant on those who would exercise a tyrannous monopoly, by raising prices to what they pleased, without expending anything like the proportion our present producers do, in the purchase of British manufactures. Thus, the farmers and labourers would be ruined, and the nation in no wise compensated for their loss. Under free trade, we have proved, and it is notorious, that provisions of all kinds are alternately higher and lower in prices than in this nation under legislative protection. The greatest variation in that fluctuating article, wheat, for instance, was but 79 per cent., from 1828 to 1841;‡ a degree of stability in the price of that article, unparalleled under any other circumstances. To prove that prices are more than proportionately diminished or increased by any diminution or increase in the supply, we need only instance the highest and lowest prices of wheat, during the operation of the last corn law. In December, 1835, the price was reduced to 36s. 8d., but in January, 1839, it was as high as 79s. 9d.; this shows a variation of 117 per cent., but it would be a perfect fallacy to suppose that there was anything approaching a like variation in the supply; in other words, that the crop of 1838 was less than one-half that of 1835; for, if it had been so, there must have been a grievous famine, with an importation of foreign corn, amounting to less than two millions of quarters in the former year. Under a free trade, therefore, the farmer must anticipate a lower price than that of '35, continued for some time, or, as we have already shown, 15s. 9d. less than he can grow it at, rent free, and other things in proportion; for if the raw materials can be imported at this low rate, the manufactured article (meat) will soon be brought in also, and the same laws regulate the prices of every article. Protection from this is, therefore, the second advantage farmers receive.

As tenant farmers are benefited or injured by that which benefits or injures the nation at large, *they are benefited by legislative protection in its prevention of a perpetual drain of the precious metals,* which must ensue from a free trade in the necessaries of life. It is now an exploded fiction that other nations will take our manufactures in return for provisions to a like extent. Free traders themselves have given in evidence to that effect,* and statistical returns prove the truth of it.† This it was which caused the drain of bullion in 1838 and '39, when the Bank of England was driven to the necessity of borrowing three millions sterling from the Bank of France. A scarcity was thereby produced, which occasioned that stagnation in the country from which it has not yet fully recovered. We know that other causes have assisted in producing this state of things, but still it is clear that foreign provisions must be paid for, and if, as is clearly the case, other nations are discouraging the use of our manufactured exports, then they must be paid for in the precious metals; and we have seen enough already of the injurious effects of a drain on the currency, to be enabled to judge of its ruinous consequences to all classes.

Protection is productive of no mean advantage to tenants, again, in enabling them to bring into cultivation poor or waste lands, whereby local burdens are diminished. If there are 2000 acres cultivated in any one parish under protection, which would be diminished to 1000 under free trade, it is evident the tenants of the latter portion must be benefited by protection, since they have but about one-half the parochial rates to pay. Double the number of acres in cultivation must of necessity di-

* *Essay published by Anti-Corn-Law League,* written by Mr. Greg.

† Porter's *Progress of the Nation.*

‡ Spackman's *Statistical Tables.* N.B.—This is the fluctuation in annual wages.

* *See* Evidence of Messrs. McGregor, Hume, Walker, Johnston, Moore, Smith, Porter, and Dr. Bowring, before Import Duties Committee.

†	Official value of British and Irish produce and manufactures exported. £	Wheat, foreign and colonial, annually imported.
1830	61,140,864	1,663,283
1831	60,683,933	2,309,970
1832	65,026,702	469,902
1833	69,989,339	227,565
1834	73,831,550	176,321
1835	78,376,731	66,905
1836	85,229,837	241,743
1837	72,548,047	559,943
1838	92,459,251	1,371,957
1839	97,402,726	2,875,427
1840	102,714,060	2,483,267
1841	102,180,517	1,948,121
1842	100,200,101	1,241,761

Porter's *Progress of the Nation,* and *Parliamentary Tables.*

In the above statement we find an extensive importation of foreign grain to have been attended or followed by a diminished exportation of manufactures.

minish the proportion of rates upon each acre to nearly one-half. That there are millions of acres which could not be cultivated under a free trade, we have already shown. Now, the non-cultivation of a portion of the present productive soils of this country would throw a proportionate number of individuals out of employment, who must afterwards be supported by those in employment. Hence, a smaller area would have to bear a greater aggregate burden of local taxation. By the same rule also, the productive classes being reduced in number, would increase the weight of general taxation upon the remaining portion. If, by a free trade in provisions, the present productive population should be reduced one-sixth, nearly twelve millions of annual taxation would be added to the remaining portion, who would be then so burdened that to exist would be a miracle.

The last advantage of legislative protection to the tenant, which our limited space will permit us to notice, is, that *it prevents foreigners from obtaining that wealth so speedily as they otherwise would, which will enable them to compete with British manufacturers, in their own market, and thereby deprive agriculturists of a portion of their present customers.* To assert that any one class in a nation is independent of others, is to declare that which is alike opposed to reason and experience. In order that any nation should flourish, all interests must be supported; the manufacturer is as necessary to the agriculturist as the agriculturist to the manufacturer, neither is independent of the other. If foreigners obtained that wealth, by selling us provisions, which would enable them to raise manufactures and compete with the British, the home agriculturist would be deprived of a portion of his customers. If the number at present engaged in manufactures was reduced one-fourth, so would their consumption be reduced one-fourth, and this must tend to injure tenant farmers. That our continental neighbours only require wealth to compete with the British in manufacturing, is now generally known and acknowledged; and as that wealth would be supplied by purchasing their provisions, it is evident that protection against the importation of such provisions, farther than is indispensable, is a great advantage to tenant farmers.

It is clear, therefore, that legislative protection is productive of important *absolute* advantages to tenant farmers exclusively. It prevents extreme fluctuations in prices; it prevents the supply from greatly exceeding the demand, and thereby a multiplied ruinous depression in prices; it prevents an incessant drain of bullion, and thereby tends to maintain higher prices generally; it diminishes local and general taxation; and it preserves plenty of consumers for that the farmer has to sell. With these, and those previously enumerated, it is clear legislative protection is advantageous to tenant farmers; it is, moreover, obvious that ruin, immediate and complete ruin, must overtake the majority of them, if deprived of legislative protection. And if the agricultural occupiers are ruined, who will answer for the welfare of the community at large?

We have but little space left us to show the advantages of legislative protection to farm labourers exclusively; we must, therefore, be as brief as possible upon this subject. We have already shown its necessity to the comfort, prosperity, and even existence of this class; but there are many advantages, *absolute* advantages, conferred upon them by it, which we will briefly advert to.

It is of the highest importance to the agricultural labourer, that there should be as little fluctuation in price as possible; for it is too true that a considerable fall in the price of food is attended with an immediate fall in wages; but a rise in the former is ever followed by a tardy increase of the latter. This is only a state of things which it might be imagined would occur, and one for which none can be blamed, but still one which should be prevented as much as possible; and experience proves that legislative protection has the desired effect. Unquestionably, the great necessaries of life will always be liable to considerable fluctuation in prices; but this is less under protection, than under free-trade. In addition to the evil referred to, when the price of provisions is such that the labourer has a greater command over them, he becomes careless and extravagant; he does not see the necessity of saving the surplus against dearer times, but expends it all; and consequently, when prices rise again, he finds his wants greater than his means, and thus he becomes miserable. The more steady prices are, therefore, the better is it for the labourer; and this is effected by legislative protection.*

Although wages must, in a series of years, be regulated by the price of food, yet they are influenced, in a considerable degree, by supply and demand. If labourers are more than are wanted, the competition for work compels them to receive lower wages than otherwise; whereas, a demand for labourers must place them in a position to claim a higher rate of remuneration. It has been already made manifest, that soils are brought into cultivation under protection, which must be abandoned under free-trade. There are 14,000,000 acres of land in Great Britain, yet uncultivated, but capable of cultivation.† If legislative protection is continued, this land may be cultivated; which will give employment to more than 3,000,000 of people.‡ The consequence of which would be,

---

* Comparative fluctuations in the price of wheat, in different nations, from 1815 to 1838.

	per cent.
Great Britain	140
Hamburg	321
Prussia	212
Saxony	269
Westphalia	334
The Rhenish Provinces	312
Bordeaux	260
Lisbon	213
Rotterdam	295
Dantzic	235

—*Speech of Mr. G. G. Day, at Huntingdon, June 17th*, 1843.

† Porter, in his "*Progress of the Nation,*" gives 15,000,000.

‡ One-half the population being employed at present in the cultivation of 46,000,000 acres.

that the demand for labourers would be far greater than the supply, and higher wages would ensue. Wages are high in America, where labourers are scarce;* but low on the continent of Europe, where they are plentiful.† *Raising the demand for labour is the second advantage conferred upon the farm labourer by legislative protection.*

By calling into cultivation a greater extent of land, and by the increased employment consequent thereon, the burdens of taxation would be less; and this would be another advantage to the labouring population. By retaining in cultivation the poorer tracts of land, the burdens of taxation are maintained at a lower rate than they otherwise would be. Our population is increasing at the rate of 300,000 per annum, and this proportion cannot be half employed in manufactures;‡ consequently, a considerable number must either be employed in the cultivation of land, or become a burden upon the rest. We have shewn that nothing but legislative protection to the agricultural interest can maintain those lands in cultivation, which will afford employment to the surplus population for years to come.

Legislative protection is thus productive of numerous advantages to the agricultural labourer. It operates in various ways, all tending to improve his position in life. It brings into, and maintains in cultivation, lands which would otherwise lie barren; and thus it creates a demand for labour. By preventing extreme fluctuations in prices, it makes wages higher on the average than they would otherwise be. It moreover diminishes the amount of taxation payable by each individual, by employing greater numbers, by making fewer those dependent on their fellows, and by increasing the number of those who pay. And it confers a secondary advantage upon this numerous class, by its many advantages to the tenants. If the employer is in a better position, so much the more is he enabled to make his labourers so. It is impossible that the tenant farmer can be long depressed, without that depression extending to those beneath him. Even if he is more than ordinarily desirous of maintaining his labourers in comfort, yet he will soon find it impossible to do so, under the weight of heavy depression. Indeed, it is clear to the commonest understanding, that the interests of tenant farmers and labourers are so intimately mixed up—so interwoven with each other, that they must of necessity stand or fall together. Whatever tends to the benefit of the one, must in the end prove advantageous to the other.

But the agricultural labourer has a greater interest in the success of agriculture than any other class in the community. His stake in its prosperity is even greater than the tenant farmer's. The latter is generally a man of some little available capital, and possessing a certain stock of education and general information, with which he may, if ruin overtakes his present occupation, enter into some new employment at home, or embark for another shore. But the labourer is chained to the soil on which he works. Starvation or the workhouse awaits him and his family, if he cannot gain his subsistence upon the soil on which he was born. We may talk of emigration, but there are no means of emigration for him; he would perish with want before he reached a seaport town. Or if he embarked for another country, and reached there, he would be destitute of the means or knowledge requisite to obtain his desired end. Again, without education, his mind is unequal to the hard task of tearing himself from his present habitation. He would starve on the spot ere he acquired energy enough to encounter the uncertain difficulties of a country unknown to him. As to seeking his living in other pursuits, it is out of the question. He is, of every class, the least fitted to overcome the difficulties of a change in occupation. Under all these circumstances, it is indispensable to him that agriculture should still flourish; with it he must fall or rise accordingly. And when it is remembered, that, of the 13,000,000* persons engaged in agriculture, in this kingdom, more than 10,000,000 must be labourers, it becomes the subject of serious consideration, whether they should be protected or ruined.

That agriculture would be depressed, and that most severely, without protection, we have shewn; that the labourers must depend on agriculture is clear; and considering the necessity of legislative protection, it therefore becomes a question, whether the nation is prepared to submit to the depression of ten millions of its people.

Agricultural labourers receive many advantages from legislative protection, and those advantages are returned to the community at large; but without protection they would be useless to others and wretched themselves. Deprive them of that, and they must submit to inhabit the same wretched hovels, be clothed with the same coarse materials, and fed on the same rye-bread and water, with their competitors of other nations. In fact, the advantages of legislative protection are great to labourers themselves, and through them to all other classes.

We have now accomplished the object we had in view. We have shewn that the tenant farmers and labourers, as a body, are entitled to a protection of 100 per cent.; in other words, that foreigners can sell, on the average, at one-half the price which the British can. We have shewn that they now receive a protection, varying from 28 per cent. to 4 per cent.; and therefore, this is, to that extent, advantageous. We have not attempted to shew how it is that they have been enabled to struggle on, at a direct disadvantage already of 70 per cent. The immense losses which landlords are compelled to bear annually from ruined tenants; the diminished and rapidly diminishing capitals of those tenants;

* The usual price of a day's labour in America is now a dollar (4s. 2d.) *Essay, by Arthur Morse*, published by Anti-corn-law League.

† Mr. Alison proved from authentic data, that the average of wages on the continent, 3s. 11¾d. per week of 79 hours.—Alison's "*Principles of Population.*"

‡ This is clear, since our foreign trade is not increasing, and there are already too many engaged in supplying the home market.

* In round numbers, estimating them at one-half the population, they would be 13,415,843.

the landlords receiving 2 and 2½ per cent. for wealth in the shape of land, which, in other forms, they might receive 4 or 5 per cent. for; the inventions (and *necessity* is the mother of invention), and shifts to which agriculturists have been compelled to resort: all these things must furnish answers to that question. And it should be remembered that there is no argument against legislative protection to be drawn from the fact of depression in agriculture existing with it. Our object has been to shew that tenants and labourers receive advantages from legislative protection, small as that protection may be; and at the same time to shew that that protection ought to be greater.

We have moreover shewn that legislative protection is productive of many advantages to labourers and tenants respectively; advantages, which, although not indispensable, have had great influence in enabling agriculturists to withstand the ruinous effects of a reduction in that protection, and in promoting the comfort of those classes generally.

In estimating these advantages and disadvantages, we have considered them independent of any other class whatever. They are just those under which they exist, when compared with their competitors of other nations. We think, therefore, that our purpose is accomplished.

Before we conclude, we will advert to the oft quoted plea, that those thrown out of employment by the removal of protection, might find it in other occupations. This is untenable and absurd. Manufacturers cannot employ even the present surplus population; how then could they employ millions more, with a diminished home trade, and no extension of the foreign? Six millions of agriculturists would be thrown out of employment by a free-trade in food; this would reduce the home trade in manufactures one-fourth, or thirty-two millions per annum. Now, a foreign trade to the same amount must be added to the present, before one of the six millions could be employed, and where is there a promise of this? To employ those six millions would require a further foreign trade of one hundred millions sterling. Where could it be obtained? Our present foreign trade is not more than fifty millions sterling annually; and every attempt to increase it, by offering terms of reciprocity, and making advances towards the free introduction of foreign staple produce, has been followed by immediate restrictions on our manufactures; whereby the foreign trade has actually decreased, in proportion to our increase of population. Where then, can we hope to obtain a foreign trade of two hundred millions annually, which alone can compensate us for the removal of agricultural protection? It is weakness—it is palpable delusion, to suppose it even possible.

Legislative protection is necessary to the existence of the present proportion of tenant farmers and labourers, and their existence is necessary to that of the manufacturers, whilst these are both essential to the prosperity of the whole community—to the welfare and even existence of this independent nation. Thus the nation is dependant for its prosperity, in the chief degree, on legislative protection to agriculturists. Without it, all will be depressed; with it, all may flourish. And well would it be for society at large, if that protection was greater than it is, for, at the present rate, foreign competition will soon ruin many, and seriously injure all.

A national debt is artificial; civilization itself is artificial; and these two artificial circumstances require artificial regulations. *When wars and rumours of wars are no more heard of, when civilization becomes generally equal, when justice rules man instead of self-interest, and when the present national distinctions no longer exist, then may we think of free trade between nation and nation. But until this occurs, nations must be content to preserve their prosperity and independence by legislative protection.*

IMPORTANT DECISION UNDER THE TITHE COMMUTATION ACT.

TOMLINSON, CLERK V. SIR F. BOUGHEY, BART., AND ANOTHER.

This was a rule, lately heard in the Common Pleas, calling upon the defendants to shew cause why they should not accept an issue under the Tithe Commutation Act, 6 and 7 William IV., chap. 71, sec. 76, by way of appeal from the decision of the Assistant Tithe Commissioner. The point raised was new. The plaintiff is the rector of the parish of Stoke-upon-Trent, and the defendants are the devisees in trust of certain lands within that parish, in respect of which they had set up no less than 14 different modusses. Of these 14 modusses, 10 were decided in favour of the defendants, and 4 in favour of the rector. No question arose about the latter moduses, but it appeared that the aggregate value of the payment for lands, covered by the moduses, which the Assistant Tithe Commissioner had found for the defendants, was considerably above 20*l.*, although the individual value of the payment, in respect of each farm, was below that amount. The rector, being dissatisfied with the decision of the Commissioner, obtained the present rule in the course of Easter term.

Cause was now shown against the rule. It was that the object of the act of Parliament would be entirely defeated if the Court should entertain the present application. The intention of the act was to make the decision of the commissioner final in every case upon which he was called on to adjudicate where the value of the payment to be made or withholden according to such decision did not exceed 20*l.* In the present case, the Commissioner had been obliged to give a separate decision upon the merits of each one of the farm moduses which had been set up by the defendants, and as the yearly value in each case was below the amount of 20*l.*, the rector had no right to appeal from the decision of the Commissioner.

Mr. Serjeant CHANNEL, on the other side, contended that the meaning of the act was, that any person who had an interest in the matter decided, exceeding the yearly value of 20*l.*, and who was dissatisfied with the decision of the Commissioner, might resort to an issue at law by way of appeal from his decision. The aggregate value of the tithes of the farms which the Commissioner had decided were covered by the various moduses set up, was considerably above that amount, and therefore he submitted that the parties ought to have the question settled by the trial of an issue.

The Court, however, after referring to the language in the 44th, 45th, and the 46th sections of the act, said that it appeared to them that the construction put upon the statute by the counsel for the defendants was the correct one, and discharged the rule.

THE TURNIP CROP.

TO THE EDITOR OF THE FARMERS' GAZETTE.

Sir,—In the whole range of practical agriculture nothing is so important as the proper management of the turnip crop: the rotation of crops depends upon it; and if mismanagement in this preparatory step be made, a yearly loss is inevitable during the round of rotation.

As the season of turnip sowing will shortly be round, I have attempted to lay before you the mode of operation which for many years I adopted with success, from the first to the last stage of this, the most important of all crops, in its management.

Preparing the Soil.—The first process is to cross-plough the land, either by cutting the old furrows at right angles or obliquely, as convenience may suggest, then harrow the surface to fineness. If clods make their appearance, the hand wooden mallet, roller, and clod-crusher must be vigorously applied, and all weeds lifted and removed off the surface.

After the first ploughing and harrowing, if the soil appears so far pulverized that it can admit the grubber, apply it; but if in passing through the soil it causes large lumps to rise which do not crumble in pieces, its application at this stage is improper; recourse must again be had to the plough, and the rule is, to plough narrow and deep, so that the mould-board *mills the clods to fineness.* This is rather a severe operation for the horses, but it is the most speedy and effectual way of thoroughly reducing the soil.

Harrowing, grubbing and harrowing, and the removing of weeds, alternately follow, until the soil is considered fit for drilling; and let it never be forgot, that the finer the soil is pulverized, it attracts more moisture from the air during extreme heat and drought, never binds, and gives free access to its every particle, so that the atmospheric air acts uninterruptedly, which is the life and spirit of vegetation.

I have, however, to mention, that in giving the first ploughing as directed, it is not applicable in every case; for instance, if the soil be of a strong, clayey nature, and not brought into a loamy state by good culture, and if by chance or bad management the stubble-furrow had been laid over when too wet, such lands in the spring of the year will become bound and hard; and the evil to be apprehended in ploughing across is, that the old furrow slices would be cut into square lumps, which would create an immensity of additional labour to break them down. Therefore, instead of ploughing across, plough in the same direction in which it was previously done: this process will split the old furrows, and the pressure of the mould-board will break the split furrows into smaller pieces; by this precaution two-thirds of labour will, in many instances, be saved.

Drilling. — This operation is performed in three different ways: when the land is properly wrought, the double mould-board plough is used in the well-known way. The next method is advisable when the land is not in the best condition: this is done by the common plough first opening the drill, and returning in the same track, cutting three inches or more off the new-made drill; this allowance for cutting off must be taken in by the ploughman when opening the new drill. If this care be not taken, the drills will be formed of a bad shape, like the letter Λ, inverted, whereas they should be like the letter U, inverted. The next and last method is what is called cutting out: this operation is also performed with the common plough, but the land must be in the finest condition before this plan is admissible. The process is this: the field is feered off into parallel sections, forty yards lêss or more apart: each ploughman commences at one of these feerings, and cuts out the drill off the furrow wake of the last drill, throwing out the earth always to the unbroken ground. The necessity of this speedy operation is to get the land fowarded in drilling, when the soil is in condition, and the weather favourable, so as the whole strength of the farm can be brought to bear on the operations following.

This speedy method of drilling is well suited to this busy season, but it is not advisable to have the drilling too far in advance of the dunging, and other operations, as the drills are liable to become scorched in very dry weather; and the fresher the drills, the more likely the crop is to succeed.

The usual width of a turnip drill is twenty-seven inches, but there will be instances when twenty-five inches will be enough; and in others when thirty inches will be required.

Manuring.—When laying the manure in the drills commences, the disposable force of the farm should be so arranged, that the greatest expedition can be given to the operations.

The best mode in leading out the manure is, to employ as many carts and hands as will keep one or more ploughs covering, according to the size of the farm: the force should be so balanced, that the fillers should be able to have a loaded cart at the hand of the puller out, before he has got the preceding cart emptied; and that an empty cart be always at hand before the preceding one is filled. Not more than three persons should ever be allowed for the filling of a cart at the dung heap; one distributor, and three spreaders; that is, one to each drill—follow the puller out, who carefully breaks and spreads the manure in the bottom of the drills. In this way the plough is pushing on the spreaders, the spreaders are pushing on the fillers, and the work is thus carried on with ease, spirit, and expedition. The quantity of manure for a statute acre should never be under twenty-five tons of farm-yard dung; and there is little danger of any farmer giving his land a surcharge of this valuable article.

The Deposit of Artificial Manures.—Much difficulty, and often loss, have happened in applying artificial manures to the soil. There is a safe way, if adopted, not only for the safety of the manure, but as a safeguard against the evils which have so often occurred, by the seeds being placed in too close contact with these artificial stimulants.

To prevent these evils, the drills are made with the common plough, in the way before described "cutting out;" but in this operation the plough must not go so deep. The guano, bone-dust, &c., are sown on the side of the drill, or rather in the plane of the drill, which has not been covered, from the intended shallowness of the cutting-out furrow; the manures are then covered by the plough, in giving the drill what is called the sweep—this is done by the plough going in a contrary direction; and the sweeping, earths up the lower side of the drill to the same height of the other side, and thus the manures are safely covered.

It will be necessary to have at least eight or ten drills betwixt the last cut drill and the last sweeped, this will give room for the sowing of the manures; and then the ploughman goes round and round, cutting out the one way, and sweeping up the other.

Seeds.—With the different kinds of turnips, farmers are generally well acquainted; but there is one kind to which I beg to draw your attention; it is called "Skirving's purple Top" (not a Swede); it is a hybrid betwixt the finest species of the Swede kind and that of the yellow species. This superior kind of turnip was first propagated by Mr. Skirving, farmer, Quarryholes, near Edinburgh, who is still cultivating it, and preserving its seed in the greatest purity. For these last six years I was a constant visitor of the farm of this eminent agriculturist; and it was there I saw this turnip in its superior excellence. For the information of those who have not seen this bulb, it is in shape beautifully rounded; when denuded of tail and top, and a quantity of them heaped together, they have a similar appearance to a pile of large cannon shot. This bulb is firm and solid, sweet to the taste, and excellent for both milk and fattening. I therefore recommend this kind as the most profitable, on good and well-prepared soils.

The next variety, in point of utility, is the Aberdeen purple top yellow, which is universally cultivated in the district from which it takes its name, to the exclusion of almost all other sorts.

In the pure Swede variety, I recommend that of Mr. Skirving's, Liverpool.

Sowing.—The quantity of seed necessary for an acre is of little consequence to be nicely considered, provided enough be sown; for whether thick or thin, in the first instance, the thinning afterwards will give the proper allowance of plants for the ground. From three to four pounds of turnip seed of any kind I consider quite enough per Irish acre.

The best time for sowing turnip seed is in the afternoon, and as quickly after the manure has been covered in as it can be possibly done; for it is a well-known fact, that turnip seed sown in the same field on the same day, during extreme heat, and the soil parched, will not equally braird; that part of the field which was sown in the evening will take the lead of that part which was sown in the forenoon during the extreme heat of the day; and in many instances, the seed of the forenoon sowing will remain for weeks in the soil without springing, whereas seeds of the same kind sown on the same kind of ground in the evening, vegetate forthwith.

The depth to which turnip seed should be deposited will depend much on the trim of the ground: when in a proper state, the covering that will fall over the seed will be about an inch; when sowing over artificial manures, care must be taken that this depth is not exceeded; when sowing over farm-yard manure, deeper sowing may be tolerated; but under no circumstance should the depth ever exceed an inch and a-half.

Machines for sowing should be so constructed that the covering roller may be taken off as occasion may require; for I consider covering up the seed with a roller to be, in most cases, altogether unnecessary, even when the ground is very dry.

When proper care has been taken in the preparation, there is no danger of turnips succeeding when the rollering has been dispensed with; but when rolled, it has often proved otherwise. This I have proved from twenty years' experience and observation; and it can only be accounted for by observing, that in a well-pulverized soil a sufficiency of mould will of itself fall over the seed, the sides of the rut being thus left up, they serve as a protection to the infant plants in the tender stages of their growth; also, any moisture that falls during night is thus longer preserved on their tender leaf; they are therefore not so liable to be attacked by their enemy, the "fly." If, however, the ground has not been well prepared, rolling then will be necessary, but the roller for this purpose should be concave, so as to roll the sides as well as the top of drill.

Singling out and Finishing.—The time for singling out is known by the fordwardness of the plant: when the rough leaf is properly formed, and about an inch in length, singling may commence. For the distance between the plants, soil, climate, locality, and kind of seed, will direct. I may, however, state, that less than eight inches apart should not be, and more than twelve inches should never be. Care must be taken that the plants be all cleared of earth, so that the main root only has a hold of the ground. This precaution is a preventive against the evil called "fingers and toes." The first operation is, to pare the earth off each side of the plants, leaving a very narrow stripe on which the plants are growing. This paring makes the work of singling out more easily done.

The different kinds of implements for paring are numerous; when the land is well-prepared, free and mellow, any of them may do the work well; but if the soil has become firm, or thick-set with deep-rooted weeds, the whole tribe of double paring-ploughs, grubbers, scufflers, &c., are comparatively useless.

The light single paring-plough must then be applied; and those farmers who have not one, the common swing-plough, with one horse, can be usefully applied as a substitute. After the furrows have been taken from the plants, the horse-hoe and scufflers can then be usefully applied, in shaking up the weeds and breaking down the clods. Thus preparation being made, singling out should commence.

The proper way for doing this operation is, to place the hoers, be they few or many, each a drill apart from his neighbour; this gives them room to work in line, and allows each of them to get in advance when the work is easy, or fall back when the work is difficult. This convenience cannot be obtained when the drills are taken abreast, each to each.

The hoe for singling out should be made of steel plate, six inches in breadth and three in depth, and placed on the shaft at right angles, so as to answer the opposite actions, pulling and drawing. The hoe for the operation of cleaning is of similar metal and make, but it has a set at the neck to make it suit the hand for striking inwardly, in breaking up the earth and cutting weeds.

The hand of the worker should be seldom used when singling; he must learn to be expert in the handling of the hoe, as every particle of surface left by the paring plough about the plants must be driven down either by pushing or drawing. When the roots of the young plants may happen to be entangled with each other or with weeds, it will then be sometimes necessary to use the hand; but I have always observed, that those workers who use the hand often in singling, leave much of their drills unpushed and undrawn. The consequence of which is, every drill neglected in this way shows itself throughout the field, from its being more weedy and more difficult to get over in the hoeing process.

When a field of turnips has been singled out and horse-hoed, the heavy part of the work is finished; the hoeing and cleaning after this, if what is already done be well executed, will be speedily got over; and when every weed appears to be destroyed, and the leaves of the turnips making fast way to meet each other from drill to drill, then, in dry weather, earth them gently up, not throwing the earth near the bulbs; where the soil is dampish, make the setting-up furrow a little deeper, finish the headlands, clear all surface-water courses, shut the gates, and nature will do the rest.—Yours, &c.

James Hunter, Agriculturist.

April 30, 1845.

WORTLEY FARMERS' CLUB.

We have been favoured with a report of the proceedings of this valuable society during the last month. An introductory paper was read by Mr. G. Chambers, of High-green House. This paper was highly interesting, and displayed great knowledge and correct appreciation of all the modern improvements in agriculture. After a very able paper "On growing potatoes" had been read by Mr. R. Surtees, of Bromley, Mr. Wright read the following essay:—

ON GROWING SWEDE TURNIPS.

The recent improvements in the growth and management of the Swede turnip, have made it of all other crops, the most important to agriculture on those soils where its cultivation can be carried on; for upon the success of this, the whole of the following crops have, in a great measure, to depend; as well as the value of the root in feeding and maintaining the different kinds of live stock.

Formerly, it was considered necessary to give the land a rest, or naked fallow, every fourth year, and even now in many districts where turnips may be grown with proper draining, this old and expensive system is still carried on. The introduction of the drill and horse hoe now enables us to keep the land equally as clean with a crop of Swede turnips as when fallowed, and the resting of the land (or an equivalent) is obtained by the alternate sowing of green and white crops, and thus rendering the naked fallow both unnecessary and ruinous.

The varieties of the Swede turnip are so very numerous, that it is impossible to give a list of the whole, I will therefore only name Skirving's, Mattson's, and Laing's improved, as being the most extensively cultivated. Too great attention cannot be given to the selection of the seed; and I should recommend every turnip grower to raise his own, always planting the roundest, and not the largest bulbs, with fine necks; carefully avoiding all those with a coarse and forked root, at the same time observing that too great a deficiency of the fibrous part of the root indicates a delicacy of growth, which must always be avoided.

Light soils are the most adapted to the growth of the Swede turnip, but owing to the introduction of draining, they may be grown on almost every soil except stiff clays. Tull says—"All sorts of land made fine by tillage, or by tillage and manure, will serve to produce turnips, but not equally."

Although turnips can be grown to advantage on lands that vary in their texture and quality, it is always necessary to have those soils reduced to as fine a state as possible, not only for the growth of the turnip, but also in promoting the growth of the seeds of weeds, which are in this state more easily eradicated. The usual practice in obtaining this mouldy, or fine surface, is gained by giving four or five ploughings, with cross dragging, rolling, harrowing, &c., the first ploughing being given in the autumn, and leaving the ground as rough as possible, so as to have a greater surface exposed to the action of the winter's frost. Any further remarks on the usual routine of working or pulverizing the soil will be unnecessary, as it is so generally known; but in clearing the land of twitch or wirks, which are so prevalent in this neighbourhood, I shall strongly recommend the broad share plough, or scarifier, to be used about four inches deep, as soon as the wheat crop is taken off, and the land harrowed and dressed before autumnal ploughing. By this means, the broad share of the plough, being kept under, but still as near to the roots of the wirks as can be, the whole of them are kept on the surface, and one half the expense of cleaning is consequently saved, and one dressing will clear out the whole when well managed; whereas, by the general and present method of ploughing first, the whole get buried, and several dressings are required before they can be picked out.

On some of the stronger soils, where turnips are grown, I often notice water standing in large pools through the winter; this ought to be carefully looked after and avoided, as it is certain to destroy or prevent the winter's rate, and increase the expense of working the land, as well as checking the growth of the turnip in its youngest and most precarious stage.

After pulverising and working the soil, the next consideration is the application of manure, to supply which the greatest economy of the fold-yard manure is necessary, for it has always been found that the swede turnip grows better with this than any other manure. In order to save, and increase this as much as possible, I have always found it the best plan to prepare a bottom, or foundation of soil, about 12 or 14 inches thick (in or as near to the turnip field as may be) on which to make the manure heap, carefully avoiding any carting on this bottom before a covering of manure is first thrown on, as the wheels of the carts will compress the soil too much to allow it to absorb the liquid that drains from the manure. When the manure is not wanted to be used soon, as much of it should be carted on the heap as possible after securing the soil at the bottom from the pressure of the cart wheels, as this prevents the heap from heating and wasting; the whole should then have a covering of soil about three inches thick. About three weeks before wanted, the manure and soil should be turned over and mixed, when the soil will be found to have absorbed the whole of the drainage and evaporation of the heap, and equal in quality to the rest of the manure, as well as having increased the quantity one-third. Unfortunately, it generally happens, even after the strictest economy, that most turnip growers find a scarcity of fold-yard manure, and are compelled to resort to bones, rape-dust, guano, butchers' manure, and ashes, &c. The latter compost (costing about 12s. per acre besides labour of turning, riddling, &c., and about twelve loads of fold-yard manure) I have seen drilled on one farm for 16 years successively, and producing an average crop of about twenty-eight tons of swedes per acre. Another compost easily made by every turnip grower, and now strongly recommended, is a mixture of the refuse of whale oil and ashes, or common soil, applying at the rate of fourteen gallons per acre, and costing 10s. 6d. besides carriage. This mixture, used with fold-yard manure, I have no doubt will answer for the swede turnip, and I intend giving it a trial this season. This manure I remember having seen applied to some cold grass land in Leicestershire, when, from all appearance, the crop of hay was doubled, or nearly so. And in referring to the *Farmer's Magazine* for February, 1843, I find that at the annual exhibition of the Sussex Express Root Show, two samples of swede turnips among the extra productions were the subject of considerable inquiry: one was grown by R. Gray, Esq., at Barcombe, with bran as a manure; the other by T. Richardson, Esq., in the same parish, with oil as a manure, &c. After going on at some length, the same report states, that "It should be borne in mind that fish oil, until it has undergone a chemical change, is injurious to both seed and plant; it is consequently applied after having been incorporated with wood ashes, in which there is a quantity of potash; this immediately changes the oil into soap, and the manure, therefore, actually is soap, and not oil, when thrown upon the land. When wood ashes are not readily to be obtained, the oil mixed with soda, dissolved in water, will produce the change necessary for its becoming a useful and active manure, and may then be incorporated with road-scrapings, or other materials to fit it for drilling."

Bones for many years have been employed as the principal bought manure for swede turnips, and such has been their success on every soil on which they have been tried, that the preference is generally given them before every other bought tillage, and particularly so, as the following crops are invariably found to receive the greatest benefit from them; this is more distinctly visible after a failing crop of turnips. Nevertheless, the great outlay of capital at the moment being to the large turnip growers a serious consideration, many have been induced to use the cheaper and more perishable manures, in lieu of bones, and probably calculating that a good crop of swedes will be the means of producing good succeeding crops; but as all are subject to a failure in this crop, even with the best management, it necessarily follows that good husbandry demands a selection of those manures that will benefit the following crops. The boiled bones have been strongly recommended as preferable to the raw ones; this at first I did think unreasonable, as the fatty substance must be lost by boiling; but on considering this more closely, I am obliged to alter my opinion, because in every instance I have heard of their having been tried, I find the boiled are more easily decomposed and made available as food for plants, and the purchaser gets a greater bulk of the bone if the fatty substance is extracted in boiling. Professor Springel in naming the phosphate of lime in bones as a manure, states that it is this substance, to which bones chiefly owe their manuring quality, is proved satisfactorily by the circumstances that even burnt bones, in which, therefore, the whole of the cartilage containing nitrogen is destroyed, still yield a superior manure. Of this I have become convinced by comparative experiments, which I repeated more than once.

The application of sulphuric acid and bones has lately been tried in Scotland, and the results communicated to the Royal Agricultural Society by the Duke of Richmond, from whence it appears that this mixture not only increased the weight of the crops of the Swede very materially, at a cost of one-third less than manures tried at the same time, but also forced the young turnip into rough leaf, and ready for hoeing from four to ten days before the others. For the particulars see *Farmer's Magazine*, August, 1843.

Rape-dust by many has been reported to have answered uncommonly well for swede turnips. The quantity generally used is from 4 cwt. to 5 cwt. per acre. There has been a great difference in opinion as to the most proper method of applying this manure—some advocating the cakes only to be broken into small lumps, whilst others very justly contend that if ground into dust it is preferable, as it will go farther. The best plan is to sow it broad-cast before splitting the drills, as by this means it becomes more evenly mixed with the soil, which ought always to be the case with all the most powerful manures, as many of them, when drilled and placed in immediate contact with the seed, I have no doubt destroy vegetation instead of promoting it. Guano, another powerful manure, has recently been introduced, and is perhaps used to a greater extent than any other manure for this crop. The many reports of the immense weight of swedes, after an application of from 2 to 3 cwts. per acre, are a convincing proof of its importance. Still in a great many instances I have heard bitter complaints of its failure, and this I attribute chiefly to the method of applying it. Last year in one field, with twelve loads of fold-yard manure, I had swedes drilled with 2 cwts. of guano per acre—the guano mixed with a fair cart-load of ashes to the 2 cwts. The land was apparently in a beautiful state, with every prospect of a good crop. Yet, throughout the whole field scarcely any of the turnips got into rough leaf. The same occurrence I noticed in 1842, which, I have no doubt, was owing to the guano being in too great a body, and in contact with the seed; for in passing through Wentworth last September, I noticed a large field sown with swedes, and varying very much in appearance—a small portion with as good a crop as I almost ever saw—the remainder very thin. On inquiring the treatment, I found the guano was sown broad-cast before the drills were split on the better part, and drilled with the seed on the larger and worst part, thus showing very plainly that the most advisable and best plan is to distribute this manure evenly in the soil, and not confine it in the drills too close to the seed.

The quantity of seed necessary to be sown may vary on different soils, but the best plan is to sow plenty as the cost is very trifling. Two pounds are, in every instance, considered plenty. I would never sow less.

The time of sowing the swede turnip depends upon the soil as well as the climate. In this neighbourhood I should recommend sowing as near to the 20th May as possible; as here I have always found the earliest sown the best, whilst in Nottinghamshire, on the south of the Trent, I have invariably found all swedes sown before June were taken by the mildew when about half grown.

The depth of drilling the seed requires more attention than is generally paid to it. In a dry season, if put in too shallow, there is always a deficiency of moisture to force the plant into rough leaf; and if drilled too deep, there is a risk of the seed growing or not coming up evenly. I think the most advisable depth is about an inch, not less; but this opinion I must particularly ask you to discuss, because it is a point on which I have some doubt.

The best system of sowing is with the drill, as upon this plan the turnips, being in rows, are left more evenly on the land with the hand hoe; and the horse hoe (with very little expense) keeps the intermediate space between the rows perfectly clean. The usual distance between the rows is about twenty-seven inches, as this allows the cart wheels to get between the ridges with the manure without carting on to the fine mould. Another advantage by working on this plan is, the manure being placed at the bottom of the drill is completely buried, which is never the case on the old broad cast system.

The hoeing of the swede turnips requires great care, always giving them plenty of room, and leaving the strongest and healthiest plants; the best distance to leave them will vary from ten to fourteen inches apart in the rows, where they are drilled twenty-seven or twenty-eight inches; but instead of leaving the plants even in distance, for mere form, I would have the strongest, or master plants, always left, if nearer, but so that the general average be not less than ten or fourteen inches. The proper time for first hand hoeing or thinning, is as soon as the turnips get into rough leaf. Many farmers advocate leaving much thicker the first time over, as the plant is so very precarious in its first growth, and this is a point that requires a deal of judgment, according to the season, &c., because in a dry season there is great risk, whilst in a moist one little or none. The horse hoe should always precede the first hoeing or thinning, as it saves much hand labour and the work gets better done. The after hoeing every farmer ought to regulate according to the season and state of his land, for if he will make a point of keeping his turnips free from weeds, and by frequent horse and hand hoeings, keep the surface of the land in a pulverised state, instead of allowing it to get set hard, he can never get far wrong.

Having thus stated my opinion of the growth and management of the swede turnip, and quoted what I consider the most desirable selection of opinions worthy of notice, I shall be happy to be corrected where wrong, or should any further explanation be required from you, to carry out any point I have now brought forward, I shall have great pleasure in giving it.

Mr. R. Fisher proposed a vote of thanks to Mr. Wright for his paper, which was seconded by Mr. Chambers, and carried unanimously.—*Doncaster Gazette.*

CATTLE EPIDEMIC IN IRELAND.—AN EXAMPLE TO LANDLORDS.—On its being made known to Capt. Stackpoole, R.N., who resides at Milford, in Ireland, that *the entire* of the Cattle of Michael Finucane (one of his tenants), of Caherconlish, had died of the prevailing epidemic, with the benevolent spirit of a true British tar he at once ordered his agent to allow half the value to the poor man in his rent. In the answer given to the Landlord and Tenant Commission in Ireland by the Rev. Dean Coll, of Newcastle (county of Limerick), we find that the epidemic there will call loudly on the landlords to follow the above worthy example: he is asked—"Are the small tenantry getting richer?" "No, I do not believe any of the farmers are getting richer. I believe for some years every farmer has been declining. The *disease among cattle, horses, sheep, and pigs*, and the severe seasons and low markets, *have brought the whole farming population to a state of decline.*"

LANDLORD AND TENANT.

TO THE EDITOR OF THE MARK LANE EXPRESS.

Sir,—Much is constantly said about the majority of farmers carying on the old jog-trot system; and there is no doubt that the majority are not keeping pace with the improvements in other branches of society. But it is in a great measure to be attributed to the old customs in the letting of farms, which the tenantry have to abide by to the present day, which are of so prejudicial a nature, as to quite preclude them from making improvements, and farming on the most improved system.

The farms are let under a yearly tenure, and when a tenant quits, he is not allowed for manures made on the land; which, on a farm of two hundred acres, well cultivated, would amount to six or eight hundred pounds. No allowance for new buildings, or any other improvements of that description. And no allowance for draining after the expiration of ten years.

With regard to manures; the landlords argue if the tenant paid for none when he entered, he has no claim for any when quitting. But the quantity and quality made at the present day are fourfold, compared with a few years ago. And in the onset, how is the quantity and quality obtained? The farmer does not find so many manure heaps raised up, as if a descent had taken place from the clouds, or an eruption from the bowels of the earth. No, they are raised by the farmer spending his capital in the purchase of bones, guano, and other fertilizers, of a very costly nature. And the quality is obtained by giving the cattle plenty of linseed cake, corn, &c.; although they are quite aware they can never half pay for such food. But it is the manure that is so desirable. Presume the same customs prevail in the letting of shops; and a grocer takes to a shop doing little business, but by perseverance he increases his connexion fourfold: he must therefore increase his stock in the same ratio. The landlord gives him notice to quit, or he wishes to quit on his own account; he is allowed to remove his tea and coffee, but must leave the sugar for the landlord (what a sweetener it would be)! The farmer is precisely so situated. If manure is not live stock, it is dead stock, purchased by the tenant; and the landlord has no more claim to it, than he has to the live stock, carriages, or implements: he has a right to be paid for it, or be allowed to remove it, as the occupier of a mill can remove the machinery, or a shopkeeper his stock and fixtures. This is one of the great barriers to improvement, for what sensible man will expend his capital in bones and guano, when the next year he may have a six months' notice to quit, without a shilling compensation? The custom is becoming more common. I could enumerate several instances where the tillages have been taken from tenants within the last few years.

As regards compensation for new buildings, aud other improvements of that description, where such improvements can be shown to be indispensable to a farm, as conveniences, the tenant has a right to be paid. The landlord is, in a many instances, never seen by the tenantry; and the steward is only visible on audit day, when he has neither money, time, nor commands to make improvements. And are we not told by the agricultural professors that it is almost as necessary to erect liquid manure tanks, as it is for a man to have a house to live in? And are we not told at every farmers' club in the country, that the soiling of cattle not only economizes the quantity of food, but prevents them imbibing an excess of oxygen, which retards their fattening? If a tenants wishes to adopt the economical system, and has 40 head of cattle, but only convenience for the soiling of 20, what is he to do? He must either build conveniences, or pursue the old plan. And what security has he for building under a yearly tenure? Why, none; but a pretty good surety that his landlord will either send his agent or valuer, who will not take these matters into consideration, but raises the rent.

As regards the subject of draining, the time formerly allowed was twenty-one years. It was reduced to fourteen, and is now reduced to ten. This operation is no doubt the foundation of good farming, but a most costly one. It is the opinion of the most eminent man in the country, on the subject of draining, Mr. Smith, of Deanston, that if properly executed, it will stand one hundred years. It is also his opinion that there is little or no benefit derived the first two or three years, particularly if the seasons are wet, for the clay must become thoroughly contracted before the drains can act. Then why should the tenant farmer who does the rough and dirty work, lose both principal and interest at the expiration of ten years? in fact, you may say at the expiration of seven or eight, the first few years not acting. What encouragement for a man under a yearly tenure to expend his capital!

We are told by the landlords, the reason why the farmers do not progress in improvements is because they are too poor. Are not such customs in the letting of farms the very way to keep them poor? It must either jeopardize his capital, or prevent him improving and bettering his condition. In fact, the customs are what Mr. Mechi has most truly denominated them, "a facile appropriation of the tenant's capital to the landlord's own use."

To show the unfair advantage of the system, I will enumerate one instance for example, where a family have been on a farm perhaps fifty years, which on their entering, was overrun with indigenous plants, and perhaps not twenty pounds worth of manure on the place; it is now in a high state of cultivation, thoroughly drained, and a heavy sum expended on the buildings. In times of high prices of corn, the rent has been regularly raised (but not lowered when the depression came), till the tenant now finds that he is unable to meet the present low prices; he communicates with his landlord, explaining the cause, and wishes to know if he will compel to quit on the same terms he entered; he answers him "*decidedly so;*" but mark the anomaly between entering and quitting: he must leave a thousand pounds in manure, several hundreds spent on the buildings, and a many hundreds in thorough-draining. Therefore, can it for a moment be astonishing why farming should have made so little progress, when such customs are in usage in three fourths of England?

As long as landlords have such advantages over their tenantry, so long will agriculture be kept in the back ground; so long must the labourer endure a scarcity of labour; and so long will the system be a public evil. With yearly tenures, the landlord would always have a great advantage over his tenantry, if the tenants were paid for improvements. It is neither difficult nor expensive for a landlord to write a tenant his mittimus; and if he lets his land at a times rent, there is invariably a tenant to be found. The tenant not only suffers great inconvenience, but often great loss, obliged to sell his stock and implements at a sacrifice, besides the trouble and expense of removing. How are the grievances to be remedied? They never will between landlord and tenant. It must become the law of the land to pay for manures and improvements. What system could be more just and equitable than one valuer appointed by the landlord, a second by the tenant, and an umpire chosen before the day of valuation, whose decision, if necessary to be had, should be final? The tenant to be paid for all manures and fertilizers, and for the erection of new buildings, for a term of 21 years, and for all draining done in an effectual manner for the term of 21 years, for claying and marling as the custom may be.

Lord Portman is about to introduce a bill for protecting the tenant farmer; so that now is the time for the tenant farmers to evince their feelings on the subject, and petition the legislature from every county and parish in the country for their rights. And I trust the example will be set by the members of the Norton Farmers' Club, who are at all times ready to establish justice and equity, which ought to be the motto between landlord and tenant.

I am sir, yours respectfully,

AN AGRICULTURIST.

THEORY OF BONE MANURE.

BY MR. J. TOWERS, MEM. ROY. AGRIC. SOC. OF ENGLAND.

It is astonishing in how short a time an entire change of opinion may be brought about by circumstances which were not at all foreseen, nor even suspected. Referring to an encyclopædia, in a volume printed in 1836, under the head *Bones* we meet with the following remarks and conjectures:—

"Bones have been of late years very extensively used as manure, especially on *poor lands* and *gravels*." "By their means large tracts of barren heaths have been converted into fertile fields. Most of the bones procured from London and the manufacturing towns have undergone the process of boiling, by which the *oil* and a great part of the gelatine (or animal jelly) which they contain have been extracted." "All those who have used bones extensively, report that little difference can be observed. Some give the preference to those from which the *oil and glue* have been extracted; but oil and glue form excellent manure. How is this to be explained?" "The fat and gelatine being intimately blended with the bony matter, and contained in cavities or cells, may remain a long time in the earth without decomposition. As a proof of this, it has been found that bones which had lain in the earth for many centuries, on spots where ancient battles were fought, afforded, on analysis, nearly as much gelatinous matter as fresh bones would have done."

This remark my own experience has partially confirmed; for, upon opening a vine-bed, wherein a quantity of cracked ox and sheep bones had been placed in 1836, I found that eight years had produced no apparent change, other than that of discolouration, owing to the deposition of some oxide of iron, which conferred a brown and yellow tint.

I had heard and read much about the ramification of myriads of fine fibrous vine-roots among the tissue and in all the apertures, but am constrained to confess that, while I traced this ramification from some other vegetable roots, I discovered very few from those of the vine. It is stated that the great effect of bones most likely depends on the phosphate of lime:—

"But a closer examination of the fields manured with bones has led us to surmise that much of their importance depends on the mechanical texture of the bone, and on its power of absorbing and retaining moisture; for if a plant which vegetates with peculiar vigour in a field manured with bones be pulled up, it will almost invariably be found that small pieces of bone are attached to the roots: and when these are minutely examined, the smaller fibres of the roots will be found to have grasped them, and to pervade their cavities, which will always be found more or less moist."

"The *moisture*, then, and a small portion of the remaining *gelatine* dissolved in it, *form the food* on which the plant has thriven. The more the bones have undergone fermentation, the more soluble the gelatine will be. This accounts for the seeming anomaly of boiled bones—they have undergone a fermentation. The residue, although not deprived of all its animal matter, is much more porous, and will imbibe and retain *moisture in its pores*. The food of the plants is here ready prepared and dissolved, and kept in store, without being in danger of being washed through a porous soil, or evaporated by the heat. The solid substance, which is chiefly *phosphate of lime*, has a stimulating effect," (how *stimulating*, and what does the expression imply?)—" and assists that of the more soluble parts. But phosphate of lime is not soluble in water, and does not decompose readily in the earth; its effect, therefore, is not so great as to account for the general result. In *stiff* clays the pieces of bone are bedded in a tough substance, which prevents their decomposition; and in very wet soils the advantage of these small but numerous reservoirs of moisture is lost. Hence it is easily seen why bones are of less use in such soils."

The above extract, which appears to comprise all that was known, or rather conjectured, of the availability of bones as a manure chiefly for turnips, clovers, and pasture grass; and I give it, not with any view to enlighten the agriculturist, but to demonstrate the contracted limits of our information at a very recent period. Four years only from that time had elapsed, when Liebig's Organic Chemistry announced and proved the very great, nay paramount, utility of "*trustworthy investigations of the ashes of plants*,"—the products of combustion, scientifically conducted, with a view to detect the true *inorganic* constituents of each individual.

In attempting to present a tolerably clear and accurate view of the chemical agency of *bones*, I may claim some authority, as perhaps I am now the only chemist alive in whose laboratory the *phosphate of soda* was manufactured, in the large way, for the medical practitioners, soon after its discovery and announcement by the late Dr. Pearson. Before I refer more particularly to a process which will elucidate the entire theory of bone-manuring, it will be right to adduce some facts which have been recorded in the Journal of the Royal Agricultural Society of England. There I find, in the following short letter from the Duke of Richmond, and in a note appended by Mr. Pusey:—

"*On the solution of bones in sulphuric acid for the purposes of manure.*—My Dear Pusey,—I have not yet received the details of the experiments tried by the Morayshire Farmers' Club with sulphuric acid and bones, but I know that the result has been most satisfactory. On my own farm, which is a light sandy soil, I tried one acre with it, another with guano, and a third with stable-yard dung. Early in November I had a quarter of an acre of each drawn and weighed. The heaviest crop was from the land manured with the sulphuric acid, though it did not cost me above 11s. or 11s. 6d. an acre. I understand also that the turnips came into rough leaf sooner on that acre than on any of the others.—Believe me yours, sincerely,

"RICHMOND."

"*London, December* 9, 1843.

Note.—The experiments contained in this letter bear out those of the Morayshire Farmers' Club, the details of which appeared in the last Journal, and affords good hope that this, the most important saving which was ever held in the use of manure, will be found generally useful. For those details I must refer to that paper, merely mentioning now that in one trial a bushel of bones, to which sulphuric acid had been applied, exceeded in its effects six bushels used in the common way.

Mr. Pusey then alludes to the chemical composition of bones, and takes a view of them corresponding in many particulars with that I have already given in the extract from the encyclopædia. Space will not admit of farther quotations, therefore I will at once come to the practical evidence afforded by the processes of the laboratory.

Premising, then, that ox and sheep bones consist (on the authority of Fourcroy and Vauquelin) of—

	Parts.
Solid Cartilages, Gelatine, and Oil .	51.
Phosphate of Lime	37.7
Carbonate of Lime	10.
Phosphate of Magnesia	1.3
	100.

We have 51 parts which can be *partly* extracted in the forms of oil and size by simple digestion and boiling in water, and wholly decomposed by the agency of combustion. The elements of these 51 parts yielded by combustion, prove them to be oxygen, hydrogen, carbon, and some azote or nitrogen. Now, in our process to obtain Dr. Pearson's tasteless purging salt, chemically termed (then *natron phosphoratum*, but now) "phosphate of soda," the bones were placed in iron cylindrical retorts, terminating at the farther extremity in a nozzle, to which were adapted pipes to receive and convey the gaseous and fluid products. The machinery and furnaces, in a word, closely resembled those now employed in the coal-gas works, and the bones were ignited to redness much in the same way as the coals. The liquids obtained were impure ammonia (hartshorn) contaminated by abundance of fœtid animal oil. Here we perceive the union of the elements of water and of ammonia; the former being hydrogen and oxygen, the latter hydrogen and azote. A volume of carbon vapour must also have been extricated, and recombined with hydrogen and oxygen in the animal oil.

When these fluids had passed off, the bones or animal charcoal, then heated to redness, retained their figure, and, if suffered to cool in the retort, would have remained quite black, in the condition of *ivory black*. But the doors of the retort were immediately unluted, and the contents withdrawn as quickly as possible, when, by the attraction of oxygen from the open air, they burst into flame, and the carbon remaining in them was consumed, passing off in the state of carbonic acid gas.

Thus, then, the 51 parts per cent. were disposed of, leaving the 49 parts to be accounted for; but these represented the *inorganic* constituents of the bone.

It is now plain that by boiling and burning we get rid of the elements of humus and of ammonia; and, in so doing, relieve the bone from those substances which coat and entangle it, while they also prevent the operation of the soil and plant-roots upon those other elements which are required for specific purposes.

The *theory of humus* has, from the first, been problematical; and while it was received as the sole interpreter of vegetable nutrition, philosophers and practical men floundered about amidst difficulties and contradictory perplexities. Carbonic acid was referred to as the *sine qua non*, and so long as any substance could be deposited in the land which might be made to yield that gas it was believed that enough was done.

The more recent discoveries have, however, proved that, while farm-yard manure contains an ample store of that decomposing animal and vegetable matter which is finally resolvable into black humus or vegetable mould, applicable to *every soil* and plant, there are other constituents of each individual plant which require specific manures for their especial nutriment. And now, to come to the point at once, if it can be clearly shewn by analysis that a sound well-grown turnip *does* contain bone-ash—that *trefoil* exhibits vestiges of gypsum—and that *lucerne* yields a very considerable portion of *phosphates*—then we can distinctly assert that, be the quantity of humus in the soil what it may, it is utterly incapable of furnishing one particle of those inorganic salts which, nevertheless, must be derived from the soil, and not from the atmosphere.

Bones deprived of their decomposible organic elements contain 49 parts per cent. of salts of lime. Now, in order to produce phosphoric acid from these salts, the bones, rendered white by their final combustion, were placed in deep leaden vessels; and so much water was added as completely to cover them with an inch stratum in excess. Concentrated sulphuric acid was then poured with great caution over this water in a small stream, till, in the end, whatever was the weight of the bones, just one-half of that quantity of acid was superadded, while a man with a wooden oar stirred the contents of the vessel. The first operation of the acid was to seize the *lime* existing in the form of a *carbonate*—thus liberating, with strong effervescence, a volume of carbonic aërial acid.

In this process, 10 parts of the 49 were, by combining with their equivalent of sulphuric acid, converted into about 11 of sulphate of lime, in round numbers; that is, supposing in every 100 parts of carbonate of lime there are 44 or 45 parts of carbonic acid. Artificial gypsum, therefore, was the first product of treating calcined bones with sulphuric acid.

The effervescence having ceased, the remainder of the sulphuric acid was employed in liberating the super-phosphate of lime, by combining with the basal lime of the bone-phosphate, and thus producing a proportionate additional quantity of artificial gypsum or sulphate of lime.

Let any one burn a few bones in a common furnace till they become white, and to one pound placed in a stoneware jar add one quart of rain water, and then about half-a-pound of the strongest sulphuric acid. By slow degrees, and in a few days, if the mixture be occasionally stirred with a stick, the decomposition will be completed, and a thick mass, called, by some writers, "gruel of bones," will be the result. If this mass be put into a jelly bag of coarse linen, a clear pale-yellow fluid will draw off, after which, water should be poured upon the filter till the fluid no longer has an acid taste. The filtrated liquid is the phosphoric acid of the bone, holding in solution a considerable portion of phosphate of lime, while the residuum in the bag is gypsum.

The agriculturist may thus learn what he effects by treating bones with sulphuric acid; for he will discover that he not only obtains a *super-phosphate* of great importance to any crop which contains, and therefore requires, this chemical agent as its peculiar element, but that, in addition, he has acquired a great bulk of that valuable salt called gypsum, (sulphate of lime).

That the clear liquid is not pure phosphoric acid is readily shewn by heating it in an earthen vessel, and adding, till the hissing ceases, a quantity of carbonate of soda. A copious white sediment will be separated, and the clear liquid will be a weak solution of phosphate of soda, that the salt originally announced as a purgative by Dr. Pearson. This liquid evaporated by simmering, will form rhomboidal crystals of phosphate of soda.

I have thus endeavoured to shew in plain terms, without entering into any *atomic minutiæ*, the precise composition of bones. As to the fact alluded to in the first quotation, that "the food of plants is *ready* prepared in bones that have been boiled, and that the roots will be found to have grasped the bones, and to pervade their cavities," it just amounts to, and proves nothing more than, the adhesive pertinacity with which the roots of any plant cleave to the bottom and sides of a porous garden pot. Here they find no prepared gelatine, nothing, in a word, but *diffused* water—moisture so distributed as neither to glut nor swamp the most delicate fibre; and, indeed, so long as the *porous medium* of baked clay can thus be retained in that state of saturation, most plants will thrive with superior luxuriance. As to manures soluble in soils, we know nothing of them; every direct experiment evinces that the rootlets, while uninjured, cannot inhale the smallest particle of even colouring matter, although it is equally proved that, by amputation, a woody twig will imbibe ink and red solutions, and convey them even to the leaves and blossoms; water, therefore, alone, or holding salts in solution, (as soda, potassa, and the phosphates with a saline base, or gases developed by vital agency), appears, upon the above cited evidence, to be the only *terrene* aliment of vegetable bodies, since, moreover, it is certain that *humus* accumulates in all cultivated soils.

But recurring to undecomposed bones, whether crushed, ground to small pieces, or to the finest dust, they are so guarded by the animal matters as to resist the energy of either soil or plant, and, for a considerable period, that even of strong sulphuric acid. Yet they can be acted upon by that acid; for I have obtained phosphate of soda from crude bones. The speedy and determinate effect produced upon a crop of turnips, recorded by the Duke of Richmond and Mr. Pusey, depends upon the free condition of the *super-phosphate*. Admitting that it is not traceable in the turnip, while in that condition, it is not the less certain that, if chalk exists in the soil, the salt, which will be formed by its combination with the acid, will still be phosphate of lime, which, being a fresh product, and in an extremely divided state, can be attracted and taken up by the roots of the vegetables at the precise moment when it is immediately required.

Our colleges and seminaries, forming now or contemplated, for the instruction of rising agriculturists, ought to enter deeply into such researches, and make apparent those facts which, at present, are receive as speculative theories.—*Quarterly Journal of Agriculture.*

A FEW REMARKS ON THE LARGE HEDGES AND SMALL ENCLOSURES OF DEVONSHIRE AND THE ADJOINING COUNTIES.

By John Grant, Surveyor and Land Agent.

From the Journal of the Royal Agricultural Society.

Every practical farmer coming into Devonshire for the first time is struck with the fertility of the soil and the genial climate with which the county is favoured. He may not be equally struck with the quality of the farming, though this has of late made an immense stride; but he is certainly astonished at the small quantity of the produce of the soil returned per acre, a much greater being produced in districts immeasurably behind Devon in natural advantages. A superficial observer places this to the credit, or rather discredit of the farmer: the practical man is not long in discerning that *not the least* of the causes is the baneful effect of the high hedgerows and small enclosures, which add so much beauty to the scene at so great a cost to the landlord and tenant.

Struck with these reflections, I resolved to make some actual measurements, in order that the landed gentry and agriculturists of the county might see the full extent of the evil.

At the present time there is a strong tendency towards improvement in farming; the general opinion being that none of the sciences is in so backward a state. But no very great advance can be made in this, and a great part of the adjoining counties, so long as the enclosures are so small, and the hedges so many and so large, that upwards of 7 per cent. of the land is occupied, besides that which is otherwise injured by them. "What," it has been asked me by more than one intelligent and extensive farmer, "is the use of our being told that we should study practical chemistry, and copy the example of farmers in better cultivated districts, if we are not allowed to enlarge our fields by taking down those immense banks, or even to cut down the wood growing on them but once in seven years, and then only that which has not been previously marked for rearing? Look at what I lose from the shade of those hedges and trees, besides what they actually occupy. For nearly a ridge wide on each side the corn is hardly worth reaping." And who can deny that this is discouraging? Is it not to be seen everywhere in the county, and every year the same? The necessity of making extensive alteration in this respect will, I trust be evident by consulting the following table, which gives the total number of acres in each of ten parishes, all within a circuit of 15 miles of Exeter, and extending over a district of twenty miles; varying from 700 to 9,000 acres, and amounting to nearly 37,000 acres. It also gives the number of miles of hedge, the number of acres and per centage occupied by them; the number of cultivated enclosures of different sizes above half an acre, all under that size being left out as gardens, &c. No enclosures are taken into account but such as are cultivated by the farmer; that is such as are arable, pasture, or orchard. Coppices, woods, plantations, &c., are not included, as these are in the most cases in the hands of the landlords. The tithe apportionments have been my authority for the number of fields of different sizes. Fractions have been as much as possible avoided, as being unnecessary, and to prevent confusion. In some of the parishes there are parks, commons, and large woods, which, if deducted, would make the per centage much greater on the portions which are divided.

In the table it is shown that in the parish of Huxham, containing 762 acres, there are 34 miles of hedge, which occupy 54 acres, being 7 per cent., or 1 acre in 14. There are 55 in every 100 fields under 4 acres; 9 of 10 acres and upwards, being 142 acres in all; and 1 field larger than 10 acres in every 16 fields, or in 100 acres. There is a portion of the parish, containing $84\frac{1}{2}$ acres, in which there are 5 miles of hedge, containing about 8 acres; being $9\frac{1}{2}$ per cent., or 1 in $10\frac{1}{2}$. Lately there have been more than 3 miles of hedge taken down, thus saving between 5 and 6 acres.

In the parish of St. George's Clyst, containing about 1,040 acres, there are 52 miles of hedge, occupying 83 acres, being 8 per cent., or 1 in $12\frac{1}{2}$. There are 126, or about half the number of fields, under 3 acres; 163, or 61 of every 100 fields, under 4 acres; 9 of 10 acres and upwards: being 264 in all; and 1 field larger than 10 acres in every 30 fields, or in 115 acres. In the upper half of this parish the hedges occupy 10 per cent., but the large marshes in the lower half reduce it to 8 per cent. If we take $78\frac{1}{2}$ acres in one part of the parish, we find 6 miles of hedge, occupying between 9 and 10 acres; being 12 per cent., or 1 in $8\frac{1}{4}$.

In the parish of Rewe, containing 1341 acres, there are 65 miles of hedge, occupying 104 acres; being $7\frac{3}{4}$ per cent., or 1 in $12\frac{9}{10}$. There are 56 between 3 and 4 acres; being 207, or 64 in every 100 fields under 4 acres; 8 of 10 acres and upwards; being 324 in all: and 1 field larger than 10 acres in every 40 fields, or 170 acres. If we take a separate portion of the parish, containing 81 acres, we find $5\frac{1}{2}$ miles of hedge, occupying 9 acres, being one-ninth. This part of the parish is rented at 40s. per acre, and the outgoings are from 12s. to 15s. more; so that there is an annual loss of at least 23*l. on these* 81 *acres.*

In the parish of Poltimore, containing 1710 acres, there are 59 miles of hedge, occupying 94 acres; being $5\frac{1}{2}$ per cent., or 1 acre in 18. There are 168, or 56 in every 100 fields, under 4 acres; 259 under 10 acres; 38 of 10 acres and upwards: being 297 in all; and one field larger than 10 acres in every 8 fields, or 45 acres. The park and roads in this parish amount to 140 acres. In a part of the parish, containing 115 acres, the hedges occupy $10\frac{1}{4}$ per cent.: in another part, containing 280 acres, they amount to 6 per cent.; but in another, containing 327 acres, they are only $2\frac{1}{2}$ per cent. Before the apportionment of this parish was made, five years ago, Lord Poltimore's steward took down, on a farm of less than 200 acres, 8 miles of hedge, and thereby added 15 acres to the productive portion of the estate. Since that time there have been removed in the parish $6\frac{1}{2}$ miles of hedge, saving about 10 acres; so that there have been taken down in the last five years, besides what were taken down before, on Lord Poltimore's property in the parishes of Huxham and Poltimore, 10 miles of hedge, and from 15 to 16 acres gained: as much as would be an allotment of a third of an acre to each of about 50 labourers. On account of these alterations, the number of enclosures of 3, 4, and 5 acres would be much fewer, and those of a larger size greater, than is given in the table. Whilst in the parish of Rewe, containing 1341 acres, there are 65 miles of hedge: in Poltimore, which is nearly a half larger, there are only 59; and if we deduct the $6\frac{1}{2}$ since taken down, only $52\frac{1}{2}$ miles. It will also be perceived that this, containing 1,710 acres, contrasts favourably with the other parishes, having about as many enclosures above 10 acres as are in the five parishes of St. George's Clyst, Rewe, Clisthydon, Feniton, and Talaton, containing 8,293 acres: also with the parishes of Silverton and Broadclyst, having two-thirds as many enclosures above 10 acres as the latter parish, which is 9,188 acres.

In the parish of Clisthydon, containing 1,725 acres, there are 86 miles of hedge, occupying 138 acres, being 8 per cent., or 1 in $12\frac{1}{2}$. There are 228, being 56 in every 100 fields, under 4 acres; 403 under 10 acres; 4 fields of 10 acres and upwards, being 407 in all; and 1 field larger than 10 acres in every 102 fields, or in 431 acres.

In the parish of Feniton, containing 1822 acres, there are 95 miles of hedge, occupying 152 acres; being $8\frac{1}{3}$ per cent., or 1 acre in 12. There are 261, or 60 in every 100 fields, under 4 acres; 443 under 10 acres; 6 of 10 acres and upwards, being 449 in all; and 1 field larger than 10 acres in every 75 fields, or 304 acres.

In the parish of Talaton, containing 2365 acres, there are 114 miles of hedge, occupying 182 acres; being $7\frac{3}{4}$ per cent., or 1 in $12\frac{9}{10}$. There are 341, or 62 in every 100 fields, under 4 acres: 535 under 10 acres; 13 of 10 acres and upwards, being 548 in all; and 1 field larger than 10 acres in every 42 fields, or in 182 acres. The divided part of this parish would appear much worse if the common, park, and roads were deducted, as they amount to 180 acres, or more than one-twelfth of the whole.

In the parish of Silverton, containing 4714 acres, there are 222 miles of hedge, occupying 356 acres; being $7\frac{1}{2}$ per cent., or 1 in $13\frac{1}{4}$. There are 587, or 55 in every 100 fields, under 4 acres; 1031 under 10 acres; 35 of 10 acres and upwards; being 1066 in all; and 1 field larger than 10 acres in every 30 fields, or in 134 acres.

That 356 acres, or an average of $7\frac{1}{2}$ per cent. should be occupied by hedges in this one parish seems bad enough; but there are parts of it much worse in proportion. In 147 acres at the south-east end, which I surveyed, I found more than 9 miles of hedge, occupying $14\frac{1}{2}$ acres, or fully 10 per cent. When to this is added the further injury otherwise caused by these hedges, as mentioned elsewhere, it will be self-evident how utterly impossible it must be for the farmer of such densely-wooded districts to compete with those who are living on more open, and therefore more productive, farms.

In the parish of Broadclyst, containing 9188 acres, there are 383 miles of hedge, occupying 613 acres, being $6\frac{2}{3}$ per cent., or 1 in 15 acres. There are 1176, or 60 in every 100 fields, under 4 acres; 1913 under 10 acres; 57 of 10 acres and upwards; being 1970 in all; and 1 field larger than 10 acres in every $34\frac{1}{2}$ fields, or 161 acres. The per-centage occupied by hedges in this parish is $6\frac{2}{3}$, or 1 in 15; but if we were to deduct 977 acres for large woods, the park, roads, &c., it is evident that the per-centage to be allowed for hedges on what would remain would be very much increased. I surveyed a part of the parish containing 133 acres, which is divided into 44 enclosures, averaging 3 acres, on which there are $8\frac{1}{2}$ miles of hedge, occupying $13\frac{1}{2}$ acres, or fully 10 per cent. The hedges of this parish would make a bank of earth between the capitals of England and Scotland.

In the parish of Crediton, containing 12,309 acres, there are 541 miles of hedge, occupying 866 acres; being 7 per cent., or 1 acre in $14\frac{1}{4}$. There are 1455, or 58 in every 100 fields under 4 acres; 148 of 10 acres and upwards, being 2530 in all; and 1 field larger than 10 acres in every 17 fields, or 83 acres. The hedges of this parish would more than extend from the Land's End, through the centre of England, to Edinburgh in Scotland.

The result of this examination of 10 parishes, containing 36,976 acres, being an average size of about 3700 acres, is, that there are 1651 miles of hedge; about half as long again as the famous wall of China; or sufficient to hedge round the whole of England with an immense bank of earth, and occupying 2642 acres; being $7\frac{1}{7}$ per cent., or 1 acre in 14; that 805, or 10 in every 100 inclosures, are between $\frac{1}{2}$ an acre and 1 acre:—that 1347 are between 1 and 2 acres, being 2152, or 27 in every 100 enclosures; more than a fourth being under 2 acres:—1293 between 2 and 3 acres, being 3445, or 43 in every 100 enclosures under 3 acres; 1220 between 3 and 4 acres, being 4665, or

58 in every 100 fields under 4 acres: 1015 between 4 and 5 acres, being 5680, or 71 in every 100 being under 5 acres: 743 between 5 and 6 acres, being 6423, or 80 in every 100 under 6 acres: 511 between 6 and 7 acres, being 6934, or 87 in every 100 under 7 acres: 357 between 7 and 8 acres, being 7291, or 91 in every 100 under 8 acres: 231 between 8 and 9 acres, being 7522, or 94 in every 100 under 9 acres: 148 between 9 and 10 acres, being 7670, or 96 in every 100 are under 10 acres: 327 are upwards of 10 acres, being about 2½ in every 100 fields; or 1 field larger than 10 acres in every 113 acres; and making in all 7097 enclosures. Thus it will be seen that whilst 87 in every 100 enclosures are under 7 acres, only 13 in every 100 are larger than 7 acres. With such a disproportionate number of small fields the immense loss sustained may be still further shown by the following calculations, which I made from a great number of measurements, the average being taken. By the kind of hedges generally used, on fields of the first size given, averaging ¾ of an acre, the loss by hedges is 17 per cent.; on fields of the second, between 1 and 2 acres, the loss is 12 per cent.; by those of the third size, between 2 and 3 acres, the loss is 10 per cent.; on fields between 3 and 4 acres, 7½ per cent.; on fields of 10 acres it is about 4 per cent. The per-centage of course varies very much with the shape of the field and the thickness of the fence: but by this it will be seen that when the fields average 10 acres, the hedges being of the same kind, the loss is only half of what it is when they are 3 acres and upwards.

The evils of the present system of dividing farms, general over this and great part of the neighbouring counties, may be thus summed up. The hedges occupy in some cases fully 10 per cent.; but on an average of these ten parishes, 7¼ per cent., or 1 acre in 14. They shade and injure at least half as much; most persons, landlords as well as tenants, whose opinions I have asked, say *quite* as much more. They harbour birds and vermin which injure the crops; and that this is no small evil any one may satisfy himself, by going into a field just before harvest. They are nurseries for weeds; they prevent that free circulation of air so necessary to the healthy growth of plants as well as animals: they are obstacles to the drainage of the soil, the roots found in them frequently choking up the drains. They are expensive to erect, as well as to keep in repair; the expense of new hedges in labour and planting being about 3s. 6d. per perch, and that of keeping them in order about 5 per cent. of the rental. The soil on each side of them is generally thinner, from the materials for making the banks being taken from it. So many small enclosures require a much greater number of gates, which have to be kept up and renewed: and they cause a much greater number of small lanes and cart-tracks leading from one place to another. The damage from shade is also very much greater from those hedges which run east and west. To do the least damage, and to be of the greatest service as shelter, our most prevalent and severe winds being from the west and south-west, hedges should be made, and the long way of the fields be from north to south: for the same reason that Loudon lays it down as a rule in building a house, to make a diagonal line in that direction; namely, because the sun thus shines on every side of it every day. The fences being in most cases crooked, and the fields of every shape but right-angled, the labour of every operation of the farm, particularly ploughing, is most materially increased. The parishes of Huxham and Poltimore will contrast favourably with the others in this respect. This evil is anything but a trifling one, especially when to it is added the labour caused by the roots of trees which shoot out into the fields. In any parish this is felt; but in such a parish as Rewe, where there is much timber, one may see, when the ground is laid open by the plough, that *the roots of the trees cross each other from opposite sides of the field*. These roots must abstract much of the nutritive qualities of the ground. As an instanse of how fast the root of a tree grows, the following fact was mentioned to me by a gentlemam of Crediton:—"A drain which had been made only the year before, was found to be stopped up; and on examination the cause was discovered to be the root of an elm, which had grown into the drain more than thirty feet."

Having pointed out the evils of the existing system, I may be asked how it can be remedied, especially without marring the beauty* of this country, to which these luxuriantly-wooded hedges add so much. To this I would say that such a landscape gardener as Mr. Loudon, if asked to dispose of this timber in the most effective manner, would not have been likely to lay it out in long straggling hedge-rows, but in clumps, belts, and woods, which would serve for shelter and give the best effect. Fences could then be of a much simpler and inexpensive kind. Where stall-feeding is practised, there need not be anything lost by hedges; as I have seen farms without any fences but that which surrounded and divided them from the adjoining farms, a furrow being all that separated one crop from another. But even where this system is not adopted, there are several methods whereby farms may be sufficiently divided, and the whole or greater part of the ground saved, which is at present lost. Besides railings of wood, wire, or iron rod, there is the sunk fence; none of these taking up any land. In wet, marshy, or boggy ground, ditches would serve for fences and drains

* Even the beauty of Devonshire and Somersetshire may be greatly improved by the removal of a large part of the fences. A few of the most beautiful trees, especially oaks, which from the depth of their roots are less injurious than ash or elm, may be spared, and will have more picturesque effect than long lines of undistinguishable foliage. The undulating lines of the surface thus unmasked, afford often a graceful landscape, with swelling knolls hidden before, and on these knolls the farmer will not grudge a little ground for single trees or clumps planted in commanding situations. In many places a confused farm might thus receive at once the character of an arable park.—PH. PUSEY.

TABLE referred to in the foregoing report.

NAME OF PARISH.	Total Acres in the Parishes.	Miles of Hedge in the Parishes.	Acres occupied by Hedges in the Parishes.	Per centage occupied by Hedges.	Equal to one in	Enclosures between ½ acre and 1 acre.	Enclosures between 1 acre and 2 acres.	Enclosures under 2 acres.	Enclosures betweeen 2 acres and 3 acres.	Enclosures under 3 acres.	Enclosures between 3 acres and 4 acres.	Enclosures under 4 acres.	Enclosures between 4 acres and 5 acres.	Enclosures under 5 acres.	Enclosures between 5 acres and 6 acres.	Enclosures under 6 acres.	Enclosures between 6 acres and 7 acres.	Enclosures under 7 acres.	Enclosures between 7 acres and 8 acres.	Enclosures under 8 acres.	Enclosures between 8 acres and 9 acres.	Enclosures under 9 acres.	Enclosures between 9 acres and 10 acres.	Enclosures under 10 acres.	Enclosures of 10 acres and upwards.	Total number of cultivated Enclosures in Parishes.
Huxham	762	34	54	7	14	16	14	30	23	53	26	79	16	95	14	109	9	188	8	126	4	130	3	133	9	142
St. George's Clyst...	1,040	52	83	8	12½	35	57	92	34	126	37	163	29	192	18	210	23	233	8	241	8	249	6	255	9	264
Rewe	1,341	65	104	7¾	12°	33	47	80	71	151	56	207	33	240	29	269	13	282	14	296	9	305	11	316	8	324
Poltimore...........	1,710	59	94	5½	18	27	50	77	48	125	43	168	25	193	20	213	18	231	11	242	9	251	8	259	38	297
Clisthydon	1,725	86	138	8	12½	26	52	78	69	147	81	228	59	287	39	326	41	367	15	382	14	396	7	403	4	407
Feniton.............	1,822	95	152	8¼	12	48	71	119	74	193	68	261	67	328	45	373	31	404	17	421	15	436	7	443	6	449
Talaton.............	2,365	114	182	7¾	12 9/10	57	105	162	90	252	89	341	76	417	49	466	31	497	21	518	10	528	7	535	13	548
Silverton............	4,714	222	356	7½	13¼	92	161	253	161	414	173	587	168	755	110	865	70	935	58	993	27	1020	11	1031	35	1066
Broadclyst...........	9,188	383	613	6⅔	15	108	348	536	336	872	304	1176	243	1419	197	1616	115	1731	94	1825	55	1880	33	1913	57	1970
Crediton............	12,309	541	866	7	14¼	283	442	725	387	1112	343	1455	299	1754	222	1976	160	2136	111	2247	80	2327	55	2382	148	2530
Total...........	36,976	1651	2642	7¼	14	805	1347	2152	1293	3445	1220	4665	1015	5680	743	6423	511	6934	357	7291	231	7522	148	7670	327	7997

at the same time; and in such a place as Broadclyst Moor, this method of dividing and at the same time of draining the land, would very much increase its value. But in cases where it might not be thought advisable, either owing to the first expense of iron rod, or wire railings, or to other circumstances, to adopt any of these methods of dividing land, the white-thorn would make a cheap and good fence, taking up very little room, being impervious to cattle, and costing little either at first or in keeping up afterwards. A thousand plants will plant thirty perches of one row, or fifteen perches of two rows, the plants being six inches apart: they cost from 10*s*. to 20*s*. per thousand, according to their age, and the planting of them costs very little. Sir John Kennaway, by taking down 100 perches of bank and planting 50 perches of thorn hedge, thus making three fields into two, saved nearly an acre of ground. There is not any reason that I can see why a farm even so small as a hundred acres should lose more than 1 per cent. by its hedges. In a survey of a parish road which I lately made, with a view to its being widened, I found that, for the greater part of its length, its width might have been *trebled* by merely adding to it the space taken up by its present wide fences. John Matthews, Esq., of Clisthydon, has within the last few years taken down half of the fences on his estate, and is proceeding to take down nearly all that remain. Timber need not be encouraged in hedgerows on account of its value, as, from the admission of foreign timber, this has been materially reduced. I should not think that the timber thus grown pays nearly so much annually as 1 per cent. of the rental, while it destroys about 10 per cent. of the ground; allowing 3 per cent. more than what is actually occupied for injuries sustained by the causes mentioned. What necessity is there for a farm, even so small as a hundred acres, being divided into smaller enclosures than eight ten-acre fields, and the remaining twenty into four or five, as might be most convenient? It would be a great improvement on the present state of things, if, instead of six fields of every ten being *under* four acres, there were the same proportion over ten acres. If to the loss shown to be sustained from these small enclosures and great hedges were added that from waste ground and the want of drainage, how very far short of its capabilities would appear that which is at present derived from our soil! An eminent writer of the present day says, "The introduction of thorough-draining will probably increase the productive power of the soil in Great Britain a third; scientific discovery may perhaps add another third: but at least ten years must elapse, in the most favourable view before these effects take place,—ere the judicious and well-directed labours of our husbandmen have formed rivulets for the superfluous wet of our fields, or overspread the soil with the now wasted animal manures of our cities."

Although I have shown the loss to be so great from the present system of dividing farms, I am not so sanguine as to expect to see anything like the saving made which might be, there being in some cases many difficulties to contend with; as where property is very much intermixed, and where it is leasehold. But with willing minds, and an enlightened co-operation of landlord and tenant, this county may soon become as famous for its superior farming as it is now for its mild climate and beautiful scenery. I have given several instances where much has been done in this neighbourhood; these, and the example of other districts at present in advance of this county, form examples worthy of imitation. If every agriculturist recorded the results of his experience, much knowledge of the most practical and useful kind, at present confined to himself and frequently dying with him, would be added to the general stock, and advance the science proportionably. The discoveries of Professors Liebig and Playfair, the improvements made by our Royal, Highland, and Provincial Agricultural Societies, and put into practice by Earls Ducie and Spencer, Mr. Pusey, and a long list of the great and intelligent throughout our our island, have given an immense impetus to agricultural improvement, which I trust will not cease till our land has attained that full amount of productiveness which the Almighty intended, and which his kind providence has placed within the reach of every practically scientific agriculturist.

243, *High-street, Exeter.*

ON MANURES.

From Law's Translation of Boussingault's Work on "Rural Economy," published by H. Baillière, 219, Regent-street, London.

GREEN MANURES.

Under this title, I include the green parts of vegetables which form part of our crops, such as the haulm of potatoes, the outer leaves of carrots, cabbages, beet, turnips, &c. These articles are at once forage and manure, and it is for the husbandman to decide in conformity with his position and particular resources, whether he ought to bury them at once, or to use them first as food for cattle.

From my own experience, I should say that the leaves of beet and of turnips, and patatoe haulm, were articles which ought only to be given to cattle in cases of necessity. It is generally much better to bury them in the ground immediately after the crop is gathered; if they be very indifferent food, they are, on the contrary, excellent manure; superior in quality even to the best farm dung. From the experiments I have made on this subject, I find that the potatoe tops from an acre of ground, may be equal to six or seven hundred weight of that manure presumed to be dry; and the leaves of the beet from the same extent of surface, are equal to more than twenty-one hundred weight of the same manure, also in a state of dryness. It is among green manures, that we are to class the sea-weed or marine plants, which, in many places, are employed for improving the soil. These cryptogamic plants, which abound in azote, have a fertilizing power superior to that of common dung, a fact which explains the great store which is set in Brittany by the sea-weed that is collected on its coasts. Sea-weed is either employed fresh and as it comes from the sea, or half-dried, or macerated, or roasted, and even partially burned. It appears to act at once in virtue of the azotised organic matters which it contains, of the hygrometric properties which it possesses, and of the saline substances which enter its composition. The agriculturists of Brittany have employed sea-weed as manure from time immemorial; and so have the people of Scotland and Ireland. In Brittany, the sea-weed is gathered at periods fixed by law. The first gathering, as well as that which has been cast up by the waves, is given up to the poor. The gatherings then take place at regular intervals, by means of a kind of cutting-rake. The sea-weed cut from the rocks, is piled upon rafts, or thrown into barges and carried to the shore; and there is a trade carried on in the article all along the shores of the channel, between Genest and Cape la Hogue, from the Chansey Isles, and from the coast of Calrados.

When sea-weed is employed in the fresh state, it is ploughed in as speedily as possible. For those kinds of crops which require made manures, the sea-weed is stratified with dung and so left to ferment. In some places the sea-weed is roasted, or imperfectly burned, by which a large proportion of the vegetable tissue is destroyed—an azotised product is still left behind. Before burning the sea-weed, it is exposed for a time to the air and the rain, and it is then dried, being frequently turned. In this state it is often used as fuel where wood is scarce. One great advantage in sea-weed, which has been particularly indicated, is its total freedom from the seeds of noxious weeds.

Aquatic plants which grow in fresh water, may also be employed as manure. The common reed, cut and buried green, decomposes rapidly. And here I may mention, that to destroy reeds which are often a cause of great annoyance in ponds, Schwertz recommends lowering the water to sixteen inches, cutting the plant, and then raising the water to its old level, the water enters the interior of the stems, and they all die in a very short space of time.

Crops which are buried green, for the improvement of the soil, are also ranked in the list of the manures which now engage us. The plan of burying green crops, dates from the most remote antiquity; it was greatly recommended by the Romans, and is followed in Italy at the present day. The plants usually grown for the purpose of being burned green, are colza, or colewort, rape, buckwheat, tares, trefoil, &c. The preference, however, is given to one or other of the leguminous plants, such as tares, lupins, &c., plants which appear to have the highest power of extracting azotised principles from the atmosphere; and, indeed, the value of the whole process is founded upon this fact; for otherwise, it would be impossible to give any reason for this long accredited mode of improving the soil. This, too, is one of the ways in which fallowing becomes useful; it is not merely the rest which the land thus obtains, it is also benefited by the vegetables which grow upon it spontaneously, which come to maturity and die, leaving in this way in the ground, all they had attracted from the atmosphere, or fixed from the water with which they had been supplied.

SEEDS, OILCAKE.

It is in the seed that by far the largest proportion of the azotised matter assimilated by vegetables during their growth is finally concentrated at the period of their maturity.

Seeds are consequently very powerful manures, and great advantage is taken of them. In Tuscany, lupin seed is sold as manure; it contains 3½ per cent of azote. It is employed after its germinating power has been destroyed by boiling or roasting. The cultivation of the lupin is carried on in districts, the situation of which is such that difficulty would be experienced in exporting more bulky crops. Grains from the brewery would also make excellent manure, were it not generally found more advantageous to use them as food for cattle. In some places, however, where there is no adequate demand for them in this direction, they are dried upon a kiln, and are then equal to twice-and-a-half their weight of farm dung; in some places, they are actually sold at a proportionate price.

The state of division of grains admits of their being regularly spread. In some parts of England, grains are used in the proportion of from 40 to 50 bushels per acre for wheat or barley.*

The refuse of the grape in wine countries contains a large quantity of azotised matter. The decomposition of the grape-stones being slow, this refuse answers admirably as a manure for vines.

Oleaginous seeds, after the extraction of the oil, leave a residue, which is an article of commerce, and is familiarly known under the name of *cake.* Oil contains no appreciable quantity of azote; this principle is contained entirely in the cake, which becomes through this alone, most excellent manure.

The proportion of azote which cake contains varies from 3½ to 9 per cent. Oil-cake, from its mode of preparation, contains but very little moisture, and consequently offers great facilities in the way of carriage; it may be taken without difficulty to situations whither a load of dung could scarcely be carried.

Cake is applied in two modes. First, in powder, and by sowing upon the field, sometimes mixed with the seed. Second, mixed in water, or in the drainings of the dung-hill, in which case, the liquid containing the products of the decomposition of the cake is distributed over the land. By putrefaction under water, cake yields a matter of extreme fetor, comparable both in point of smell and of effects on vegetation, to human excrements obtained from privies.

Although cake, from the large proportion of albumen and legumen which it contains, be an excellent food for cattle, it is still found more advantageous in many districts to use it as manure than for feeding. England imports oil-cake from all parts of the continent. France alone, from 1836 to 1840, exported more than 117,860 tons of the article. Oil-cake has been particularly recommended as manure for light sandy soils. When the soil is clayey and cold, Schwertz recommends

* Sinclair, Agriculture, vol. 1.

a mixture of one part of lime, and six parts of powdered cake. To me, however, the addition of lime has always appeared a questionable auxiliary in such manures as give rise readily to ammoniacal products, as is the case with oil-cake, For clayey lands, it would perhaps be advisable to employ oil-cake in a state of decomposition, and diffused in water, its effects, I imagine, would not be doubtful.

Oil-cake as a manure, is employed at very different seasons, according to the nature of the husbandry. It is always well to employ it in rainy weather. Its effect is always certain, if it comes on to rain two or three weeks after it has been put into the ground. Drought suspends its action; it frequently happens, indeed, that the first crop shows none of its good effects; but these never fail to appear in subsequent crops. Schwertz remarks very properly, that this circumstance has led many farmers to overlook the real advantages that belong to this manure. Cake, in fact, according to the dryness or moistness of the season, may act as a manure either of difficult or of easy decomposition, and so produce more immediate, or more remote effects. In England, about 8 cwt. of oil-cake per acre, are commonly applied.

Mr. Coke, of Holkham, ploughed in the powdered cake about six weeks before sowing turnips, but it is held more economical and more advantageous to strew it in fine powder along the furrow with the seed. The latter view, however, must not be too confidently acted on by farmers; the general recommendation to sow the fields with powdered cake, either some weeks before or some weeks after putting in the seed, and when the plants have already sprung appears to be the right one. We have various observations made by one of our most experienced practical farmers, which prove, that oil-cake used dry and without mixture, often produces the most injurious effects upon germination. In September, 1824, M. Pilmorin, desiring to make a comparative trial of different pulverulent manures, strewed a quantity of powdered colewort cake upon a piece of red clover. Upon all the parts of the field which had received other manures, applied in the same way the clover sprung perfectly; but that which had received the oil-cake continued absolutely naked; the cake had been employed in the proportion of about 8 cwt. per acre. The same result was also obtained in a trial made with vetches and grey winter peas.* Duhamel, referring to similar facts, recommends the cake to be applied ten or twelve days before sowing. In Flanders, from 6 to 7 cwt. per acre is the quantity generally employed for wheat crops, and it is scattered over the surface before winter sets in, when the grain is already above the ground.

The pulp of the Beet-Root which has been employed in the sugar manufactories of France and Flanders, is an article which as food for cattle, is known not to be inferior to the root before it has undergone expression, and it contains nearly the same proportions of sugar, albumen, &c. It is, therefore, always used as food to as great an extent as possible. But the article is kept with difficulty, and the production at times far exceeds the powers of consumption, so that it has to be made into manure, for which it answers excellently. The skimmings and dregs which are collected in the process of sugar making, are also available as manure. They contain about the same amount of azote or azotised matter as farm dung, and are therefore of similar value. The animal charcoal of the sugar refinery, after it has served its office there, is an admirable manure. It is, in fact, bone or ivory black, mixed with coagulated blood which has been employed to clarify the syrup by entangling impurities, and a very small quantity of sugar. This mixture, so rich in azotised principles, used actually to be turned into the sewers until the year 1824, when M. Payen showed its value as manure, since which time nearly 10,000 tons have been annually employed in ameliorating the soil to the great advantage of practical agriculture. The importance of the trade in this residue of the sugar-house, and complaints of the occasional indifferent quality of the article, attracted the attention of the department of the Inferior Loire in 1838, and led to the appointment of an inspector of the manure shipped from the port of Nantz. I may here observe, that in testing a manure, it is by no means enough to limit attention to the quantity of organic matter which it contains. The only sure means is to determine the amount of azote; it is not organic matter, but the amount of azotised organic matter, upon which almost alone depends the value of the manure.

The residue of the sugar refinery is another of those articles which presents an occasional anomaly in its application, and which must not be left unnoticed.

Its effect upon the ground has not only been extremely variable, but it has sometimes happened that this manure, laid on very soon after coming from the manufactory, has been found decidedly injurious to vegetation. Kept for some time, for a month or two, in a heap before being applied, its effect has not only been found more certain, but also uniformly favourable.

It is not difficult to explain these divers and opposite influences: the sugar contained in the refuse undergoing fermentation yields first alcohol, and then acetic and lactic acids. Employed in this state, the substance must necessarily prove injurious to vegetation. It is only after it has lain for a sufficient length of time exposed to the air, to have had the animal matter it contains changed into ammonia, and the organic acids engendered, saturated with this base, that it becomes truly useful to vegetation. The heap indeed then shows alkaline, not acid re-action.*

The residue of the starch manufacturer.—The fetid water which is obtained in such quantity in the process of making starch from grain is a powerful manure, and ought not to be suffered to run waste.

The pulp or residue of the Potato, which is now produced in considerable quantity in the potato starch manufactories, is known to be

* Pilmorin, in "Maison Rustique," vol. 1., p. 204.

* Payen and Boussingault, "Ann. de Chimie," v. iii, p. 95, 3e série.

an excellent article of food for hogs and cattle. Towards the end of the season, however, it is apt to be of a very indifferent quality, and green food having by this time come in abundantly, it often goes to the dung-hill. In the dry state, it is worth its own weight of farm dung; wet, 100 of the pulp may be equal to about 131 of farm-yard dung. The water which has served for washing out the starch from the pulp, as in the case of wheat, and other grain, contains an organic substance which when dried constitutes pulverulent manure, that is equal to about half its weight of the dry manure prepared from night soil, which the French call *poudrette*. M. Dailly made a comparative trial of these two kinds of manure, and from actual experiment found that 200 parts of the deposit from the starch manufactory might be used for 100 of *poudrette*. Even the water that is used in the manufacture, and from which the substance in question is deposited, is an excellent manure, when thrown upon the ground; a circumstance which is by so much the more fortunate that this water, by standing, putrefies and throws off most offensive exhalations. By using the liquor to his fields at once, M. Dailly prevents every kind of annoyance to himself and his neighbours; and moreover from his great starch manufactory he realizes in this way an additional profit, which he estimates at upwards of £60 per annum. Analysis has shewn that 100 of this water from the potato starch manufactory represents seventeen of moist farm-yard dung.

In cider countries *the pulp of the apples* that have been pressed is always thrown upon the land as manure. At Bechelbronn we reserve it for our Jerusalem artichokes; in Normandy it is thought excellent for meadows and young orchards. Analysis of the pulp of apples grown in Alsace, shows that when dry it contains a quantity of azote, which places it on the same footing as farm-yard dung. Sinclair informs us that in Herefordshire the pulp of the cider press is made into good manure by being mixed with quick-lime, and turned two or three times in the course of the following summer. Doubtless the addition of lime will hasten the decomposition of the woody matter of the pulp; but it strikes me that this will take place rapidly enough of itself in the ground, without contriving any means of accelerating the process.

Animal Remains.—The remains of dead animals, and the animal matters obtained from the slaughter house, are powerful manures which are much sought after in places where their value is properly appreciated. Scraps and the refuse of skin, hair, horns, tendons, bones, feathers, &c., all form invaluable manure. The flesh of animals which die, and so much of that of horses that are slaughtered which cannot be used as food for animals, may be dried, after having been previously boiled, and then reduced to powder and applied as manure. The blood of slaughtered animals is less proper as food for hogs, although it is oftener used in this way, than muscular flesh; it even occasionally gives rise to serious diseases among these animals. It is most easily prepared as manure however, for which it answers admirably; it is enough to coagulate it by exposure to heat, and then, having broken it down, to dry it in the air, or in the stove. Liquid blood has been employed as manure, but decomposition then takes place so rapidly, that the products are exhaled without producing much effect. This objection may be remedied by two means; either by diluting the blood in a large quantity of water, with which the land is then irrigated; or by mixing it with a considerable mass of vegetable earth, which is then applied like ordinary manure. There is even a pulverulent manure, of which blood forms the basis, prepared in special establishments in the vicinity of various large towns. The large quantity of azote contained in these manures shows how their value may be such as to permit of their being advantageously exported to great distances beyond sea.

Bones are employed in agriculture, after having had the fat which they contained extracted from them by boiling. They are crushed by being passed between the teeth or grooves of a couple of cast-iron rollers. They must be regarded as a manure the action of which is of long duration, because the animal matter contained in them decomposes slowly, protected as it is by the earthy casing which surrounds it. In England from fifty to sixty bushels of bruised bones per acre are usually put upon land prepared for turnips.

The employment of bones as manure has given rise to the most various and contradictory observations. In certain circumstances their effect upon vegetation has been almost null; in others, their action has been decisive and most favourable. M. Payen has given a solution of these anomalies, which is perfectly satisfactory. According to my learned colleague, bones in their interstices contain a quantity of fat, of various consistency, which may be removed by long boiling in water; the average quantity of grease obtained from fresh bones is about ten per cent. It has been observed that this fatty matter diminishes gradually in bones that dry by long exposure; it even disappears almost entirely when they are dried at a high temperature. This happens from the water which is disengaged from the bony tissue, by the effect of evaporation, being replaced by fat melted by the heat. The consequence of this is, that the organic tissue of bone, which was already sufficiently rebellious to decomposition, becomes still less alterable when it is impregnated with grease. The grease, in fact, by reacting upon the carbonate of lime of the bone, has formed an earthy soap, which long resists atmospherical influences and change underground.

It will readily be understood that bones in this condition can have little or no action upon vegetation, unless indeed they be reduced to very fine powder. This alone will explain how it may happens that some bones, after having remained four years in the ground, have been found to have lost no more than eight per cent. of their weight; whilst those, the grease of which has been removed by boiling water, have lost in the same space of time from twenty-five to thirty per cent. of their weight.*

These observations of M. Payen show how completely Schwertz was mistaken when he ascribed

* Payen, *Maison Rustique*, v. i. p. 194.

the indifferent quality of the manure prepared from old bones, or from bones that had been boiled, to the absence of fat, which he regards—I know not on what authority—as a substance extremely favourable to vegetation. It is not very obvious how fatty substances should act as manures. I myself ascertained from experiments made some years ago, with a view to test the conclusions of an agriculturist, who ascribed the good effect of cake to the fatty matters which it contained, that rape oil had no kind of favourable influence upon the growth of wheat. I have said nothing here upon the importance of the earthy matter of bones, particularly of the calcareous phosphate which they contain, but which is nevertheless acknowledged to be of great importance.

The Refuse from the Glue Makers, washed and pressed, contains all the animal matters which have resisted the action of boiling water, such as portions of tendonous and skinny substance, hair, pieces of bone, of horn, and of flesh, a calcareous soap, and earthy matters. This mixture putrefies rapidly; but dried, it may be preserved for a great length of time. Analysed dry, it yields about four per cent. of azote. From four to five cwt. per acre are employed, but it is necessary to manure every year.

The Refuse of the Tallow Melter—Graves, as it is called—a residue consisting in great part of the membranes which have enveloped the fat of our domestic animals, mixed with a little blood, some flesh and bony matter, and grease—has hitherto been employed almost exclusively as food for dogs. Of late, however, graves have been used as manure; and analysis shows that this substance must be estimated as equal to about 3½, farm dung being fixed at one. Used in this proportion, graves produce a marked effect.

The action of graves—which may be thrown on in fragments and dry, or after having been steeped in hot water, and reduced to the state of a pulp—will continue for three or four years.

Shreds of Woollen Rags form a good manure, for vines and olive trees especially, though they are also available in husbandry of every description. The large proportion of azote, and the small quantity of water contained in woollen rags, constitute them not only one of the richest manures, but also one of those that are most easily transported; 25 cwt. per acre of woollen rags, the cost of which in France may be about £3, have been found sufficient as manure for three years. The slowness with which wool decomposes, indeed, causes its action to be continued during six or eight years. Twenty-five cwt. of woollen rags may be held equivalent to upwards of 40 tons of farm dung; which, at the price of 5s. 10d. per ton, would cost £12. 16s. At the end of three years, M. Delonchamps, an excellent practical farmer, gives his land a dressing of farm dung for three years more, when he returns to the wool. Before spreading rags they must be cut into pieces, which is effected either by a machine, or by a piece of scythe blade fixed in a block of wood. In England, the quantity of woollen rags allowed to the acre is generally about 13 cwt. Sinclair says that they are best suited for dry and sandy or chalky soils, and this because they attract moisture. I have not found the fact to be so. In the very dry soil of a vineyard manured with this article, I have found the pieces to decompose with extreme slowness, and up to this time the effect upon the vines has been scarcely perceptible.

The Raspings and Shavings of Horn form a manure of great power that seems applicable to every variety of soil. In England about forty bushels per acre are usually allowed.

Tendons, Trimmings of Hides, Hair, Feathers, &c., are manures very analogous to the last, and of which the value may be estimated from the quantity of azote which they severally contain. This value once determined, every farmer knows the quantity which he must lay upon his land; and he thus proceeds upon a much more rational foundation, than when he takes for his guide one or other of those vague and arbitrary indications that have been given. Sinclair, for example, would have us lay on nine bushels of feather-rubbish to the acre, and Schwertz recommends from four to five times as much more. Nothing, in fact, is more arbitrary and uncertain than to estimate such materials by the bulk: it must be obvious that the weight of a bushel of hide-trimmings, of horn-shavings, and of feather-rubbish, must differ very widely, not only with reference to one another, but also according to the state of division in which each is measured. As a general rule, it is by weight, and weight alone, that the quantity of manure must be estimated.

Shells and Mud from the sea shore and the bottoms of rivers are matters that are often not very highly azotised; nevertheless, they may contain an equivalent of all the important element, azote, which may bring them near to wet farm-yard dung in point of value. The abundance of such matter in certain situations makes them extremely useful. The alkaline and earthy salts, which they generally contain in considerable quantity, also add to their fertilizing properties. The sea-sand which is employed in Brittany under the name of *marl* (merl), consists in great part of the remains of corallines, madrepores, and shells, mixed with a few hundredths of highly azotized organic matter. This marine marl is found in great abundance at the mouths of the river Morlaix, where there is considerable traffic carried on in the article. It is said to be reproduced, new banks of it being met with from time to time. It is obtained by dredging from barges, and the process is only allowed to go on from the 15th of May to the 15th of October when the quays of the town of Morlaix are seen covered with the produce. It is carted to a distance of five leagues inland. A barge load, weighing seven tons, sells at from 6s. 6d. to 8s. This same species of marl is now obtained upon the coast of Plancoutrez and in the roads of Brest. It has also been discovered near the mouth of the river Quimpert. It appears finally that the shelf sand so much employed by the farmers of Devonshire and Cornwall is of the most essential nature.

In the neighbourhood of Morlaix, from five to six tons per acre of this calcareous sand are employed upon light, dry soils; from eleven to twelve tons are given to clayey lands. This quantity would probably be too great for porous and damp soils, inasmuch as sea marl belongs to the class of *warm* manures, that is to say, it undergoes speedy decomposition. There can be no doubt that sea marl acts further in virtue of the calcareous matter which it contains, and also of its merely mechanical properties, upon the strong argillaceous lands of Brittany, for which sand alone is an excellent improver. It is also to the carbonate of lime which it contains that its good effects upon lands that show an infloresence of iron pyrites must be ascribed. It is well to lay this shell marl upon the land shortly after it is taken from the sea; by long exposure to the air it suffers disaggregation, and loses a portion of its good qualities.

There is another kind of sea sand, salled Trez, which forms banks in the neighbourhood of Morlaix, and which is known under the name of Tanque on the northern shores of France, which is favourable to vegetation, particularly after it has been washed and freed from the greater part of the salt which it contains. It is thrown upon the land in larger quantity than the marl. The small quantity of animal matter which it contains putrefies, and is lost when it remains exposed to the air for any length of time, so that a distinction has been made between fresh or *live* Trez, and old or *dead* Trez, the one being the article as it comes from the sea, the other after it has been exposed some time on the shore; the article which has been exposed undoubtedly contains a smaller quantity of organic matter than that which is quite fresh. This variety of sea sand is particularly available upon close and clayey lands, which sometimes receive as many as sixteen tons per acre with advantage; lighter lands, of course, require much less.

Shells, sand, slime, and sea weed are not the only useful materials supplied to agriculture by the sea; *fish*, or their *offal* is frequently employed as manure. The practice of manuring with fish is very old, and is universal wherever it can be had recourse to. I have already had occasion to say that at the period of the conquest of America, the Spaniards found it established among the Indians on the shores of the Pacific Ocean. The lands are occasionally manured with fish along the sea board of Great Britain and Ireland, and the low lands of Lincolnshire, Cambridgeshire, and Norfolk also receive occasional supplies of the same powerful manure. The offal of the herring fishery, of cod, of skate, and of the pilchard in Cornwall, the dog-fish entire, and other kinds that are less esteemed, or that are caught in quantities greater than can be consumed as food, are all admirable manures. We have been recommended to mix the fish or fish offal with quick lime, but, unless in certain circumstances, the practice is very questionable; the addition is probably only proper where the materials are exceedingly oily, as is the case with pilchards, herrings, &c.; an earthy soap is then formed which prevents the injurious effects on vegetation which wholly oleaginous matters scarcely fail to produce. One analysis of codfish which I made along with M. Payen, gave us a proportion of azote of nearly seven per cent. This of itself is enough to explain why the flesh, the cartilages, and the bones of fishes should be found such energetic manures.

The Slime deposited by rivers also yields manure which may be employed to much advantage. The Nile, which periodically inundates the plains of Lower Egypt, owes its fertilizing action to the slime which it contains, and which it deposits before it again recedes into its bed. On the banks of the Durance, the mud and slime deposited by the river is carefully collected for distribution over the fields in its vicinity. The waters of this river are frequently turbid, and improper for irrigation until they have deposited the slime which they hold in suspension; the waters are therefore turned into canals for the purpose of deposition before they are let upon the land; and such is the quantity of slime that is precipitated, that two or three gatherings of it are made in the course of the year. It is dug out and thrown upon the banks to dry; reduced to powder, it is fit to be laid upon the land, and such is its fertilizing power that a field which yielded but four for one has been brought to yield twelve for one by its means.*

Wood and Coal Soot, and Picardy Ashes.—Soot has been known for a long period as a useful manure. M. Braconnot, in the soot of a chimney where wood had been the fuel, found the following ingredients:—

Ulmic Acid	30.0
Azotic matter, soluble in water	20.0
Insoluble carbonated matter	3.9
Silica	1.0
Carbonate of lime	14.7
Carbonate of magnesia (traces of)	
Sulphate of lime	0.5
Ferruginous phosphate of lime	1.5
Chloride of potassium	0.1
Acetate of potash	4.1
Acetate of lime	5.7
Acetate of magnesia	0.5
Acetate of iron (traces of)	
Acetate of amonia	0.2
An acrid, and bitter elements	0.5
Water	12.5
	100.0

The analysis which M. Payen and I made of wood and coal soot confirms the presence of the azotised principle detected by M. Braconnot. A considerable trade is carried on in soot for agricultural purposes in large towns; it is thrown upon clovers and young wheats, in the proportion of about twenty bushels to the acre. Some have recommended that it should be mixed with lime, but, as soot always contains salts having a base of ammonia, the practice is evidently objectionable, unless, indeed the object be to get rid of that which is most useful in the article, which will be effectually

* Belleval in Annals of French Agriculture, 2nd series, vol. xiv., p. 261. The beds of many of the oozy-bottomed rivers in England, near the sea, are inexhaustible sources of the most valuable manure. The bed of the Thames, between London Bridge and Putney Bridge, at low water, is a true gold mine if it were but rightly used.—Eng. Ed.

accomplished by adding lime to it. The proper proceedure is to employ the soot without admixture during calm or wet weather. In Flanders, the colewort beds, destined for transplanting, are very generally manured with soot, which is believed to have the property of preserving the young plants from the attacks of insects. In the neighbourhood of Lisle they give from fifty-five to sixty bushels of soot per acre. Schwertz appeals to many facts which go far to satisfy us that the effects of soot upon clovers are particularly advantageous; he says, moreover, that coal soot is preferable to wood soot.

The superior properties of coal soot are evidently due to two causes: first, it is more dense than wood soot, and in a given bulk actually contains a larger quantity of matter; secondly, I have found that, for equal weights, coal soot contains the larger quantity of azote.

Picardy Ashes are prepared by the slow and imperfect combustion of the pyritic turf which is dug up in the department of the Aisne, for the manufacture of sulphate of iron and of alum. This turf piled up, heats, and finally takes fire: the combustion continues for about a month, abundance of sulphureous vapours being disengaged. The residue is a grey ash, still containing a quantity of carbonaceous matter which is found very advantageous in the way of top-dressing for meadows. It might be maintained that the utility of such ashes depend solely on the sulphate of lime which they contain; but it is ascertained that they are much more active as manure than this substance employed by itself; analysis, in fact, explains in some degree the fertilizing powers of these ashes by showing that they contain more than one-half per cent of azote, to say nothing of the saline matters, of which vegetables are so greedy. It is extremely probable that during the slow incineration of the turf, there is a quantity of sulphate of ammonia produced.

The ashes which remain after the lixiviation of the pyrite and aluminous lignites which are mixed for the purpose of making green vitriol, are analogous to Picardy ashes, and are employed with equal success in agriculture. At Forges-les-Eaux, the pyritic earths, after lixiviation are mixed with a quarter of their weight of turf ashes, and form an active manure which is employed very extensively in the country around the town of Bray in France. It is equally adapted to meadows and to land under roots—such as potatoes or turnips, green crops, or corn. Analysis shows these ashes to have the following composition:—

Soluble organic matter	2.7
Insoluble humus	49.8
Sulphate of protoxide and of peroxide of iron	1.8
Fine sand	29.0
Sulphuret of iron } Peroxide of iron }	6.7
	100.0

The vitriolic ashes of Forges-les-Eaux, are more highly azotised than those of Picardy; they contain 2.72 per cent. of azote.

The effect of the imperfect combustion of these pyritic turfs—the product which results from it, explains to a certain extent the beneficial effects of the practice of PARING AND BURNING, an important and widely spread practice, the utility of which it would be difficult to understand were it not connected in some way with the production of ammoniacal ashes.

The useful effects of paring and burning, are, in all probability, connected with the destruction of organic matter, very poor in azotised principles; in the transformation of the surface of the soil into a porous, carbonaceous earth, made apt to condense and retain the ammoniacal vapours disengaged during the combustion; lastly, by the production of alkaline and earthy salts, which are familiarly known to exert a most beneficial influence upon vegetation. These conditions seem so entirely those, the object of which it is to realise by paring and burning, that, in order to make the operation favourable to the soil which undergoes it, the vegetable matter which it has produced must of necessity be transformed into black ashes; when it goes beyond this, as Mr. Hoblyn has well observed, when the incineration is complete, and the residue presents itself as a red ash, the soil may be struck with perfect barrenness for the future. The burning, therefore, that was not properly managed, that led to the incomplete incineration of all the organic matter, would, for the same reason, have a very bad effect in the preparation of the Picardy ashes, which might indeed act in the same way as turf ashes from the hearth or oven, but which, deprived of all azotised principles, would not ameliorate the ground in the manner of organic manures.

I have frequently seen the process of burning performed in the Steppes of Southern America. Fire is set to the pastures after the grass which covers them has become dry and woody, the flame spreads with inconceivable rapidity, and to immense distances. The earth becomes charred and black; the combustion of those parts that are nearest the surface, however, is never complete; and a few days after the passage of the flame, a fresh and vigorous vegetation is seen sprouting through the blackened soil, so that in a few weeks the scene of the desolation by fire becomes changed into a rich and verdant meadow.

ELECTRICITY AND AGRICULTURE.

We are not surprised at the numerous letters which we have received on this very important and interesting subject. Many of our letters notice a typical error, which we had discovered in the external dimensions of the area of one acre described in our last article. They should have been 80 by 60½ yards. The experiment referred to in our last paper was made by Dr. Forster, of Findrassie, near Elgin, who produced from a single acre one hundred and eight bushels of chevalier barley. In reply to several inquiries we may say that the cost of a square 55 by 22 yards, being an area of half an acre, would be —for 6 lbs. of iron wire at 1d. per lb. (for burying) 2s.; 4 lbs. of ditto at 3d. per lb. (for suspension) 1s.; two poles of dry wood 1s.; labour, &c. 1s.; total 5s. As the area increases the cost diminishes. Convenient and desirable areas are, for two acres, 120 by 80 2-3rds yards; one acre, 80 by 60½, three quarters of an acre,

$82\frac{1}{2}$ by 44; half an acre, 73 1-3rd by 33; quarter of an acre, 55 by 22; one eighth of an acre, 40 by $15\frac{1}{2}$. The mode in which the plot is laid out is as follows. With a mariner's compass and measured lengths of common string, lay out the places for the wooden pins, to which the *buried* wire is attached (by passing through a small staple). Care must be taken to lay the length of the buried wire due north and south by compass, and the breadth due east and west. *This wire must be placed from two to three inches deep* in the soil. The lines of the buried wire are then completed. The *suspended* wire must be attached and in contact with the buried wires at both of its ends. A wooden pin with a staple must therefore be driven in, and the two poles (one 14 feet and the other 15 feet) being placed by the compass due north and south, the wire is placed over them, and fastened to the wooden stake, but touching likewise at this point the buried wire. The suspended wire must not be drawn too tight, otherwise the wind will break it.

The above calculations will perhaps enable our readers (some of whom make the inquiry) to decide the quality or size of the wire used. Some other questions of greater minutiæ we will reply to next week, and we hope then also to be able to furnish the result of some further interesting and important experiments on this subject.

When our attention was first called to this question, we were forcibly struck with a practical difficulty, if it should be carried very generally into practice, viz., that the free electricity in the atmosphere would be insufficient to influence an extensive surface, to which this means of attracting it might be applied. But we were indebted to the suggestions of the accomplished geologist and agricultural chemist, the Rev. William Thorp, of Womersley, for the easy and simple mode mentioned in our last, by which electric fluid could be generated. The principle being once known the means of applying it are thus furnished without any limit.—*The Economist.*

BREEDING OF HORSES.

TO THE EDITOR OF BELL'S LIFE IN LONDON.

Sir,—The English race horse is an animal of which all classes of our countrymen are justly proud; but at the same time it may be doubted whether the great and numerous prizes now offered to speed, without much regard to stoutness, do not produce results injurious to the country; and I wish to call the attention of your readers (who comprise most of the sporting public,) to the present state of our horses. The Arabian blood, by its mixture with ours, has long since attained to a wonderful degree of perfection; and racing having been at an early period enrolled among our national amusements, the attention of the most wealthy among us has been directed to race horses, and to the breeding of them with the utmost possible speed. Formerly horses had to run four miles at high weights, now it is a course of a mile and a half, with light weights, to try to approximate to the speed of steam. One attempt has been made to stem the torrent by the race instituted some years ago by the Duke of Portland, but it was against the fashion, and it was given up; and if any one objects that such a race is more cruel and more distressing to horses than a short one, I say he can know but little of racing, for horses differ much more in stoutness than in speed; and as you lengthen the course you do away with the keenness of the contest, which is what causes the distress, and this in fact is the very reason why the B.C. is unpopular. A leggy animal with a long stride is worth more now than he was in the days of our fathers; this, I say, is entirely wrong and mischievous. Then, as to another point—no regard is paid to sound and lasting legs and feet for mares or stallions; these points would be carefully looked to for a riding horse, but when it comes to breeding a more valuable animal, the breeder says, "Oh, the colt will come out well at two years old, and win me a few good stakes, and that will do, never mind his legs. Then, again, what carelessness there is as to size and power, especially as to the dam; on these points stoutness, soundness, and power, I say, most wonderful indifference is daily shown, as any man will see who looks through thorough bred studs in nine cases out of ten. Let him go to Tattersall's and almost all the thorough breds he sees sold will be long thin legged colts (most of them chesnuts), with slight and upright pasterns and small round fetlocks. What on earth are they good for? a Welsh pony would kill three or four of them in a costermonger's cart. Then we expect to sell our thorough breds to foreigners, but they will not buy small lame cats—they buy nothing but the very best sort we have. In short, whether for use at home, or as merchandise to go abroad, we ought to be more particular in the shape, size, and soundness of sires and dams of horses, than the short horn breeders are as to their cattle; whereas most of us, on the contrary, trust to blood, and think of little else. I have addressed you long ago on this subject, but I do so again because I think it one of great and national importance, and because I see the evil growing daily. There would be much less expense, and much less disappointment, if one colt was bred from a sire and dam of true form and soundness, than if six were bred at random with the hope of one turning up a trump. Again, it is not near so easy now as it used to be to buy a good, strong, young hunter: and steam is in some measure the cause of this, for an old fashioned, compact, active, coaching mare, when her work was over, bred a good hunter by a lengthy thorough bred horse; now, the demand for the machiner is nearly gone, and the animal is very scarce. In the want, then, of this middle class, from which to recruit the patrician blood of our Sultans, &c., we have an additional motive to be careful about strength and size in the latter. I have been bitten by thorough breds when younger, but I think of them now, that though a large and powerful thorough bred is the finest form of a horse, bring me them at random, and I will engage three out of four will be irredeemable rips. I am, &c.

Q. IN THE CORNER
(but not in the Magazine).

THE COMPARATIVE APPLICABILITY OF THE ABERDEENSHIRE SCYTHE AND THE COMMON SICKLE IN CUTTING LAID CROPS.

In these days of scientific reseach and mechanical invention, many benefits have been conferred on agriculture, by the removal of a large amount of prejudice against things new or strange, by which a fair trial generally is obtained for all suggestions bearing the semblance of improvement. The continuance of this favourable state of feeling may be endangered by the exaggerated statements with which new methods or inventions are propounded. A manure, for instance, found to be highly beneficial in one locality, is held up as being universally so; and an implement useful and valuable in some situations, is declared to be generally so. The merits or demerits of each proposed improvement not being clearly or sufficiently defined, its subsequent failure in any case tends to damp the zeal with which even really useful matters are received, and to strengthen prejudice against it.

Having at intervals, seen, in the pages of this Journal, and in those of the Transactions of the Highland and Agricultural Society, startling statements as to the great superiority of the Aberdeenshire scythe over the sickle and scythe-hook for reaping grain crops of all weights, both as regards economy and despatch, and having frequently used the long-handled scythe in cutting grain as well as hay, but never with satisfaction as to the completeness of the whole work, where the crops were lodged, I had recourse to the short-handled scythe of Aberdeenshire, putting it into the hands of our own workmen, and found, after a trial of several seasons (except in the lightest crops), neither the amount of work, style of execution, or saving of expense, such as to induce its continuance. Thinking that our own scythesmen might not have been sufficiently trained to the right use of the implement, or expert enough in its application, whilst those who formed the sheaves might not have acquired the requisite dexterity possessed by those who had been long employed at it, I asked a friend to engage for me for the harvest of 1843 two mowers and two gatherers from Aberdeenshire, so that I might practically test the applicability of the implement to the cutting of our crops of wheat, barley, and oats, and introduce amongst our own work-people the superior acquirements evinced in that county.

The harvest had commenced before their arrival. Their first start was in a field of barley, an average crop, mostly standing, some of it laid, but not twisted. The surface of the ground was flat, with merely marks for furrows, and, saving that the crop was rather ripe, a better than average situation. There being little wind, many stalks were left and intermixed. It was very low cut, except where lodged, and where much of the stubble was passed over to drag in sight, with the rake, many ears which found their way into the stubble end of the sheaf. On the whole, the first day's work did not come up to my expectations or conception of how the work should be executed. Next day a slight breeze favoured their operations; the sheaves were clearer of stray stalks, and the raker had less to collect; but the extent of ground gone over was only three-fourths of a Scots acre to each scythe. They continued cutting barley for several days. So soon as a light field of oats was ripe, they entered on it, and here they seemed more at home. The straw was short, and it was very low cut; no more ears left in the stubble ends of the sheaves than when cut with the hook, and very few rakings. The appearance of the whole was satisfactory; yet there was not more than one Scots acre cut by each scythesman per day, working ten hours. From the last field they removed to a bulky field of oats, laid, twisted, and tangled many ways; the ground was good, being smooth, free from stones, and no deep furrows. The standing portion was managed in a tolerable manner, but little progress and imperfect work was made with what was laid. When the weather was quiet, it was painful to see the destruction of grain caused by many stalks falling back after being cut, mixing amongst the swathe and shedding their grains, a disadvantage detracting very much from the profit arising from the additional length of straw obtained; for in this field there was no other saving, the time taken being about the same as an equal number of Irishmen took to cut it with the hook. No extent of wheat was cut with the scythe.

The two men were stout, active, and ready fellows, by no means lazy, and anxious to acquit themselves well. The gatherers had been trained to it from the time they could work. On the conclusion of the mowing, I had them employed for two weeks at the usual harvest labour, and found them all no ways inferior to our own hands. Each scythesman had 2s. 6d. per day, the gatherers 1s. 8d., with lodging, and their passage paid from and to Aberdeen, but they provided their own living. In order to form a comparison of the expense of reaping with the scythe and hook in this situation, I may state that the average rate of wages paid our shearers for the last four years has been 1s. 4d. per day, with victuals, or 2s. 1d. without; and finding that, in the cutting of 160 Scots acres of wheat, barley, and oats each season, that it required $4\frac{1}{2}$ people to shear and bind one acre; and taking three-fourths of an acre as the average work performed by each scythesman in similar descriptions of crop, we have

1 acre Scots, cut with the scythe, costing	£0 9 $3\frac{3}{4}$
1 acre Scots, cut with the scythe-hook,	0 9 $4\frac{1}{2}$

Of course, had there only been oats to cut, or light oats and barley, the expense of mowing would have been much less than shearing; a fact which, on reflection, is quite easily accounted for; because the scythesmen, meeting with no interruptions in such crops, can expend all their force with most effect, and the additional power conferred by the larger implement can be fully applied. When the crops are laid and twisted, the case is materially different; the powerful leverage of the scythe is lessened, the mower must be constantly making fresh openings, cutting much of it twice over, and seldom has a full, free, unhampered sweep. The shearer, with his scythe-hook, shifts his position easily, and loses no power in applying it. Such being my experience of the Aberdeenshire scythe when managed with men trained to it, I can therefore understand the reason for its being so little used for cutting the strong, tangled, twisted crops of the Lothians or Carse of Gowrie; and in such situations the scythe-hook is, everything considered, certainly to be preferred.

Although I have never seen the extent of work, either on my own farm or elsewhere, performed by the scythe as represented, I am convinced that it is a cheaper and more economical mode for cutting light crops than the hook. This season (1844) I had another opportunity of comparing the difference of the two modes, in a field of 50 acres of light oats, with a good sole, there being a smooth surface to cut upon, and a small quantity of grass where the crop was thinnest, enabling the scythesman to gather even the lightest corn well in, and there a band of fourteen Aberdeenshire people cut 38 acres Scots in eight working days, in a very satisfactory manner; no more ears being seen on the outside of the stacks after being put up than the shorn ones, and the stubble was more equal and lower down than the other twelve acres that had been cut with the hook. The number of shearers required to cut and bind these twelve acres was under four per acre; and taking three as the number required to mow an acre, we have

1 acre mown, 3 people at 2s. 1d. per day	£0	6	3
1 acre shorn, 4 people	0	8	4

In reality, the sum paid the tacksman for mowing was 10s. per acre, but as he brought the people from the distance, running risks of bad weather, and as all the crop he cut did not prove so favourable as this field, he would not profit greatly; and in this locality a good scythesman would cost 3s. per day, reducing the difference in favour of mowing to 1s. 2d. per acre, which, with the greater weight of straw obtained, is a sufficient inducement to recommend its adoption in like circumstances. My experience this year is also equally conclusive against the scythe, in economy or despatch, in cutting laid crops, such as a great portion of the Lothians presented, and which opinion was coincided in by the Aberdeenshire mowers I had the opportunity of meeting. J. M.

Quarterly Journal of Agriculture.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A Monthly Council was held at the Society's House, in Hanover-square, on Wednesday, the 4th of June, present: The Right Hon. Earl Spencer in the chair, Marquis of Downshire, Earl Beauchamp, Viscount Torrington, Lord Portman, Lord Bridport, Lord Hatherton, Hon. R. H. Clive, M.P., Hon. Capt. Spencer, R. Archbold, Esq., M.P., D. Barclay, Esq., M.P., Sir D. Baird, Bart., T. R. Barker, Esq., S. Bennett, Esq., W. Blacker, Esq., G. J. Bosanquet, Esq., W. R. Browne, Esq., Col. Challoner, F. C. Cherry, Esq., W. A. Cherry, Esq., H. B. Clayton, Esq., E. D. Davenport, Esq., T. Dunne, Esq., R. Edwards, Esq., C. Eyre, Esq., J. H. H. Foley, Esq., A. E. Fuller, Esq., M.P., R. W. Gaussen, Esq., H. Gibbs, Esq., B. T. B. Gibbs, Esq., C. Hillyard, Esq., W. Fisher Hobbs, Esq., J. Hudson, Esq., S. Jonas, Esq., G. Kimberley, Esq., J. Kinder, Esq., Sir F. Lawley, Bart., J. Laycock, Esq., Col. M'Douall, M. Marisco, A. Ogilvie, Esq., E. Parkins, Esq., Sir R. Price, Bart., P. Pusey, Esq., M.P., F. Pym, Esq., J. A. Ransome, Esq., J. W. Scott, Esq., Professor Sewell, W. Shaw, Esq., J. V. Shelley, Esq., R. A. Slaney, Esq., Professor Solly, T. H. S. E. Sotheron, Esq., M.P., C. W. Spooner, Esq., W. R. C. Stansfield, Esq., M.P., E. Thomas, Esq., T. Turner, Esq., F. R. West, Esq., J. T. Wharton, Esq., and G. Wilbraham, Esq., M.P.

Mr. Hudson on being informed of the resolution of the Council not to increase the salary of the Secretary, withdrew his resignation.

Finances.—Mr. Raymond Barker, Chairman of the Finance Committee, reported to the Council the state of the Society's accounts on the last day of the month just ended, from which it appeared that the amount of invested capital was 8,200*l.* Stock, and the current cash-balance in the hands of the Society's bankers, 3,049*l.* (including a special balance of 816*l.* on the Shrewsbury account).

The Council unanimously confirmed the recommendation of the Committee, that Messrs. Burton, Lloyd, and Co., of Shrewsbury, should be appointed the bankers of the Society for the period of the ensuing Shrewsbury Meeting.

Journal.—Mr. Pusey, M.P., Chairman of the Journal Committee, reported that the June Number of the Journal would appear in about a fortnight; but that many good papers were necessarily postponed until the Christmas Number, which would come out before the General Meeting in December.

Shrewsbury Meeting.—The noble chairman reported from the committees for the selection and recommendation of judges for the Shrewsbury meeting, that among the nominations delivered in by members at the recent General Meeting, none occurred for judges of mountain sheep, and only an imperfect list for judges of implements; but that the committee of judges for stock had decided on the names of the gentlemen to act as judges in the other classes, which the committee abstained, from obvious reasons, from reporting to the Council till nearer to the time of the show.

The Council unanimously referred to the Committees the completion of the list of judges to be recommended by them for appointment by the Council.

Mr. Manning, the Contractor of Works for the Shrewsbury Meeting, presented a favourable report of the progress of the works. He also transmitted to the Council a statement connected with the subject of conveyance to Shrewsbury by canal, which was referred to the General Shrewsbury Committee.

Country Meetings.—Mr. Gibbs having laid before the Council his suggested points of enquiry, previously to deciding in future on the place of any Country Meeting, the details were referred to the consideration of the Yard Committee.

Mr. Fisher Hobbs gave notice that he should move at the next Monthly Council the adoption of a renewal of the existing rotation of districts for the Country Meetings, for the period of nine years following the year 1847, when the present schedule of rotation ended.

The Council then adjourned to Wednesday next.

A Weekly Council was held at the Society's House in Hanover-square, on Wednesday, the 11th of June, present: T. R. Barker, Esq., in the chair; Earl of Lovelace; Sir Francis Lawley, Bart.; Sir John V. B. Johnstone, Bart., M.P.; J. Baines, Esq.; D. Barclay, Esq., M.P.; G. R. Barker, Esq.; F. Burke, Esq.; F. C. Cherry, Esq.; R. C. Clayton, Esq.; G. Cottam, Esq.; C. Cure, Esq.; T. Dean, Esq.; T. Dunne, jun., Esq.; R. Edwards, Esq.; C. Eyre, Esq.; A. E. Fuller, Esq., M.P.; B. Gibbs, Esq.; J. B. Glegg, Esq.; J. C. Hayward, Esq.; E. Holland, Esq.; W. H. Hyett, Esq.; J. Kirksopp, Esq.; R. Knight, Esq.; Dr. Knox.; Capt. Langley; J. H. Langton, Esq., M.P.; Dr. Macdonald; Col. Mac Douall; A. Ogilvie, Esq.; E. Parkins, Esq.; H. Price, Esq.; Prof. Sewell; W. Shaw, Esq.; R. A. Slaney, Esq.; S. Solly, Esq.; S. Staffurth, Esq.; W. B. Stopford, Esq.; C. Tawney, Esq.; E. Thomas, Esq.; J. H. Tremayne, Esq.; T. Turner, Esq.; T. Tweed, Esq.; J. Walker, Esq.; W. W. Whitmore, Esq.; and G. Wilbraham, Esq., M.P.

Deep-Draining.—Mr. Parkes, consulting-engineer to the Society, transmitted to the Council a letter addressed to him by Mr. Spencer, of Park Farm, near Wrotham, Kent, containing the results of that gentleman's experience on the point of deep-drainage. Mr. Parkes regretted that his professional attendance on a Parliamentary Committee prevented his being present at the meeting of the Council for the purpose of answering any inquiries that Mr. Spencer's letter might suggest. He, however, begged it to be stated from his own knowledge of Mr. Spencer (who was considered to be the "father" of deep-drainage in Kent), and many of his neighbours who had adopted his system of deep-draining, that perfect reliance might be placed on the accuracy of every statement he made.

"*Park Farm, Wrotham, Kent, June* 10, 1845.

"I see by the newspapers that you are advocating the system of deep-draining. Now, as there is a great deal of draining about to be done throughout the country, I think the landowners and farmers should pause a little before they go into this work to any great extent, and should endeavour to ascertain the best and most effectual mode of doing it. Practice and experience have taught me to have the drains from 42 to 52 inches deep, and from 24 to 34 feet apart in the strongest clays; and from 48 to 60 inches deep, and from 50 to 60 feet apart in soil of a more porous character. Such draining will lay the land perfectly dry; and no one can conceive the benefit arising from deep drains as compared with shallow ones, unless they have experienced it both in crops and tillage. I will endeavour to explain to you how I have been draining for these last 30 years, and what the results have been. My idea at first was that I could not go too shallow; and accordingly I put my drains from 20 to 24 inches deep; but finding very little benefit from so doing, I was induced in the year 1830 to drain a field 3 feet deep, that had previously been already drained only 2 feet. To my surprise, I found that the shallow drains became useless. I then tried a drain of 4 feet in the same field, and found that this deepest drain, after rain, always ran the first and the longest, carrying off more than double the quantity of water. This convincing fact made so strong an impression upon me, that for the last 15 years I have been draining my land, that was formerly drained 2 feet deep, over again 4 feet, and with the same satisfactory result as in the instance just cited. I put my drains perpendicular, that is to say, up and down the field, to bring both sides into action; and although I was at first much censured by many for pursuing this plan, the same parties are adopting it, being convinced by the stubborn facts they have witnessed as my results. Before my land was deep-drained, it had always furrows to take the top water away; now, however, I have none, for by taking the bottom water away, the top will follow. I could give you volumes of proof on this subject, having done a great deal for landowners at several places. I will mention a gentleman in Hertfordshire, who came to inspect my drains last year, and saw their good effects. He wished me to drain one of his farms: I did so, taking a man with me who understood the work. I met some farmers there, who said I must be insane to think that the water would get through so strong a soil into a drain so deep; and yet I have now the tenant's letter in my possession, informing me that the plan had perfectly succeeded; that the deep drains ran like a pump, and that one of his neighbours had sent to borrow his draining-tools for the purpose of making similar drains. I should be happy to receive a visit from yourself, or any other gentleman, and show the benefit of deep-draining compared with that of shallow. About three years ago, the subject of drainage was brought forward at the Maidstone Farmers' Club, when I stood almost alone in advocating deep-draining; it was again introduced a short time since, when many had become converts, and stated that they would not lay their drain-tiles shallow, even if their landlords would give them leave to do so.—THOMAS SPENCER."

Agricultural Buildings.—Mr. Charles Miles, of 15, St. James's-square, communicated to the Council a paper containing a review of building and mechanical appliances for agricultural purposes, and various plans and drawings illustrative of his proposed arrangements; his suggestions having reference to the following topics:—

1. The internal and external drainage of the land on which the farm-buildings, &c., are erected.
2. The collection of rain-water in a tank.
3. The conveyance of liquid manure into tanks by means of water-tight drains.
4. The adoption of hollow concrete walls where good orick and stone cannot be obtained on reasonable terms.
5. New asphalte floors throughout, cheap, durable, and water-tight
6. New and improved construction of weather and fire-proof roofs, without incurring an additional outlay.
7. Application of heat to water in the preparation of food, and warmth and ventilation to the air in all situations where required.
8. The employment of horse or engine-power for general purposes.
9. Improved modes of separating and storing grain.
10. General arrangements of the farmstead, and of the farmers' and labourers' houses; plan for carrying off smoke and removing soot to be applied to the land; new mode of hanging doors, so as to allow ingress and egress with ventilation, but without draught.

In reference to an inquiry made by Mr. Ricardo, of Gatcombe, near Minchinhampton, as to the best mode of laying down an asphaltic or bituminous flooring in his pigsties, Mr. Parkins informed the Council that he had found the following composition very useful for that purpose, namely, lime or pounded chalk mixed with so much coal-tar from gas-works as will leave the mixture in a state not too soft for ramming, adding a sufficient quantity of sand or fine gravel to bind the whole. Mr. Parkins stated that these materials not only formed a hard basis for pigsties, farmyards, &c., but made good walks on which weeds would not grow, and answered the purposes generally for which asphalte was commonly employed.

Lord St. John informed the Council that the plans of his farm premises, at Melchbourne, presented by him to the Society at a former meeting, referred to an occupation of 500 acres of land, about half of which was under the plough.

Col. Elwood, of Clayton Priory, near Brighton, favoured the Council with some suggestions in reference to Captain Scobell's plan of cottages at High Littleton, in Somersetshire, presented to the Society at the general meeting.

Chinese Cabbage.—Mr. Langdale, of Gower-street, Bedford-square, presented to the Council some of the seeds of Endive-Cabbage, from Chusan, as the only supply which, up to the present time, had been received in this country. From the report of Mr. Boyd it appears that this vegetable is very prolific, grows lofty, and requires a warm aspect; being serviceable both for the cottager and farmer. The Council referred the trial of these seeds to the Horticultural Society and Messrs. Thomas Gibbs and Co., with a request that they would respectively report to the Council the result of their cultivation.

Russian Turnip.—Mr. Wells, of Botley, Hampshire, presented specimens of plants grown from Russian (Swedish) Turnip-seed imported last year, and sown on the 22nd June. The Turnips were hoed on the 25th July, formed miniature bulbs early, and soon completed their growth. Mr. Wells considered that on these accounts, this new variety of Swedish Turnip would be found well adapted for late sowing. The seed-plants presented by Mr. Wells stood about five feet high.

Gurneyism.—The Rev. Daniel Gwilt, of Icklingham Rectory, near Mildenhall, Suffolk, reported to the Council the success with which he had adopted the plan of cultivation recommended by Mr. Gurney; and he ventured from practical experience to recommend the system most strongly, his success under it having greatly exceeded his expectations. He thought it might be carried out with great advantage to a certain extent upon most farms in any district; but more especially in the sandy districts of Norfolk and Suffolk, where heather, broom, larch-trimmings, &c., may be had in such abundance, and at a small expense.

St. John's Day Rye.—Mr. Gwilt also informed the Council that for the last three years he had been cultivating a variety of rye very similar to that named the St. John's day rye. It was known to him as the giant rye, and seemed, from the experience he had had of its qualities, entirely to answer the description given of its merits in Mr. Pusey's communication to the Council.

Flax-seed.—Mr. Taylor, of 314, Regent-street, communicated to the Council analyses made by Dr. Ryan, of the Royal Polytechnic Institution, of common linseed and the seeds of the "gold of pleasure" flax. It appears from these results that linseed gave 82½ per cent. of a peculiar gum, and Gold of Pleasure 83¾ per cent. of a mucilage, which on further analysis yielded 61¾ parts of a soluble, and 22 parts of an insoluble gum. The elementary analysis showed the Gold of Pleasure mucilage to contain 7 per cent. more nitrogen than the Linseed-gum, and 6 per cent. less oxygen. Dr. Ryan considered the amount of nutriment in the seeds of the Gold of Pleasure, the excellent quality of the oil, and the small quantity of inorganic matter they contained, as points greatly in their favour for the production of oilcake of a nutritious character.

Analysis of Manure.—Mr. Shaw laid before the Council the analysis made by Messrs. Balmain and Parnell, of the manure manufactured by Messrs. Daniel, Hutchinson, and Co., of Camborne, Cornwall; from which it appeared that the manure in question consisted chiefly of 45 per cent. of silicate of lime, 19 per cent. of carbonate of lime, 28 per cent. of caustic lime, with 3¾ per cent. of magnesia and alkaline salts. Messrs. Balmain and Parnell remark: "The efficiency of the manure is, no doubt, owing principally to the silicate of lime and the alkaline salts. The lime is useful alone, but the silicate of lime (and more especially that variety of it present in this manure) is valuable as a constant source of lime and soluble silica, the lime being progressively supplied from a latent source. The silicate of lime gradually yields both its silica and its lime to the action of water; but until the lime is separated from the silica it is not active or caustic, and not all at once presented in a caustic state. The alkaline salts, though so small in quantity, are still important; possibly, in many cases, all the more useful because they are so small in quantity, as an excess of them is more to be dreaded than a dearth."

Agricultural Education.—Mr. Warry, of Shapwick, near Glastonbury, Somersetshire, expressed his willingness to place at the entire disposal of the Society (on terms of nominal acknowledgment only of his proprietorship) a school and master's house, with a farm of a great variety of soils attached to them, for any experiment the Council might wish to make in reference to the education of those who depend upon the soil for their support.

Mr. Turnor, of Abbot's Bromley, near Rugeley, Staffordshire, transmitted copies of the Society's Tract (from the Journal) on Cottage Economy and Cookery, and Mr. Blacker's essay on the cultivation of small farms, both translated into the Welsh language, and printed in a cheap form for extensive distribution among the farmers of North Wales. The following directions for butter-making had also been translated into Welsh and extensively circulated throughout that part of the principality.

Preparing Butter for the London Market.—"The following is the most approved method of making and preparing butter for the London market, and is submitted for the advantage of farmers and dairymen throughout Ireland. Butter made on this system, with care and quick dispatch, will insure high prices and quick returns. The agent's comment on each dairy's butter, and improvement, are still going on. The best land is old pasture, as free from weeds as possible, with abundance of good water. The cows should not be heated or tormented in any way; housed at night, and fed on green food, and the pasture changed when practicable. In milking, take saltpetre in the pail, one-eighth of an ounce to 8 quarts of milk. The dairy should be perfectly clean, airy, of equal temperature (say 50°), very little light, and completely shaded from sun, by trees or otherwise; and in winter a stove may be required. Strain the milk into coolers, sweet and dry (never mix warm and cold milk), keep it from two to four days, then put the whole of the milk and cream into a clean churn, which is not to be used for any purpose except during the time it is in operation. Boiling water to be added to raise the temperature to about 68° or 60°, if horse or water-power be used. The time occupied is from one to two hours, depending on the size of the churn; but churning should not be continued beyond the proper time. After churning put the butter into two bowls or pans of pickle, made from pure water and fine-stoved salt (as common gives the butter a bad flavour). It should be well washed, and the pickle changed frequently, until all milk is extracted, working with the hand the two pieces alternately, until the grain becomes quite close and firm; when it is to be cured with the finest dry-stoved salt and sugar. The proportion to be one ounce of refined sugar to one pound of salt, to be well worked into the butter with the hand; but the quantity of curing materials will depend on the time and labour given by the dairy-woman, in working and beating the butter (after the salt and sugar are applied), which should continue until all pickle is driven out. The butter should be finished the day it is churned, and then be pressed as closely as possible into the cask. The cask should be well seasoned for some days previous, with strong pickle, frequently changed, or hot pickle; and must be strong and air-tight; the size is of no consequence, if filled and sent off in one week. If not filled at one churning, the butter is to be covered with pickle until the next; but no cask to contain more than one week's butter. If butter should, at any time, appear pale in colour, after churning has commenced, a little grated carrot-juice may be put into the milk, and will not injure either milk or butter. All butter should be at the place of shipping one day prior to the steamer leaving, so as to run no risk of going forward to the agents."

Garden Allotments.—Mr. Dean laid before the Council copies of the third half-yearly Report of the Garden Allotment Committee established in the parish of Tottenham; and such, he stated, had been the beneficial result of the system, that although the past winter was an unusually severe and long one, no application had been made by the labouring class for a supply of coals or other assistance, heretofore usually granted in the winter season; a fact attributed mainly by the committee to the aid which the poor had derived from the advantages of their garden allotments.

Ploughing.—Mr. Kirsopp, of the Spital, Northumberland, called the attention of the Council to the meritorious conduct of Mr. Richardson, farm-steward to St. Mary's College, near Birmingham, in having introduced into that neighbourhood the plan of ploughing with two horses and one man, instead of with four, five, or six horses, and two men, as had been the custom in that part of the kingdom from time immemorial.

The Duke of St. Alban's presented to the Society a bridle of his own invention, intended, by the application of the principle of leverage, to force open at will, on drawing a particular rein, the mouth of a vicious run-away horse, and thus stop his career. Mr. G. Turner, of Bayswater, presented an iron model of a draining machine invented by himself. Mr. Curtis transmitted, on the part of M. Guerin-Méneville, of Paris, copies of his own work, and that of M. Robert, on the subject of Insects Injurious to Agricultural Crops. Mr. Sandars, of Lockers, Hemel-Hempstead, communicated the results of his inquiries on the subject of Agricultural Statistical Returns. Mr. Dickson, of Broad-street-buildings, transmitted papers on Flax Cultivation.

The Council having ordered thanks to be returned to the authors and donors of the various communications then made to the Society, adjourned to Wednesday next, the 18th of June.

A Weekly Council was held at the Society's House in Hanover-square, on Wednesday, the 18th of June. Present: His Grace the Duke of Richmond, K.G., President, in the chair; Viscount Torrington; Sir J. V. B. Johnstone, Bart., M.P.; R. Archbold, Esq., M.P.; J. Baines, Esq.; T. R. Barker, Esq.; J. B. Browne, Esq.; F. Burke, Esq.; H. Burr, Esq.; W. W. Burrell, Esq.; Col. Challoner; F. C. Cherry, Esq.; W. A. Cherry, Esq, E. D. Davenport, Esq.; J. E. Denison, Esq., M.P.; T. Dunne, jun., Esq.; F. W. Etheredge, Esq.; A. E. Fuller, Esq., M.P.; H. Gibbs, Esq.; B. T. B. Gibbs, Esq.; J. B. Glegg, Esq.; S. Grantham, Esq.; G. Heneage, Esq.; C. Hillyard, Esq.; J. Kinder, Esq.; J. J. Mechi, Esq.; A. Ogilvie, Esq.; J. Parkes, Esq., C.E.; Rev. T. Pennant; R. W. Purchas, Esq.; W. Pyne, Esq.; J. G. Rebow, Esq.; Prof. Sewell; W. Shaw, Esq.; W. Simpson, Esq.; T. Spencer, Esq.; T. Manners Sutton, Esq.; E. Thomas, Esq.; T. Turner, Esq.; and T. Tweed, Esq.

Deep Draining.—Mr. Parkes exhibited a diagram, explanatory of the action of the 4 feet deep drains, described at a previous meeting in a letter from the Right Honourable C. Arbuthnot. Since that period, and during the recent heavy rains, a hole had been dug 5 feet deep, near the crown of one of the ridges of land, about 24 feet wide between the drains. The object of this experiment was to test the depth at which the water might stand after rain had ceased, and had passed off through the drains, and it appeared that free water pretty uniformly existed in the hole at the depth of 4 feet 2 inches from the surface. The rise of the ridge, at the crown, was 15 inches above the level of the surface of the furrows: so that the level of the water, at the half way between the drains, was 13 inches higher than the bottom of the drains. Mr. Parkes called the attention of the council to the important phenomena elicited by this experiment, and as bearing particularly on the drainage of ridged land. Mr. Arbuthnot had described the field to have been drained 2 feet 6 inches deep previously, but that it remained constantly wet, whereas it was now thoroughly dry; and the singular fact appeared that drains laid in the furrows 4 feet deep removed the stagnating water to a depth of 4 feet 2 inches below the crown of the ridge. He hoped to be able at a future period to lay before the Council the result of similar tests applied to the ridges 45 feet in breadth. Mr. Arbuthnot had furnished him with particulars of the cost of this drainage, which amounted to 18*l*. 15s. for the seven acres, or 2*l*. 13s. 7d. per acre, which would be considered very moderate, when it was known that the small pipes had cost 30s., and the 3-inch mains 40s. per 1,000. Mr. Parkes would caution those who might practise deep draining not to expect in all cases such immediate beneficial results as had occurred in this, and in many other instances where land had been long drained previously, though at shallow depths. It was well known in the Weald of Kent clays that drains laid 3 and 4 feet deep in undrained lands rarely produced their full effect, till after two or three seasons; yet in most cases with which he was acquainted, where deep drains had been placed in the same soil, previously shallower drained, they acted at once and efficiently. He would again bring to the recollection of the members the facts stated by Mr. Pusey, viz., that drains laid in some clay land of his had scarcely acted, or very imperfectly, till after the long drought of last year, when recently made drains also produced an immediate effect.

Mr. Spencer, whose letter to Mr. Parkes was read at the previous meeting of the Council, favoured the members on the present occasion with a detailed statement of his plan of deep draining, the circumstances of soil under which it had been executed, and the beneficial results with which it had been attended. He submitted to the inspection of the Council various plans, calculations, tiles, and specimens of the soil in which his operations had been conducted. He also furnished a copy of the following letter, addressed to him out of Hertfordshire, by the tenant referred to in his former communication:—

"*Hadham, June* 7, 1845.

"I am happy to inform you that the drains act in every way as you told us. Since I wrote to you, the shallow drains in the next field have not run for three weeks together, but the four feet ones have never stopped running since they were done. Mr. Randolph came up last week, after the rain, and was very much pleased to see them run so freely, and no water standing on the land. Most of my neighbours approve of the plan, but do not like the expense, as corn is at a low price. I do not find any difference in those that had bushes in them. My man says the land ploughs better now, and I think more good will be done in a year or two. My neighbours say I am ploughing too deep, but I do not mind what they say, as I have been told so before, but afterwards found the benefit of it.—JOHN SMITH."

Mr. Denison, M.P., called the attention of the Council to various important points of consideration, in reference to the conditions under which the system of drainage found successful in his own case by Mr. Spencer, and advocated on theoretical grounds by Mr. Parkes, could be adopted generally, and without a more specific inquiry into the principles on which Mr. Spencer's land had been drained, and a careful consideration of the question, how far those principles would render the system effective under other circumstances, in which the nature of the soil, the depth of the strata, and the position of the water itself in the land, would materially influence the results.

Veterinary Practice.—Mr. Turner, President of the Royal College of Veterinary Surgeons, transmitted a report of the proceedings of the Council of that body during the past year.

Mr. Faulkes suggested that the Society should publish "a work comprising the best method of prevention and cure of the common diseases of horses, neat cattle, and sheep; clearly pointing out such cases of a more dangerous class, where veterinary surgeons ought to be called in."

Prizes for Cattle.—Mr. Hillyard stated, that as he considered the great object in offering prizes for different breeds of cattle was to ascertain which breed produced the best beef, with the least amount of expense in the feeding, he should on a future occasion propose that the Society take into consideration the propriety of offering two prizes of 10*l.* each for oxen of any breed under five years old, in one case and under four in the other; the restrictions as to feeding being the same as in Class 2 of the Smithfield Club.

Draught on Uneven Ground.—Mr. Beaumont informed the Council that, having completed the model of his contrivance for the draught of carriages, or the working of ploughs, on uneven ground, it might be seen by the members at Mr. Frasi's, engineer and millwright, 158, Goswell-street. The Council directed information to be conveyed to Mr. Beaumont that, when his machine was completed, he would be at liberty to exhibit it at any of the country meetings of the Society.

Draught by Wind-Power.—Mr. Fuller, M.P., laid before the Council various interesting statements connected with the experiments of his tenant, Mr. Stace, residing at Berwick, near Lewes, in Sussex, in the application of the power of windmills to the general purposes of agricultural draught, especially in the operation of ploughing. Mr. Stace remarks, "We believe we are prepared to show, by our rude and imperfect apparatus, that we have invented means of applying wind-power to the purpose of working agricultural implements effectively, cheaply, and therefore profitably. We have considered it useless to attempt more than to bring our apparatus to that state in which we can show the efficiency and applicability of the power, and thus defend the invention from piracy; leaving it for completion to the application of the skill of the practical machinist. The facts that we have ploughed, and ploughed well, several acres of land whilst making our experiments, that we have mole-ploughed several acres, and that we have drawn Pearson's draining-plough, are sufficient to convince us of the utility of the invention; and, even though it were not susceptible of greater improvements than we can apply, *we* should use it; for the advantages of being able to plough land at some seasons, without treading it with horses, are so great, that it would be worth doing at even a greater expense; but we can, I believe, plough by wind at less than half the expense of horses. It has been considered desirable to substitute mechanical for manual power in the plantations of the West Indies; and it appears to me that in hot countries, where the wind is tolerably certain, our power might be very advantageously applied, as the labour attending the ploughs is very trifling, and the mills might be taken to pieces in a few minutes in the case of a storm."

Mr. Stace furnished a sketch of the arrangements by which his trial ground was ploughed, from which it appeared that, supposing the field to be a square, the two windmills were so relatively situated to each other, that the one would occupy one corner of the square, and the other windwill the other, where the same diagonal would terminate in opposite directions, the furrows being parallel to two of the sides of such square, and made by ploughs attached to an endless rope passing round the wheels of the mills for its prime movement, and over upright rollers placed along the other two sides of the field for the regulation of the lines of draught, and moved onward over the unploughed portion as each furrow was successively completed. A man was required to each plough. In a moderate wind three ploughs, and in a strong wind five might be used at the same time. Mr. Denison doubted whether wind-power would be found equally advantageous with that of steam; and he had understood that in the marshes the wind-mills had been given up for steam-engines.

Morocco Wheat. — Sir Arthur de Capell Broke, Bart., of Oakley Hall, near Kettering, presented to the Society a supply of Barbary Wheat, grown fourteen years ago in Morocco, and brought by himself from that part of Africa. The cultivation of it, on his return to England, had been tried by his tenants in Northamptonshire; but whether owing to the unsuitableness of the soil, or an unfavourable season, it came to nothing. Thinking that some portion of the Wheat might still be found good, and that on further trial its cultivation might be attended with better success, he took that opportunity of laying it before the Council accordingly. Sir Arthur stated, that the attention of travellers had often been attracted to the "Metamores," or granaries of Morocco, on account of their simplicity and efficacy, being merely pits dug in the ground, and lined with straw at the sides and bottom; and that in these receptacles, owing to the nature of the soil and the dryness of the climate, grain was preserved uninjured for many years.

Bridles.—The Duke of St. Alban's having presented to the Council, at the previous meeting, a bridle for the effectual control of a strong and vicious horse, in which the principle of leverage was conjoined with punishment effected by a sharp rectangular curb-chain, Mr. Shaw thought it might not be unacceptable for the Council to receive also a bridle intended for a horse of similar propensities, but less vicious and powerful, invented by Messrs. Martin & Son,* Birmingham, and of which the principle introduced was that of impeding the horse's respiration. This was effected by a leather strap, each end of which is attached to the ring of the upper end of the bit-iron, and being crossed, forms a loop which passes over the horse's nose. On drawing the curb-rein, the upper ends of the bit-iron are projected forward, and carrying with them the two ends of the nose-band, the loop is drawn tightly over the nose, the muscles which regulate the expansion of the nostrils rendered ineffective, and the horse consequently unable to draw his breath with that freedom which is essential to the increased respiration his going off or continuing at speed would occasion. Col. Challoner remarked that he had observed, when in Italy, that the Neapolitan cab-horses were driven without bridles, by a similar contrivance, of the nature of a cavesson, commonly used in England for breaking horses, being a leather band passing over the nose, lined inside with sharp studs, and furnished outside with two short protecting ring-stems, to which the reins were attached, and the horse driven without the slightest inconvenience.

Mr. Cadogan Williams presented specimens of preserved vegetables, and concrete formed of Glamorganshire lias lime and gravel; and Mr. Turner communicated the results of his experience in barking trees.

The council ordered thanks to be returned for the various communications presented them, and adjourned to Wednesday next, the 25th of June.

NEW MEMBERS.

The Marquis of Downshire, of Hanover-square, London, and Hillsborough Castle, Ireland; The Earl of Euston, of Clarges-street, Piccadilly; Henry Hippisley, Esq., of Lambourn-place, Hungerford, Berkshire; and Edward Rose Tunno, Esq., of Warnford Park, Bishop's

* It was not invented by Messrs. Martin, but is manufactured and sold wholesale by Messrs. Bright, Martin, and Birtles, Birmingham, and 30, Bow-street, Covent-garden, and may be obtained retail of any respectable saddler. As regards its efficiency, Mr. Martin says, "I venture to assert, from my own experience, as well as that of many persons who have tried it, that it is the most simple and effectual thing of the kind ever brought before the public: it can be used with any description of curb bit either in riding or driving."

Waltham, Hampshire, were elected Governors, and the following gentlemen Members of the Society :—

Abbott, Stephen, Jun., Castleacre, Swaffham, Norfolk
Anslow, William, Eyton, Wellington, Salop
Anstruther, Sir Ralph Abercromby, Bart., Balcaskie, Leven, Fifeshire
Archbold, James, Newcastle-on Tyne
Arden, Hon. Richard Pepper, Pepper-hall, Catterick, Yorks.
Baddeley, William, Brutton, Wellington, Salop
Baker, Thomas, Jun., Chilton, Rushyford, Durham
Bateman, Henry, Asthally, Witney, Oxon
Beckwith, Rev. Henry, Eaton-Constantine, Shrewsbury
Bent, William, Chilton, Shrewsbury
Bennion, Edward David, Summer Hill, Oswestry, Salop
Boulton, Rev. William, Wem, Salop
Bourne, William Kemp, Fisherwick, Lichfield, Staffordshire
Brand, Henry, Glynde, Lewes, Sussex
Bulmer, Charles, Hereford
Clark, Thomas, jun., Derndale, Hereford
Clark, Nathaniel, Jun., Urpeth, Chester-le-street, Durham
Clay, J. Sutton, Shrewsbury
Clement, W. J. Shrewsbury
Colley, John, Osbaston, Wellington, Salop
Cowdell, Rev. Henry, Shelderton, Ludlow, Salop
Daniell, Frank, Camborne, Cornwall
Davies, John, Fronhanlog, Corwen, Shrewsbury
De Tabley, Lord, Tabley-house, Northwich, Cheshire
Dickin, John, Shrewsbury
Dickinson, Henry, Severn-house, Coalbrookdale, Shiffnal, Salop
Dickinson, Joseph, Westbury, Salop
Digby, Rev. Kenelm, Tettenhall Rectory, Litcham, Norfolk
Dinning, John, Elford, Belford, Northumberland
Downes, Thomas, Brynich, Brecon
Drinkwater, Richard, Sen., Shrewsbury
Elliott, William, Brick House, Burghill, Hereford
Farrer, Edmund, Sporle, Swaffham, Norfolk
Fernie, George, Fron, Oswestry, Salop
Gardner, Robert, Leighton-hall, Shrewsbury
Greene, John, Greenville, Kilkenny
Griffiths, Thomas J., Bishop's-castle, Salop
Harris, Henry, High Ercal, Wellington, Salop
Henderson, Matthew, Haydonbridge, Northumberland
Hoff, William, Halston, Spilsby, Lincolnshire
Hoskins, J., Crewkerne, Somerset
Ireland, Philip, Muckleton, Shrewsbury
Jebb, John, Stanwardine, Baschurch, Salop
Jones, J. Robinson, Brithdir Hall, Welshpool, Montgomery
Jones, Joseph Owen, Park, Llwydiarth, Can Office, Montgomeryshire
Kirman, Thompson, Walesby, Market Rasen
Lanwarne, Nicholas, St. John's-street, Hereford
Lawson, W., Longhurst-hall, Morpeth, Northumberland
Macdonald, Rev. Douglas, West Alvington, Kingsbridge, Devon
Mansfield, Earl of, Scone-palace, Perth
Midgley, Thomas, Buersill, Rochdale, Lancashire
Minnett, William, Crumpwell, Oswestry, Salop
Mousley, Isaac, Sandwell, Birmingham
Morris, Philip, The Hurst, Ludlow, Salop
Mytton, Rev. D. F. Glynn, Llandyssill, Montgomery
Napier, Edward Berkeley, Pennard-house, Shepton-Mallet, Somerset
Nash, Joseph, Walesby, Market Rasen, Lincolnshire
Osborn, George, Glanbrogan, Llanfechan, Oswestry
Overman, Henry Robert, Weasenham, Rougham, Norfolk
Pardoe, Rev. George, Hopton Castle, Ludlow, Salop
Pearson, Rev. John, Rector of Suckley, Worcester
Pitcher, Robert, Mayor of Lynn, Norfolk
Powell, Thomas, Muckleton, Shrewsbury
Racster, William, Thingehill, Hereford
Roberts, John, New-hall, Rhuabon, Denbighshire
Smith, T. W., Greenfield-lodge, Oswestry
Smith, Augustus, Ashlyn's-hall, Berkhampstead, Herts
Smith, Henry, Wilford, Nottingham
Smith, Charles P., Southrop-house, Fairford, Gloucestershire
Smith, Sir Edward, Bart., Acton-Burnell, Shrewsbury
Stable, Robert Scot, Cranbrook, Kent
Stallard, William, Blankets, Worcester
Stephenson, William, Throckley, Newcastle-on-Tyne
Taylor, William, Showle-court, Stoke-Edith, Hereford
Timms, William, J. P., Cadley Hill, Burton-on-Trent
Trotter, Robert, Twyford, East Grinstead, Sussex
Twort, Tyler, Horsemonden, Kent
Vaughan, Sir Robert Williames, Bt., Hengwrt, Dolgelle, Merionethshire
Wall, James, Sheffield, Yorkshire
Watson, Jacob, Allendale-town, Northumberland
Wellings, Thomas, Muckleton, Shrewsbury
Williams, Cyril, Faleymerau, Pwllheli, Carnarvonshire
Williamson, Isaac, East Orielton, Pembroke
Walmsley, John, Creamore, Wem, Salop
Williams, Martin, Bryngwyn, Oswestry
Wingfield, Richard Baker, 2, Lowndes-square, Middlesex
Witney, William, Hillingdon, Uxbridge, Middlesex
Woolrich, Abraham, Little Ness, Shrewsbury
Young, Allen, Orlingbury, Wellingborough, Northamptonshire.

REPORT TO THE HONOURABLE ROBERT HENRY CLIVE OF HIS POLES FARM IMPROVEMENTS, EFFECTED BY THOROUGH DRAINING.

(*Continued from the Journal of the Royal Agricultural Society*, vol. iv., p. 177.)

Sir,—Since my report to you in March, 1843, I now beg leave to state what further improvements have taken place, and I think I cannot do better than continue the plan upon which I commenced, viz., by bringing forward the abstract quantity of thorough draining and subsoil ploughing to that period, and adding thereto in detail what has been effected subsequently, together with an account of the success obtained, and other matters connected with the improvements; and in doing so I will endeavour to make the statement and report clear, beginning with the quantities done since my report in March, 1843, which I will add to the former quantities and expense, showing the full amount of expenditure; but I beg leave here to state the quantity of acres the farm contains in arable, meadow, and pasture, viz.—

	A.	R.	P.
Arable	125	3	16
Meadow	45	0	29
Old pasture	50	0	29
One and two year old leys for permanent pasture	21	3	24
Farm-house, fold, stackyard, cottages, &c.	2	3	17
Total	245	3	35

No. 13.—14A. 2R. 0P.—9038 yards. This field was an old coarse sward, with a very uneven surface. The surface and subsoil vary much; part of it is a tolerable loam, part a stiff clay substratum, with very large pebbles imbedded, which the subsoil-plough turned out to some extent, and a small part shelly sandstone. The drains are 18 feet and 24 feet apart; drained in 1842; a great part of the stone got in the field and wheeled to the drains.

Getting the stone, wheeling to drains, cutting drains open, breaking the stone, putting it in, and filling up

drains, 1129¾ roods (of 8 yards per rood) at 10d. per rood . . .	£47 1 5
Getting 160 yards of stone, at 5d. per yard	3 6 8
Four horses 4½ days carrying the above stone to drains, at 12s. . . .	2 14 0
Subsoil ploughing 14½ acres, at 21s. .	15 4 6
	£68 6 7
Cost per acre . . .	£4 14 3

No. 14.—3A. 2R. 8P.—1764 yards. This field is an orchard in grass, which has been planted a good many years; some of the trees are dead, I think a good deal owing to the cold substratum, which is a stiff clay. The drains are put in the centre between each row of trees, which are 30 feet apart; most of the drains were opened to the depth of 15 inches with drain-plough, afterwards cutting a further depth of 15 inches, the other drains 30 inches and 36 inches, at 6d., 8d., and 10d.

Breaking the stone, putting in drains, and filling in	£6 13 0
Getting 100 yards of stone, at 5d. .	2 1 8
Four horses carting stone to drains 2½ days, at 12s.	1 10 0
Six ditto opening drains with plough half a day, at 18s.	0 9 0
	£10 13 8
Cost per acre . . .	£3 0 10

No. 15.—11A. 2R. 12P.—9696 yards. This field is an old coarse pasture, varying much in surface, and substratum very cold. The drains are 16 feet apart; the greatest part of the stone got in the field, and wheeled to the drains.

Getting stone, cutting drains, breaking stone, wheeling to drains, laying and filling in 1212 roods, at 11d. (of 8 yards)	£55 11 0
Gathering and carrying 22 loads of stone from adjoining field, at 1s. . .	1 2 0
	£56 13 0
Cost per acre . . .	£4 18 6

No. 16.—6A. 0R. 4P.—3536 yards. This field is an old coarse turf, varying in quality; but, being near the homestead, it is intended to improve the surface by top-dressing, and it continues in permanent pasture. The drains are 21 feet and 24 feet apart: 442 roods (or 3536 yards).

Cutting open, breaking stone, laying drains, and filling in, at 7d. per rood	£12 17 10
Seven roods of open ditch-laying, at 1s.	0 7 0
Getting 200 yards of stone, at 5d. .	4 3 4
Four horses carrying stone to drains 3 days, at 12s.	1 16 0
Filling 200 yards of stone into carts, at 1d.	0 16 8
	£20 0 10
Cost per acre . . .	£3 6 9

No. 17.—4A. 3R. 25P.—2956 yards. This is a rough piece of ground, with a very uneven surface, substratum chiefly clay loam; it is a question at present whether it will be continued in permanent grass or undergo a course or two of tillage to improve the surface. The drains are 24 feet apart: 369½ roods (or 2965 yards) of drains.

Cutting open, breaking stone, laying drains, and filling in, at 7*d.* per rood	£10 15 6
Getting 155 yards of stone, at 5*d.* .	3 4 7
Carting and wheeling stone to drains, 4 horses 3½ days, at 12*s.* . .	2 4 9
Filling stone into carts . . .	0 10 0
	£16 14 10
Cost per acre . .	£3 10 0

No. 18.—6A. 2R. 0P.—3024 yards. This is a rough, coarse herbage, and should undergo a course of tillage to improve and make the surface more even. It is chiefly a clay loam, and the drains vary from 24 feet and upwards apart.

Cutting open, breaking stones, laying drains, and filling in 378 roods (of 8 yards per rood), at 7*d.* . . .	£11 0 6
Getting and wheeling stone to 300 roods, at 3*d.*	3 15 0
Thirty yards of stone, at 3*d.* . .	0 7 6
Laying water-course and levelling 18½ roods, at 2*s.*	1 17 0
Two horses one day carting 30 yards of stone to drains . . .	0 6 0
	£17 6 0
Cost per acre . .	£2 13 0

No. 19.—5A. 1R. 10P.—2221 yards. This is old meadow land; has a good surface; previous to draining was very wet, and of little value: the substratum varies, some part clay loam, and other parts clay mixed with stone. The drains are 30 feet apart.

Cutting open, breaking stones, laying drains, filling 2221 yards, at 1*d.* .	£9 5 1
Getting 138 yards of stone, at 5*d.* .	2 17 6
Four horses 3 days carrying stone to drains, at 12*s.* . . .	1 16 0
Filling into carts, at 1¼*d.* per yard .	0 14 6
	£14 13 1
Cost per acre . . .	£2 16 0

No. 20.—5A. 0R. 26P.—2632 yards. The surface of this field is pretty even; it is old meadow, and varies much in the substratum. The surface was very wet previous to draining; now very much improved. The drains are 24 feet apart.

Cutting open, breaking stones, laying drains, filling in, at 1*d.* per yard .	£10 19 4
Getting 160 yards of stone, at 5*d.* .	3 6 8
Four horses 3 days carrying stone to drains, at 12*s.*	1 16 0
Filling 160 yards of stone into carts, at 1¼*d.*	0 16 8
	£16 18 8
Cost per acre . . .	£3 7 8

Soughs laid in various ditches to convey water under, varying from 6 to 12 inches square:—

	£	s.	d.
222 yards, or 27¾ roods, at 3*s.* per rood, for opening, walling, and filling in	£4	3	3
496 yards, or 62 roods, at 2*s.* 6*d.*, as before	7	15	6
832 yards, or 104 roods, at 2*s.*	10	4	0
270 yards of stone for the above, at 5*d.*	5	12	6
Four horses 9 days carrying stone to the soughs, at 12*s.*	5	8	0
Filling 270 yards of stone, at 1¼*d.*	1	8	0
	£34	11	3

Abstract.

	A.	R.	P.	YARDS.	£.	*s.*	*d.*
To No. 12, inclusive	113	3	10	83,090	718	4	11
,, 13,	14	2	0	9,038	68	6	7
,, 14,	3	2	8	1,764	10	13	8
,, 15,	11	2	12	9,696	56	13	0
,, 16,	6	0	4	3,536	20	0	10
,, 17,	4	3	25	2,956	16	14	10
,, 18,	6	2	0	3,024	17	6	0
,, 19,	5	1	10	2,221	14	13	0
,, 20,	5	0	26	2,632	16	18	8
To soughs, drains, &c.	..			1,550	34	11	3
Totals	171	1	55	119,507	974	2	9

Abstract of the separate Expenses.

	£	s.	d.
171A. 1R. 15P. drained and getting the stone—119,507 yards, or 68 miles 3 furlongs and 9 yards	£720	7	3
Average expense per acre, £4 4*s.* 2*d.*			
128A. 1R. 10P., part of the above, subsoil-ploughed	134	8	0
Carting Stones to Drains	119	7	6
	£971	2	9

Average of the whole per acre, nearly £5 14*s.*

The expenditure upon the farm since the occupation is as shown in the following table; but the charge for subsoil ploughing and carting stone to drains ought not to be added to the expenditure, as stated above, because that expense is included in the working of the farm, and all team labour hired for lugging lime and working land is charged in the farm expenses.

Statement of Expenditure upon the Poles Farm from Lady-day, 1836, to 31st October, 1843.

Heads of Expenditure.	1836 £.	s.	d.	1837 £.	s.	d.	1838 £.	s.	d.	1839 £.	s.	d.
Labourers' wages	77	1	8	144	3	0	181	19	5	219	2	5
Manure, lime and bones	63	14	0	109	4	6	77	7	6	42	1	0
Seed wheat, barley, and turnip seed	16	0	0	5	5	0	21	0	0	32	15	6
Clover seeds	19	7	2	25	0	0	15	8	0	17	15	7
Repairs to implements	3	15	10	20	9	5	5	12	9	3	11	10
Blacksmith	10	10	1	18	2	5	19	4	9	15	7	3
Saddler	11	13	8	11	4	3	10	6	2	5	2	10
Irrigating meadows		—		18	19	7	10	17	0	10	6	0
Hauling lime and team labour		—		97	10	0	57	6	0	27	14	6
Poor and church rates	17	14	2	21	7	3	10	5	0	15	7	6
Taxes		—		1	1	0	1	1	0	1	1	0
Tithe	31	7	0	31	7	0	31	7	0	31	7	0
Malt and hops		—			—			—		21	3	4
Sundries	4	1	0	1	14	6	2	6	0	11	14	3
	255	7	7	505	7	11	444	0	7	451	10	0

Heads of Expenditure.	1840 £.	s.	d.	1841 £.	s.	d.	1842 £.	s.	d.	1843 £.	s.	d.
Labourers' wages	204	3	9	258	11	8	257	3	1	219	15	10
Manure, lime and bones	87	16	7	24	8	0	210	16	2	56	13	6
Seed wheat, barley, and turnip seed	14	11	6	30	0	0	17	10	0	22	10	0
Clover seeds	14	17	8	23	5	5	23	16	8	28	8	7
Repairs to implements	4	2	9	43	2	8	10	18	1	15	18	9
Blacksmith	17	14	9	27	1	1	18	14	7	19	3	9
Saddler	17	8	9	3	7	1	4	10	7	1	12	11
Irrigating meadows	15	9	0		—		20	10	0	1	4	8
Hauling lime and team labour	9	4	7		—		8	1	0	51	1	3
Poor and church rates	15	7	6	15	7	6	17	18	7	12	16	3
Taxes	1	2	0	1	3	2	5	12	7	8	6	8
Tithe	32	7	0	32	7	0	32	7	0	32	7	0
Malt and hops		—		23	13	6	10	2	4	13	2	4
Sundries	14	2	7	7	18	8	10	16	0	1	1	0
	448	8	5	490	5	9	648	16	8	484	2	6

Having shown the expenditure, I shall now give you an account of the produce in imperial bushels in the years 1822, 1825, and 1828. The quantities I have taken from the tithe, having been employed to value them in those years. Subsequently, from 1836 to 1843, the number of bushels per acre (both those years inclusive) has been taken from actual produce, which shows a great increase.

Description of Crop.	Number of Bushels per Acre, Imperial Measure.										
	1822.	1825.	1828.	1836.	1837.	1838.	1839.	1840.	1841.	1842.	1843.
Wheat - -	12½	17	12½	16¼	20½	18¾	15¾	20¼	26¼	88¾	21
Barley - -	11½	none	12½	none	31¾	33¾	26½	40½	33	42½	38
Oats - -	19	22½	16¼	21¼	29	33	44	41	42½	44	53

I am anxious to give a statement of the profit and loss upon the whole farm, but I find it a difficult matter, owing to the constant change of stock between the farm and demesne; however, I have made the following statement to the best of my judgment, taking the average upon the whole for the five preceding years to 31st of October, 1843:—

Dr., The Farm.

31st October, 1843.	£.	s.	d.
To one year's rent of farm - - -	212	0	0
To expenditure for wages, tithe, manure, and all other disbursements for one year - - - - - - -	503	12	4
To oats for 8 horses, 30 weeks, 1 bush. each per week, at 3s. 6d. - -	42	0	0
To one year's interest upon 720*l*., expended in draining - - - -	36	0	0
To ditto on capital of 900*l*. - - -	45	0	0
To seed-grain, not included in the expenditure - - - - - -	30	10	6
	869	2	10
By balance - - - -	18	9	8
	887	12	6

Cr., The Farm.

	£.	s.	d.
By value of wheat, barley, and oats, one year - - - - - - -	367	2	6
By keep of 40 head of cattle in pasture, turnips, hay, and straw, one year, at 2s. 6d. a-head per week - - -	260	0	0
By keep of 220 sheep upon clover and turnips, one year, at 3d. per head -	143	0	0
By wool from 220 sheep at 2s. 6d. -	27	10	0
By breeding and rearing 20 pigs -	30	0	0
By 12 tons of bones on hand, charged in 1842 in the gross at 5*l*. per ton -	60	0	0
	887	12	6

Having given an account in detail of the quantity of draining done up to this time, I beg leave to state that the system set out upon has been strictly adhered to in the execution of the drains, of which I gave a section in my first report to you (vol. i., p. 34). The only variation is, that where there is a strong clay, I prefer ramming it upon the stones to any other material, as no water should be suffered to go from the top of a drain. There are many opinions as to the mode and kind of drains, as well as the material to be used; but having suitable stone upon the farm, I think no better drain can be put in: it is effectual and permanent; the same parallel lines are kept in putting out the drains, as well as the distance apart, suitable to the nature and kind of strata, as the variety of soil requires.

All ditches are now soughed, and there is no loss of ground; and to the extent now completed there is no failure.

The subsoil-plough has been worked with great care to its full depth of 15 inches, over all the arable land that has hitherto come in course. From the commencement of the subsoil-ploughing, and after one course of tillage, deep ploughing has followed, the first time from 9 to 12 inches; and the land now in turnips, being the second course, was ploughed last January from 14 to 15 inches, so that the full depth of soil is brought gradually into action, with the most beneficial result, not only as to great increased produce, but eradicating all weeds. Of this I can speak with great satisfaction: remarks to this effect have been particularly made by gentlemen visiting the farm. The increased produce will show the good effect of such cultivation; the whole of the arable land is now cultivated for turnips in the four and five-course system. Previous to your taking the farm in hand, little clover or turnips were grown, and nearly all the arable land summer-fallowed in the course. The turnips and clover have been very successful, and the whole is now cultivated upon a flat surface, without furrow or gutter. Great advantage is obtained by the deep ploughing succeeding the subsoil plough: by doing it gradually, it gives a depth of soil for the crop to work in. The produce of turnips and clover has been the means of maintaining a large flock of sheep, which has very much aided the improvement of the arable land, as from one-half to two-thirds of the turnips are consumed on the ground. The sheep have done exceedingly well, and not an instance of one rotten. The other part of the turnips are consumed in the fold-yard and stalls to feed cattle and young stock.

The manure hitherto made use of has been 1 hogshead of Poittevin's disinfected, bones, street-sweepings from Ludlow, lime, and fold-yard manure. The above manures were used in an experiment for turnips and barley, 1841 and 1842 (see Journal, vol. iv., p. 117): clover, 1843, which was mown, produce estimated at 30 cwt. per acre; there was not the least difference visible in the crop. The field was sown with red clover, 6lbs. to the acre; white Dutch, 8lbs.; and 1 peck of rye-grass. The red clover failed throughout the field, the white Dutch and rye-grass were very good, and the different manures did not make any variation. Bones are continued to be used for turnips, at the rate of half a ton to an acre upon part of the turnip crop; and the effect has been very satisfactory throughout the course.

The crops this year (1844) are light, owing to the long drought, the wheat short in the straw, but will yield well; some of the barley did not vegetate till the rain we had the beginning of July; the turnips also lay dormant, and when they did come, the progress was slow for some time, and in consequence are small, with some failure from wire-worm, slug, &c.

Having now gone through the detail of the arable land, I have a few observations to make upon the old coarse, uneven pasture; viz., to break up nearly the whole, thorough-drain, subsoil-plough, and take such course of tillage as may be deemed most applicable for restoring such fields again to permanent grass. I will commence with No. 13. Lime has been liberally applied upon the turf, after draining, during the summer previous to breaking up, and a strong crop of oats has been obtained. It will be desirable to get this field to permanent grass again as soon as possible, being so near to the homestead; and I intend taking such crops as may be most suitable to effect that object. No. 15, now oats, has been treated in the same manner, and is also intended for permanent pasture. Considering the droughty summer, the oats are good; I estimate the quantity of 30 bushels per acre. There are other pastures which are intended to undergo a similar process for their improvement. The meadows which have been irrigated are much improved, although the command of water is confined to flushes during a wet sea-season; to the other meadows considerable advantage has been derived from draining and top-dressing: altogether, the meadow-land has a good even surface; and, when all the draining is completed, the produce will be abundant. A pool by the fold is frequently loosed to go over a meadow below, through which all the soakings of the whole homestead are conveyed over; but at all other times the soakings are collected outside the fold, and put on soil brought together from various parts of the farm, which is added as occasion may require, making a quantity of rich compost. The soil is first put in an oblong heap of such dimensions as may be necessary, and the soakings of the homestead put over it, adding soil as it may be required, keeping the middle lowest. A tank is about being made for this purpose.

The fences have been straightened, and new lines made. There is yet a good deal to be done in making further new lines with quick.

The roads through the farm are made very good, which eases the hauling of grain and manure: the latter is now carted out with single horses, where three were formerly used.

I have the honour to be, sir,
Your faithful and humble servant,
RICHARD WHITE.

ALLOTMENT SYSTEM FOR COTTAGES.—LIQUID MANURE.

As the laudable design for allowing agricultural labourers to have a little land to cultivate (and all others who live in rural districts ought to have some) seems to be making great progress, I will just take the liberty of making a few observations, and state what I have done, as an inducement to others to do the like.

A great deal has been written lately about liquid manure, making tanks, &c., to catch and preserve the drainings from dung-heaps farm-yards, and dwelling-houses, and returning it to the compost-heap. I will tell you what I have been doing, and would recommend others to do. Where a pig is kept, and confined in the stye, the outer yard should have a paved bottom, with a gentle slope to one point, to catch all the waste wash, urine, draining from the dung and eaves, and at this point a hole should be made that will hold several gallons of the liquid manure; when it is full, or contains two, three, or more gallons, or as much as would fill a large watering-pot, or other vessel, it should be laded out of the hole, or tank, into the pot or bucket, and carried to where it is most wanted. It should be emptied out all at once, with a sort of jerk, to spread it a little; repeat this constantly, as often as the hole fills; apply it to any close-eaten grass land if near to the tank, and a horse or cow are kept, otherwise to the different growing crops in the garden, or to any vacant ground before cropping, and to the roots of gooseberries, currants, raspberries, or other fruit trees, not close to the stems, but at some little distance from them.

The urine from a cow or horse, when confined in the house, may be collected in the same way as that from the pig-stye, into a hole under the eaves of the stable, or cow-house, where it will receive the water from them. This may be done without any expense of bricks, mortar, or cement, as few of the persons to whom these observations chiefly apply, can, or will go to any expense of this kind in these hard times, but will make any shift do. If, however, it can be done with little trouble or expense, the industrious would practice it when pointed out to them, or when they saw the good effects of it from the examples of others.

Should the stable, cow-house, and pig-stye, adjoin each other, the drainings could all be united into one tank. I might here suggest that a tar, or other water-tight barrel of a suitable size, might be sunk into the ground instead of the hole, and covered with a lid of some sort, to keep in the smell and prevent evaporation, and for the purpose of securing neatness and cleanliness. It is astonishing what immediate and beneficial effects are produced by this practice, and all this, as before stated, without incurring any expense.

I have manured a good deal of closely-eaten grass land during the last dry summer in this manner, and in a very short time after the process, I found the herbage spring up luxuriantly, and to be greedily eaten by horses, cows, and swine. I apply more when necessary, or else apply it to a fresh place. By this easy process, an extra quantity of improved herbage is produced, and two or three bites, where they would have none. This, I conceive, is something gained by the cottager, or small occupier of land, if they would but practice it: and is much preferable to catching the drainings and returning them again upon the dung, or compost-heaps, as recommended by some popular writers, because the benefit is immediate, sure, and no waste.

In dry weather, all the waste dirty water used by the careful housewife should be preserved, and thrown into the tub or tank: and at all times the soap-suds, chamber-urine, &c., should be so used. The droppings of dung from the cow and pig, when near the house, should also be collected and thrown in, and well stirred; it soon dissolves in the liquid, and when applied readily sinks to the roots of the grass, and enriches it wonderfully; whereas, if it is not collected, all the goodness becomes evaporated, and lost in a day or two in dry hot weather. It is past calculation what an immense annual loss of valuable manure is occasioned by the neglect of such useful means to every possessor of live stock, and this loss is just in proportion to the stock they keep.

Currants, gooseberries, raspberries, and other trees, are greatly improved, and the fruit enlarged by watering the roots with such liquid manure, at any time except when the fruit is ripening; and under such treatment the trees will require little or no solid manure at their roots; at other times the liquid manure could be applied between the rows of any of the growing garden crops; in fact, it should be applied to some ground or other all the year round, as more is made in winter than in summer; and although grass and other things do not grow much in the winter, yet the ground is constantly enriching, and nothing is wasted.

By following this system constantly, most of the land in a small garden, or grass field, might be sufficiently manured from a single cow, horse, or pig, by liquid manure alone. All land occupied on a small scale should, if possible, be adjoining, or very near the dwelling. It is really astonishing when duly considered, what waste of manure there is at most farm-houses and cottages, especially at the outskirts of towns; and this too, not only waste, but a perfect nuisance, chiefly for want of some such easy means of collecting it and applying it being put into practice. If proper attention were paid to such matters, there would be little occasion to traverse the globe for expensive manures, for it is admitted by all chemical writers on this subject, that after all, there is no manure superior, if equal, for general purposes, to the compound manure of a farm-yard, or a cottage, where everything of the nature of manure is mixed together.

Some writers on liquid manure say, it must only be applied when trees or herbage are growing. If such is the case, how is land enriched by irrigation, and the overflowings of drainings from homesteads at any season of the year? Others think fresh urine will scald or kill the grass for a time, when applied in that condition. It will in some cases, but not always: for instance, when cattle stale in the fields at all seasons, you will rarely meet with a scalded spot from that cause; yet perfectly fresh pure cow's urine will scald, if applied in a large quantity, as I have proved, but if diluted ever so little with other water, no such thing occurs. During the last dry summer, I frequently observed the striking effects produced by the urine from cattle in the fields, which proves that very little, if any of the ammonia is lost by evaporation, for very soon after the grass on such spots assumed a rich dark green hue. This proves that it is not absolutely necessary that it should undergo fermentation before it is applied; there are but few of the cottagers or small farmers who can go to the expense of making tanks, and wait for, and watch such processes, and attend to such numerous minutiæ.

As these suggestions are not likely to be read by, or known to those whom they are intended to benefit, it would be desirable if the readers of the Journal, especially the gardeners and land-stewards, would endeavour to inculcate them to their labourers, and the small farmers and neighbouring cottagers in their respective neighbourhoods.—W. Billington, Higher Bebbington, Birkenhead, Cheshire.—*Land Stewards' Journal.*

OBSERVATIONS AND PLAN FOR THE MANUFACTURE OF MALT FOR THE PURPOSE OF FEEDING OR FATTENING CATTLE, WITHOUT ANY FRAUD BEING PRACTISED ON THE REVENUE.

By a Practical Farmer, Maltster, and Brewer.

Having read a speech of the Chancellor of the Exchequer, wherein he states he should be most happy to allow agriculturists the privilege of using malt for the above purpose, provided it could be arranged without the revenue being defrauded, which he considered could not be accomplished,—

I propose a very simple and effectual plan. Every farmer or other person desirous of using malt for fattening cattle, should send with every ten quarters of barley to be malted, five hundred weight of oil-cake, the oil-cake to be first broken, and then, when the malt is dried off, let the oil-cake and the malt be *ground together* at the malting where it is made, under the inspection of the excise before it is taken away; the oil-cake being thus completely mixed with the malt is a certain preventive of the malt being used for the purpose of brewing.

I propose that one, two, three, or more maltings, a number of which have been for years unoccupied in most malting towns, be licensed at one pound each (yearly) for the above purpose, and a mill connected with each malting for grinding such malt and oil-cake; and no malting now used for making of malt, where the present duty is charged, should be allowed for the other specified purpose, and *vice versâ*. Oats also might be malted in the same manner.

Thousands of quarters of barley grown last year were much too inferior to allow the present duty on malt to be paid on it, consequently it was of very little benefit to the farmer; and from the present prospect of the ensuing crop, it appears evident we may have above an average, if so, the prices must be extremely low.

The above plan, I am convinced, will improve the price five shillings per quarter on all descriptions of barley, and this will be the greatest boon which can be afforded the community without in the least injuring the revenue.

Thousands of acres of land now out of cultivation would be occupied, and thousands of labourers would find employ; the unions greatly relieved from paupers; and tens of thousands of hard cash circulated in this country, instead of being sent out for the purchase of foreign oil-cake, and enable us to compete with the present tariff respecting the importation of fat cattle.

I therefore trust early measures will be resorted to this session, that the plan may come into operation the ensuing autumn.

Baldock, Herts., 6th Mo., 9th, 1845.

ON THE PECULIAR EFFECTS PRODUCED BY MANURE.

Boussingault, according to the extract which is given from Law's translation of the work on Rural Economy (*Farm. Mag.* for June, 1845, p. 524) asserts that he has been severely criticised for his recommendation of manuring over the surface of fields; and he admits that much diversity of opinion must prevail, because climate and the state of rain must have varying influence on the practice.

It cannot for a moment be doubted that, in every kind of manure wherein ammoniacal vapour is in a state of rapid development, the whole or the greater part of that volatile salt must speedily pass into the atmosphere. But there are other methods of applying farm-yard manure that appear to me to be productive of effects which, though they may be discerned, are still passed over without due observation or inquiry.

It is very common to cart manure, and deposit it in little heaps over a field intended to be sown with turnips. These heaps remain undisturbed for some time, then are scattered over the surface, and are ploughed in. The turnip-seed is sown; and, after due time, a white crop succeeds the turnip. The plant brairds, advances to a certain height, and then certain small patches take the lead, assume a deep tint of verdure, and in every possible way afford signs of superiority, leaving the crop in every direction around to appear, by comparison, yellowish and weakly.

There is a field of wheat not remote from my residence, through which runs a line of the old Bath road, evidently gravelly and deficient of loam. This strip of old road, three yards wide, borders a great open breadth of wheat-land. The crop on it is poor, short, and evidently ill-supplied with aliment; but here and there a solitary patch of a few plants stands conspicuous several inches taller than the others, and is seen from a very considerable distance. Two or three of these singular patches of verdure occur along a belt of about four hundred yards in length.

Another field of spring corn, near Maidenhead, presents a much more singular appearance. The whole breadth is looking fresh and healthy, but in no way remarkable; but there are divers patches lying interspersed through perhaps five hundred square yards of it, which assume the most fanciful shapes imaginable. One of them is a perfect circle, nearly twelve feet wide, resembling in figure the ordinary "fairy-ring" of chalk downs. Other patches represent hooks, triangles, curses—indeed, all sorts of distortion—but, without exception presenting a distinctive intensity of verdure which cannot be mistaken. I was the other day contemplating these singular sportings, when a labouring man passed, to whom I pointed out the circumstance. He told me that he had observed it, and moreover that the piece had been a meadow a year or two before, and the grass then had always shown the same sort of figures of a darker colour than the neighbouring herbage, adding, "It must be something in the soil."

This "something" implies a great deal. The peculiarity last noticed can only be explained by presuming that the soil must abound in *nitrous*, and, it may be, nitro-ammoniacal, *salts*, which (as in the instance of *nitrate of soda*) are well known to confer depth of tint on the grass of meadows and lawns; so much so, that any person may describe figures or words by cautiously watering the surface with nitro-saline liquids.

But, in respect to greener patches in corn-fields, it would be little better than a trite observation to say that they are frequently caused by the dung which English farmers deposit in small heaps on the land, were it not that this simple fact presents an opportunity to offer a suggestion on the theory of liquid manure which perhaps comprises some very important considerations.

Farm-manure, half decayed, generally contains more or less saline and ammoniacal matter; and these salts are soluble in water. Ammonia, in particular, exerts a peculiarly attractive affinity for the *humic extractive*, or the colouring matter of peat, leaf-mould, wood-earth, and reduced dung. When, therefore, a heap of manure is deposited on the ground, and lies exposed to a soaking shower before it is spread abroad, a quantity of liquid matter oozes from beneath and penetrates the soil. In such a case, the corn sown upon a spot so impregnated ought, in reason, to produce plants of richer luxuriance; but then the patches are few, and irregular in position, and this should argue that the cause must be chiefly referred to the land. There is some difficulty in the case, which, as in most investigations of the constituents of earths, require a degree of minute accuracy so great as almost to preclude the attainment of anything like certainty. We must, therefore, be content to ascribe, as before said, the patches of verdure, generally, to the presence of soda, potassa, or ammonia, combined as bases with the nitrous acid.

Admitting that in some instances this extreme verdure can be traced to a heap of manure, we need only observe that the liquid drainage is a weak saline fluid, with so much humic matter held in solution with ammonia as gives it a brown colour. It will be found a very interesting experiment to add a small quantity of powdered quicklime to the brown drainage of a dung-mine, say a quarter of an ounce to a pint; or, by another arrangement, to prepare lime-water of full strength, filtrating it through white blotting-paper till it pass clear. If very dark liquid drainage be dropped gradually into the clear lime-water, its colouring will fall like flakes to the bottom, in the condition of *humate of lime*. In the former experiment the powder of lime will fix and carry down nearly all the colouring matter of the liquid; and thus it is that quick-lime acts as a fertilizer of barren peats: it combines with the inert vegetable matter, but leaves the saline and ammoniacal constituents free and untouched.

Thus we obtain proof nearly demonstrative that the humic colour of liquid manures is of little of no value, and that their fertilizing power is to be referred solely to the salts which they hold in solution. J. TOWERS.

June 13.

ON THE TENANT'S RIGHT TO UNEXHAUSTED IMPROVEMENTS, ACCORDING TO THE CUSTOM OF NORTH LINCOLNSHIRE.

BY G. M. WILLIAMS,

(*Agent of the Earl of Yarborough.*)

TO PH. PUSEY, ESQ., M.P.

(*From the Journal of the Highland Agricultural Society.*)

DEAR SIR,—Lord Worsley has forwarded to me your note of the 4th, and I have pleasure in sending you the information you wish for as to the custom of this part of Lincolnshire with regard to tenant-right, &c.

The *usual* allowances in the north of Lincolnshire to outgoing tenants for unexhausted improvements are as follows :—

Bone-dust.—This is considered to last for three years, and a tenant quitting in the spring of 1845 receives, therefore, two-thirds of the cost of what he put on in 1844 (one-third being supposed to be exhausted by his turnip crop), and one-third of what he put on in 1843, of which he has had the benefit of the other two-thirds in the crops of that year and of 1844.

Precisely the same principle is adopted in the following improvements, the only difference being the number of years which each is assumed to last, and which are as follows :—

Marl or chalk, 7 years.

Lime, 5 years.

Clay, put on sandy land, 4 years, and on some estates 7 years, which is probably a fairer allowance.

Draining with tiles or stone, when the tenant pays the whole cost, 7 years. This is, however, now a rare case, the usual practice being for the landlord to find the tiles. In this case the tenant has generally no allowance for putting them in if he has had a crop off the land, though he certainly ought to have a proportion of the cost, as it must often happen that the first crop will not pay for the labour of draining. It would probably be right to put this on the same footing as bones.

Draining with sods or thorns, 4 years. This allowance, I believe, is not always made. Indeed this mode of draining is now not much practised.

The tenant is also paid the cost price of the seeds sown the spring previous to quitting, and for the labour of sowing, &c., provided they are not stocked after the 1st of November, and have not been unfairly stocked before.

When seeds are ploughed up for wheat the autumn previous to quitting, he is allowed for herbage until the end of the term; but it is not usual to allow anything on ploughing up clover-stubble for wheat, that being considered the crop which ought to follow clover as a matter of course.

For naked fallow, on strong land, he is allowed for ploughing and all the labour performed, but not for rent or taxes, unless he paid for them on entry. The cost of seed and labour on corn sown for the incoming tenant is of course always paid by the latter.

The tenant has the right to remove, or can claim to be paid for, any buildings put up by himself on "bay stones," where the buildings do not enter *into* the ground, but he cannot remove a building attached to the freehold, nor even claim an allowance for it except by special agreement. On some estates buildings are allowed for like other improvements on a term of 20 years.

A tenant cannot break up grass-land without permission, nor sell any straw, hay, or manure. He is bound to keep the buildings, fences, gates, and ditches in good repair, and to leave them so.

All these claims and matters are left to be settled by two arbitrators, one to be named by the outgoing tenant, and the other by the landlord or incoming tenant; and if they cannot agree, then by a third party, to be named by the arbitrators before they begin to act.

These customs are all so well established on this estate, that it is quite unnecessary to insert them in the ordinary agreements for farms; and I find on Lord Yarborough's property the simple form of agreement, which I believe you have seen, quite sufficient. They are also pretty generally followed through this part of the county, unless where modified by regular agreements.

In addition to the allowances I have mentioned, a fresh one has just been established on this estate, having become desirable from the increasing importance of its subject. It is an allowance for oil-cake given to stock, which you are aware has a most important effect in improving the quality of the manure, though there is seldom much profit to be made from it on the stock itself. The allowance is based on the assumption that the manure is improved to the extent of half the value of the oil-cake consumed; but, to get a fair average as to both quantity and price, it is made to extend over the last two years, and the allowance is *two-sixths* of the cake used in the last year, and *one-sixth* of that used in the previous one; making together the half of a year's consumption. Oil-cake given to horses is excluded, as I conceive the benefit to their manure would be comparatively trifling, and an allowance for it would tend to make cake supersede the legitimate food of the horses in the last year of a tenantcy. Cake given to sheep in the field is also excluded. This decision has been come to after careful consideration and inquiry, partly on the ground that the benefit to the sheep is sufficient to make it worth while to give cake without regard to the manure, and partly from the greater difficulties attending the getting a correct account, and the increased liability to fraud.

The allowance for oil-cake is made only on Lord Yarborough's estate, and one or two other smaller ones, and is therefore a subject of special agreement, and not a thing that can be claimed by any custom; but I have little doubt that it will become ultimately a usual allowance.

The introduction of new manures, and other improvements, will doubtless make modifications in the existing system of tenant-right necessary from time to time. For instance, should the use of sulphuric acid with bones become general, the present allowance will cease to be correct; or should guano come into general use, an allowance should be made for it. In reply to your inquiry as to the general application of bones to turnips, I beg to inform you that on the wold and heath districts, and other turnip soils, it is certainly the *general* though not the *universal* practice to apply bones; but I am not aware of any case in which tenants are bound by agreement to use them instead of other purchased manures or farm-yard dung. In some cases the latter is used along with bones, and instances are not uncommon of two or more manures being applied together. On Lord Yarborough's estate, and, I believe, through the whole district, tenants are quite at liberty to use any manure for their turnips which they may think best.

I remain, dear sir,
Your obedient servant.
G. M. Williams.

Brocklesby Park, Brigg,
May 13, 1845.

P.S.—You will perhaps notice a little difference in the rule for the allowance for oil-cake as here given from the statement made in the last number of the society's journal, in a note to the article on the Farming of Norfolk. The change was made after I had furnished the information for the article, for the sake of getting a fairer average as to price and quantity.

ON SECURING TO THE OUTGOING TENANT A CLAIM IN UNEXHAUSTED IMPROVEMENTS.

(*From the Loughborough Agricultural Society.*)

TO PH. PUSEY, ESQ.

Dear Sir,—I have pleasure in sending you the suggestions for improved agreements between landlords and tenants, which were unanimously adopted by the Loughborough Agricultural Society, at their quarterly meeting on the 27th of March last.

I take this opportunity of informing you, that the suggestions originated in the committee of that society finding the general state of the agriculture of the midland counties inferior to the highly-cultivated farms in the counties of Norfolk and Lincolnshire. The committee were led to inquire what causes had produced the great improvements in the agriculture of those counties, and found that in the former leases for twenty-one years were generally the system under which farms were let, and in the latter liberal agreements for tenant-rights were given, which in each case gives security for the capital of the tenants expended in the various improvements upon their farms when they quit them.

The committee did not think that leases were adapted to this part of the country, the farms being small, and the land of that quality which did not require a great outlay of capital (except in particular instances), and therefore the committee, knowing the high state of cultivation to which many parts of Lincolnshire had been brought, by the adoption of liberal tenant-rights, determined upon recommending these suggestions for improved agreements, as the most likely means of producing corresponding improvements in the midland counties.

I would also add, that the motives which induced the committee to bring forward this important subject for the consideration and adoption of the quarterly meeting, were a sincere desire to benefit the landowners and occupiers, the former by an improved system of cultivation, by which their estates will be greatly increased in value, and the latter by giving them security and a fair and equitable allowance for the various improvements made upon their farms. It is evident, that by adopting this system, there will be a much greater demand for labour, and an increased supply of agricultural produce for the use of the public.

I am, dear sir, yours very respectfully,
Charles Stokes.

1. No old turf land to be broken up without the consent, in writing, of the landlord or his agent.

2. No timber to be lopped or cut down without the consent, in writing, of the landlord or his agent.

3 No tenant ought to be repaid for any building erected by him, unless the same shall have been done with the consent, in writing, of the landlord or his agent.

4. All draining, where it can, ought to be done by the landlord, and five per cent. per annum charged to the tenant; but if the tenant drains the land himself, with the consent and under the superintendence of the landlord or his agent, an allowance of fourteen years shall be made for the materials, carriage, and workmanship:—and if the landlord finds materials, the allowance shall be made to the tenant for seven years only, for carriage and workmanship.

5. An allowance ought to be made for lime and carriage for five years.

6. An allowance ought to be made for four years for the cost and carriage of all bought dung and night soil, which may be spread upon the land.

7. An allowance ought to be made for bones for four years.

8. For rape dust, one third of the bill after a crop of corn, hay, or clover.

9. For marling or claying land, an allowance ought to be made for carriage and labour for seven years.

10. For linseed-oil cake and corn used for feed-

ing cattle or sheep, one-third of the cost ought to be paid for the first year, and one-sixth for the second, where the manure belongs to the landlord.

11. Where the manure so made from oil-cake and corn belongs to the Tenant, an extra allowance ought to be made on the value of the manure, in the same proportion as in the foregoing rule.

12. An allowance ought to be made for turnip fallows; namely, the working, rent, and taxes to be calculated, and the crop of turnips to be valued, and one-half the value of the turnips to be given to the outgoing tenant. Two-thirds of the turnips to be consumed upon light soils.

13. The above allowances are made on the presumption that all the produce, except corn, meat, wool, and the produce of the dairy, are consumed on the farm; and all allowances are to be made in equal proportions in each year for the period over which they extend, except in the 10th and 11th rule.

14. Such system of cultivation ought to be adopted as may be most suitable for the quality of the land; and an allowance ought to be made to the landlord if such system be not adopted, and for any dilapidations in the buildings, fences, gates, and drains.

15. At the termination of each year, the tenant shall give an account to his landlord or his agent of all money expended by him during the previous year, for which he is entitled to claim any allowance on quitting his land.

16. If the outgoing tenant refuses or neglects to enter into an agreement with his landlord or his agent, on or before the 17th day of October next preceding the termination of his tenancy, then the landlord ought to have the power of entering to sow wheat where the crops do not belong to the tenant, the tenant receiving compensation for herbage and stubbles.

17. The landlord ought to have the power of entering to plough for and sow spring corn on the second day of February previous to the tenant quitting the farm.—*Journal of the Royal Agricultural Society.*

ON THE CULTIVATION OF THE SOIL.—DEVONSHIRE FARMING.

In the part of the country in which I am living, the soil to a very considerable extent is good, a beautiful sandy loam of good staple, on a subsoil of coarse open sand: in some spots, at the depth of from 5 to 10 feet, a thin shell of rock-stone is to be found. With the improved system of culture and management that is carried out in some parts of the country, it would yield a most bountiful return, instead of which, I am sorry to observe, its general culture and management is the most deplorable I have ever met with in any part of the country. The tools and implements of husbandry are the most awkward, ill-shaped, and unwieldy that can possibly be imagined. Ploughing, it is true, is performed with a pair of horses generally, but they are poor little half-starved, worn-out runts, hardly worthy the name of that noble animal. A man is required to hold the plough, and a boy to lead the pair of horses, and beat them with a cudgel, hallooing at them so as to be heard a mile off at least, when the wind is in the right direction. Their usual depth of ploughing is from 3 to 5 inches, and averages about 4 inches; they sow thickly, and always broadcast; there is no drilling or hoeing, except with turnips, which occasionally get hoed once. I have never observed a field of turnips hoed twice in this neighbourhood, and not half of what is sown gets hoed once; the consequence is, the bulbs do not, on an average, exceed a goose's egg in size. There is no subsoil ploughing done, and rarely a drain cut for any purpose; no tanks provided for saving the liquid manure, but it is allowed to run away down the ditches, or into the streets to harbour the flies about the dwellings, and for the hogs to wallow in, in hot weather to create a sort of savoury smell. There is no stall-feeding of cattle, or green food, or root-growing; no 4 or 5 quarters of wheat to be heard of here to the acre, and it is very rare to hear of more than 20 bushels to the acre; all other produce averaging at the same ratio.

Were such farming as this in practice throughout the country, what a deplorable condition we should soon find ourselves in; every commodity must necessarily be of an extravagant price, besides being of poor quality; we should not then be enabled to obtain the cheap loaf, beef, mutton, bacon, pork, and other commodities we now do; no, we must look to the improvement which cultivators of the soil have effected in other localities for those things.

To give an idea what sort of teams are here employed at farming business, I may mention that some time since, having a job in hand that required to be done in a given time, I engaged above 40 one-horse carts; the full value of 30 of the horses would not average £1 each, and the other 15 not £2 each; these were all farmers' horses of the surrounding neighbourhood. I hear they get 5s. each for these noble animals when dead, for the dogs to eat, and a very poor picking for the dogs, too. These animals seldom or ever get cleaned, trimmed, or groomed in any way. This you may imagine to be queer management for any part of England, but so it is; there is no chaff-cutting, or corn-crushing, or very seldom turnip-cutting, which I dare say is not necessary, for the cattle do not get corn to any extent; and not many of the turnips require cutting, for they are not above the average of a cow or bullock's mouthful. The harness never gets cleaned, or seldom mended, except it be tied together with rope-yarn occasionally, which to me has the appearance of great neglect, and something of the signs of one who is a poor farmer, and likely to continue poor with such management; for his horses' stable is never thoroughly cleaned of the dirt and manure; the manger and crib never washed; the walls, boards, &c., never lime-whited; his yard and field-gates broken and without fastenings or hinges, and occasionally tied at each end when shut by a withe. He neglects to keep the dung away from the sills of his buildings; he grazes his mowing-land late in the spring, and it is not manured or weeded for years together, or ever drained. He carts his manure to some highway side, where, instead of being cast up tidily together, and earth placed at bottom and between, to soak up the drainings and prevent too rapid fermentation, it is left scattered about in a slovenly condition, liable to get much washed with rain, and parched with sun and drying winds, and weeds are allowed to grow on it to assist in its exhaustion. He sows and plants his land till it is exhausted before he thinks of manuring. He keeps too much stocks; some much past their prime and usefulness, and others very unruly for want of better food. He has no place for his various things, and nothing is kept in its place: if he wants a gimlet, chisel, hammer, nail, staple, saw, hatchet, or a few rough poles, boards, or slabs, to mend a gate, or stop a gap, no such articles are to be found. He does not often think of stopping a gap or mending a gate until his own or his neighbours' cattle have done some injury to the crops. He seldom does anything in stormy weather, or in the long winter evenings; you will perhaps hear of his being in the bar-room talking of hard times, although he has been on a piece of land 20 years. Ask him what system of cultivation he follows; he will perhaps be heard to say, that through his land being of bad quality, the seasons unfavourable, his rent high, and his landlord very hard with him, that it is impossible to carry on any regular system of cultivation, excepting a sort of make-shift one. Ask him for Swede turnip-plants, to fill up failures and vacancies amongst his crop—he has none provided. Ask him for young apple-trees, for filling up vacancies in his orchard—he has none; and will tell you he could not rear them for lack of luck. His indolence and carelessness subjects him to many accidents and losses. A barrel of beer, or hogshead of cider, is sometimes lost for want of a hoop, or possibly through a stinking cask. His waggons and carts, and other implements, are sadly out of repair, and the wheels making a horrid noise for want of attention in due time with a little grease. In his hurry in hay or corn harvest, for want of a little foresight, he meets with a break down in some narrow impassable lane, and neither wheelwright nor blacksmith is to be found within some miles possibly; his horses' harness is broken for want of a stitch in time; dirty, hard, and cracked all to pieces for want of cleaning and a little oil occasionally applied; his horses often lamed for want of a nail to the shoes in time; his plough breaks in his hurry at seed time, because it was not housed when not in use; his harrows—not easily to be found, through their being left in a ditch or under a hedge on some part of the farm where they were last made use of, and now grown over with weeds; his roller is perhaps left on some highway side, and some unruly boys, by riding on and gaming with the shafts, have broken one or both, and it is not discovered till wanted for use; and in the harvest time, when he is at work from home on a distant part of his farm, the hogs break into his garden and devour and destroy what few badly cultivated vegetables there may then happen to be, for want of some timely small repairs, and from hunger in consequence of their being forgotten to be fed on those busy occasions. He loses many of the young chickens, ducklings, and eggs by vermin and want of timely repairs; he always feels in a hurry, yet in his busiest day he will stop and talk until he has wearied your patience; he is seldom neat in his person, and generally late at public worship; his children late at school, and often not very clean, and their books torn and dirty; he has no enterprise, and is pretty sure to have no money, or, if he must have it, makes great sacrifice to get it; he is slack in all his payments, and buys altogether on credit; he purchases everything at a dear rate, and the smoke from his chimney is often not to be observed until long after daylight in the winter months; tiles, thatch, and weather-boards off month after month without being replaced, allowing the wet, wind, and storm to get amongst his corn and cattle, which latter are sometimes lost through cold and draught; his windows seldom get washed or cleaned, with much broken glass covered with paper, or the holes filled with rags—a ready means for his wife and family to procure the rheumatism, colds, tooth, and ear-ache, &c.; his children running about badly shod over the damp yard, coughing of an evening and most part of the night, or crying with pain or with itching chilblains; their hair but seldom combed, or their face and hands thoroughly washed. He thrashes his corn as soon as cut, and if his horses and hogs do happen occasionally to get corn for food, it is given them whole instead of ground; if his lambs or calves die, or the wool comes off the sheep, he does not consider it is for the want of food or care on his part; therefore, he seems a poor manager, a poor husband, a poor father, a poor neighbour, a poor citizen, a poor Christain, and not much fit for a farmer, some would I dare say imagine.—James Barnes, Bicton Gardens. Sidmouth, Devon.—*Land Steward's Journal.*

We invite the attention of our readers to the following statements in reference to the efficacy of Guano:

Guanos and Experiments of various Kinds.—It may be interesting at this moment to state, for the information of our agricultural friends and neighbours, that if they wish to examine the effects of the Peruvian and African guanos, and some other preparations, as Potter's guanos and ammonias, &c., they may see the practical results on some farms of Mr. Tasker, at Middleton Hall, close to Brentwood, and on a farm purchased by Mr. Tasker, of the Eastern Counties Railway Company (sold amongst their surplus lands, and known as Musto's farm), close to Shenfield turnpike. The experiments have been made on a large and liberal scale, and an opportunity of comparison between the effects practically of farm-yard manures and the guanos is afforded in fields of eight and ten acres each. The fields have been examined by many practical gentlemen, and, we believe, one opinion only is entertained as to the immediate result, and the first crop being quite in favour of the guano of Peru. But as Mr. Tasker has for several years made these experiments, it is only fair to add, that though the season of 1844 was against the guanos, from its perhaps unparalleled drought (such a season not occurring once in twenty, or even forty years), yet the produce is large this season (of 1845), showing there is also some durability in the guano. Of late Mr. Tasker never applied any of these artificial manures unless mixed with good earth or other soils, and results prove clearly that the ammonias are thereby rendered infinitely more effective and durable. Several fields so managed promise a yield in hay of from two to three loads an acre of the finest herbage, and of other crops an equal abundance.—*Chelmsford Chronicle.*

The value of guano was at first *denied*, and after two years' experience as generally *doubted;* yet at this moment it is welcomed alike in the cotter's garden and the conservatory; and the cit who farms a mignonette box vies with the lord of a thousand acres in praise of its efficacy.—*Gardener's Chronicle.*

GUANO.—In reference to guano, I may merely observe that *cæteris paribus*, the Peruvian guano is preferable to that of Ichaboe, chiefly on account of the absence of the agency of rain in the former case, by which its comparative uniformity must be greatly enhanced; *rain* never falls in Peru, and rain, where it does fall, must give rise to partial decomposition, facilitate the escape of the more volatile parts, and cause a subsidence to the greater depth of what is soluble. In a specimen of Ichaboe guano, put into my hands by a gentleman of Herefordshire, who imported it direct, on his own account, I found ammonia in the act of escape —a proof of *decomposition;* and yet the farmer, in his ignorance, has considered that an evidence of the excellence of guano! The test is easy: dip a feather into muriatic acid, and bring it almost in contact with the guano; if visible white fumes appear, ammonia is in the act of escape. If guano be rubbed together with quicklime, ammonia should be copiously disengaged, determined by its powerful and irritating odour; hence quicklime must, on no account, be used along with guano.—*Correspondent Wigtonshire Free Press.*

CALENDAR OF HORTICULTURE.—JULY.

RETROSPECT.—In retracing the effects of the weather from the end of the third week of May to the like period of June, we find much to interest the reader observant in rural affairs. The meteorological monthly calendar will enable any one to obtain at a glance the general characters of the weather and temperature; but it would require rather close observation in various localities to ascertain with tolerable accuracy the progress of vegetation. May was cool, and rather rainy; the ground was amply supplied with moisture, and trees or plants grew, and developed their parts slowly, but regularly.

Of the ten last days of May there were but three which were sunny, and on the 30th only the temperature at mid-day rose so high as 61°. The wind was generally fierce, from north-east, and on several occasions we had alternations of cold rain, heavy showers, and driving hail. To these ungenial visitations we ascribe that "blighting," and, as it were, actual scorching of entire spurs upon the apple-trees, which had previously exhibited garlands of the finest blossoms, embedded in clean and most healthy foliage. Never was there a finer promise, and orchardists estimated the probable price of apples at 6d. per bushel; but June evinced that an unsuspected enemy had been at work, and as so many of the fruit-bearing members were paralyzed, it becomes impossible to predict the final condition of the apple crop; but it will be irregular and local. *Pears* will not be abundant, but the trees have not been injured.

The bloom of the strawberry was superlatively fine and erect, and as the temperature improved a little during the early days of June, and some genial showers fell, there seemed an assurance of a rich crop. On the 11th day, however, the heat commenced, which continued without intermission till the 18th. Its droughting effects were surprising, and we fear that the sudden check will be seriously felt.

OPERATIONS IN THE KITCHEN GARDEN.

Potatoes.—The very earliest, as for instance the lemon-kidney of Lancashire, ought, in ordinary seasons, to be either finished, or nearly so. Wherever a gardener has been so fortunate, we recommend him to select that spot for early *spring brocoli.* The ground should be manured for this vegetable, and having been again instructed by the destruction of last winter's plants, we now recur to our favourite plan of trench-planting. *Miller's dwarf brocoli* is so hardy, that it may be said to secure itself; but all the tall growing varieties are apt to be frozen, unless laid down early in the autumn. Now, if the site of a potato-row be digged out eight inches deep, and manured, forking the lower soil and dung together, two objects will be attained; first, the potatoes will be effectually cleared away; and second, the brocoli plants can be gradually moulded up in the way of celery; till at length, the trench being filled up by the earth from ridges on each side, the stems will be almost effectually secured; or again—the plants in September may be made to incline to one side of the trench, and thus be landed up just as effectually as if raised, and laid down, avoiding any disturbance of the roots.

Kidney-beans, and *Peas.*—Finish sowing these by the end of the first week. Take advantage of showery weather to transplant, during the fine intervals, Brussell's sprouts, brocoli, May-sown cauliflowers, savoys, and cabbage. Allow a yard for the three first, and from eighteen inches to two feet for the two last, plant from plant. It is certain that all plants of the cabbage family thrive most, and are of the best quality, in entirely new, good loam, without manure; and this fact affords strong evidence in favour of the presence of potash and natural salts in such new earth. On the contrary, old garden soil ought to be deeply digged, and thoroughly manured for cabbage and brocoli, otherwise their growth will be poor. A few ounces of *sulphate of ammonia*, mixed with each barrow of dung, would be appropriate to this nitrogenous family.

Celery.—Transplant for the middle crop; the great art is to keep the roots of the plants free from injury, and to reset them with the utmost despatch. All stiff land is inimical to the quick growth of celery: rich, black, friable soil is exceedingly favourable.

Celeriac (the turnip-rooted celery) is to be transplanted, either into level ground, or in merely shallow drills, having a little dung under them.

Onions.—If the weather continue hot and dry, hoe the surface frequently, just to keep it free from crack. This treatment was wonderfully effective in 1844, when there were so many failures in consequence of the long-continued drought.

Cucumbers, on ridges, over manure, and *Vegetable Marrow,* should be trained orderly, keeping the runners secure by a few hooked pegs.

Melons under glass require no bottom heat; the runners should be stopped as they reach the sides of the frames, or walls. Persons err much who stop too early; it is desirable that the shoots be strong, and the foliage expansive, before any fruit is permitted to form. The red spider is a woeful enemy; as a preventive, nothing is so effectual as moderate moisture, raised by sprinkling about 40 c-, and closing the lights entirely while a strong heat is within the frames. Early melons are very good, but none are so excellent as those produced in July and August, and in masses of half-decayed leaves and twigs the roots of the plants revel with surprising luxuriance.

Fruit Department.

Peach and nectarine trees.—Most persons regulate these trees at any convenient period of July; that is, they displace any redundant wood, and neatly train in the shoots of the summer, retained for future bearers. We feel inclined to doubt the philosophy of the practice; because, as July is a season of moisture and growth, fresh wood is sure to be protruded, and therefore it would appear most natural to wait till elongation have ceased, rather than, by the knife, to cause the production of a number of subsidiary, ill-placed, new twigs, all of which will require mature arrangement. It is always wise to economise time and labour in cases where there exists no countervailing advantage derivable from exertion.

For a similar reason spur-bearing trees may remain uncurtailed till early in August. We have urged these considerations in former calendars, and though some very good gardeners choose to go through a double series of operations, yet there are others who wait patiently, and summer-prune but once.

Budding of the peach tribe, apricot, plum, and cherry, can be safely performed whenever the barks of bud and stock separate freely; particularly if the weather be moist.

Strawberry-runners, now laid on the surface of the soil, in small sixty or eighty-size pots, sunk in the ground, are sure to furnish the best stock for pot culture; but the plants will require due attention to give timely watering. Keen's seedling is still the best early forcer; the British Queen sometimes fails, as it is nice and very peculiar in its habits.

Forcing Department.

Pine-apple.—Every one who is wise, will either cultivate on the quick-growing system, or abandon pine-growing altogether; hence vapour from dung linings, or steam in some form, is vital. A writer in the *Gardener's Chronicle* of June 21, says that manure water, so weak as to be clear as wine, and warmed to 80° to 90°, should be freely applied. His specific directions are couched in the following terms:—"I find a mixture of stale cow's urine, guano, and soot, excellent for pines, indeed for any plant that is a gross feeder; I merely colour the tepid water with this strong mixture. Those successions or fruiters that are going to be shifted shortly, should be well soaked in this way three days previous to their shift."

We copy the above merely to explain the *chemistry* of the application. Cow-wash develops abundance of carbonate of ammonia, when becoming stale. Soot contains much *sulphate,* and some *acetate* of ammonia, and the chief saline products of *pure guano,* are the salts of ammonia. Hence, then, we are sure that these salts become the sole fertilizers; and nothing in liquid manures is of any avail excepting their soluble salts—for not one particle of the colouring humus can enter the pores of the roots. Every day, and each specific fact it furnishes, tends to diffuse fresh light upon the true theory of manure.

Vineries.—All those from which fruit is gathered should have plenty of air; those having mature, or ripening fruit, should also be freely ventilated; but the latest vines, for winter fruit, must have a closer and more moist treatment, particularly after the thinning-out has been completed. The true West's St. Peter's ranks among the choicest, and it is a matter of wonder to us how any one can call it a "bad setter." We have now a multitude of perfectly jet clusters, from six to eleven or twelve inches in length, that have never received the slightest artificial assistance towards impregnation. One thing, however, is certain, the genuine West's, with leaves smooth and glossy on *both* surfaces, produces clusters so constructed as to require the utmost skill in thinning-out, otherwise their figure will be destroyed. The management of the leaves of vines is the *sine qua non;* the following authority will justify what has been urged on former occasions:—"Any laterals, or superfluous growth that may shade, not the *fruit,* but the principal leaves, may now be in great part removed, to allow the solar light to complete the elaborative process." This remark of the *Chronicle* is correct: the sun's ray *scalds* the *fruit,* but it is vital to the foliage, and as the leaves guard the fruit, every main leaf ought to be sacredly preserved.

The weather at the turn of days, when the sun entered the summer signs, was warm and sunny, but rather too arid.—*June* 22.

WEST SUFFOLK AGRICULTURAL SOCIETY.—The thirteenth annual meeting of this society was held on the 6th June. The attendance was full, and the show was about the average. Amongst the successful competitors were the names of the following well known agriculturists:—Mr. Hudson, of Castle Acre; Mr. Overman, of Weasenham; Mr. R. B. Harvey, of Harleston; Mr. M. Crisp. Mr. W. F. Hobbs, of Marks Hall, Coggershall, took away every one of the prizes for pigs.

METEOROLOGICAL DIARY.

Barometer.			Thermometer.			Wind and State.		Atmosphere.		
Day.	8 a.m.	10p.m.	Min.	Max.	10p.m.	Direction.	Force.	8 a.m.	2 p. m.	10 p. m.
	in. cts.	in. cts.								
May 22	29.70	29.80	44	56	46	N. by East	brisk	cloudy	cloudy	fine
23	29.80	29.85	39	57	46	North	lively	fine	sun	cloudy
24	29.81	29.80	44	51	47	N. S.E.	gentle	cloudy	cloudy	cloudy
25	29.80	29.70	45	50	46	Easterly	gentle	cloudy	cloudy	cloudy
26	29.65	29.68	45	53	47	S. S. by W.	gentle	cloudy	sun	cloudy
27	29.75	29.80	43	63	53	N. East	brisk	haze	sun	fine
28	29.89	29.79	49	59	54	N. East	brisk	cloudy	cloudy	cloudy
29	29.76	29.72	47	54	48	N. East	brisk	cloudy	cloudy	cloudy
30	29.76	30.05	47	61	48	N. East	lively	fine	sun	fine
31	30.15	30.16	43	60	53	S. West	gentle	cloudy	sun	cloudy
June 1	30.16	30.09	47	65	57	N.E. S.W.	gentle	cloudy	sun	fine
2	30.00	29.80	49	67	57	s. by E. N. by W	calm	fine	sun	fine
3	29.66	29.44	49	66	54	S. West	brisk	fine	sun	cloudy
4	29.50	29.60	48	58	53	S. West	variable	fine	sun	cloudy
5	29.60	29.56	51	62	58	S. S.W.	strong	cloudy	cloudy	cloudy
6	29.57	29.80	54½	63	54	S. S.W.	strong	cloudy	sun	fine
7	29.87	29.74	51	61	51	S. S.W.	strong	cloudy	cloudy	cloudy
8	29.78	30.16	48	59	51	W. N.W.	strong	cloudy	sun	fine
9	30.30	30.36	46	63	56	W. N.W.	gentle	fine	sun	fine
10	30.38	30.30	47	68	62	Westerly	gentle	fine	sun	fine
11	30.27	30.20	52	72	62	East	gentle	fine	sun	fine
12	30.20	30.20	58	76	68	N.E. by S.	gentle	fine	sun	fine
13	30.20	30.19	60	78	70	Every way	calm	fine	cloudy	cloudy
14	30.20	30.11	62	77	68	N. by E.	gentle	fine	sun	fine
15	30.11	29.98	59	75	67	S. West	gentle	fine	sun	cloudy
16	29.90	29.84	63	73	63	South	gentle	fine	sun	fine
17	29.84	29.85	55	74	67	E. N.E.	variable	fine	sun	cloudy
18	29.86	29.87	56	67	56	N. West	gentle	fine	sun	fine
19	29.98	30.05	49	68	59	N. by E.	gentle	fine	sun	fine
20	30.10	30.13	54	69	60	N. East	gentle	fine	sun	fine

ESTIMATED AVERAGES OF JUNE.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.46	29.66	90	37	58.7

Real Average Temperature of the period.

High.	Low.	Mean.
64.17	50.13	57.15

North and N. East Winds..	11½ days.
East and South............	6
South and South West......	4½
West and to North	8

Weather and Phenomena.—22nd. Rain—finer—occasional showers. 23rd. Rain—generally fine. 24th. Rain—two brisk showers—fine. 25th. Gloomy—rain last night—soaking day. 26th. Rainy. 27th. Change of wind and brisk current. 28th. Rain—gloomy all day. 29th. Wind and rain. 30th. Fine and sunny. 31st. Changeable—hot mid-day sun. *June* 1st. Warm—cross currents—starchy cirro-stratus. 2nd. Sultry. 3rd. Fine till afternoon—then overcast—rainy night. 4th. Showers—cool. 5th. Showers—blustering. 6th. The same wind, otherwise fine. 7th. Changeable—showery evening. 8th. Windy—improving. 9th. Genial—summer-like. 10th. Fine—heat increases. 11th. Hot—splendid. 12th. Sultry. 13th. Thundery—masses of varying clouds. 14th. Most beautiful—hazy night. 15th. Cloudy—after a hot sun till afternoon. 16th. Starcy black—cirro-stratus occasionally. 17th. Changeable—many thunder clouds—singular transition. 18th. Lightning in the night—some rain. 19th. Exceedingly fine. 20th. The same.

Lunations.—*May.* Last quarter, 28th day, 6 h. 25 min. morn. *June.* New moon, 5th day, 1 h. 8 min. morn. First quarter, 13th day, 3 h. 43 min. morn. Full, 19th day, 11 h. 18 min. night.

Remarks referring to Agriculture.—How wonderfully has the equinoctial prognostic sustained its pretensions—dry in the main, subject to alternations, and those of hasty character (see March). The dry weather of June, its great and sudden heat, has acted like magic upon the hay crops, already prepared by the ground moisture created by the rains of May. A glorious contrast presents itself to the parched aridity of 1844, and grass is abundant. Wheat came suddenly into ear on the 10th, and as yet the promise is beautiful. The sun entered cancer at 2 h. 43 min., astronomical time, on the 21st day; and we look forward to a fine maturing summer. JOHN TOWERS.

Maidenhead Thicket.

AGRICULTURE.

The farm of Henry Skelton, Esq., called Braham Grange, situate about a mile to the south of Thorner, and half a mile to the north of the Leeds and Tadcaster turnpike road, does at present supply such instruction in the cultivation of land that the public would lose a great benefit were it not pointed out.

I well remember Whin Moor more than forty years since, of which this now most fertile farm formed one of the most barren parts. It was a district cold and sterile, the substratum a very stiff clay, tenacious of all the rain that fell, the surface a kind of black earth that then seemed unmeet for human habitation. Nothing could be more unpromising in appearance, and although the price of grain was excessive soon after the inclosure of Whin Moor, the price of this land did not then exceed £10 per acre. From the present character of some adjoining farms, but in the hands of cultivators of another kind, some notion may be formed of what Mr. Skelton's farm once was, although the crops now growing thereon will bear comparison with those of the most luxuriant and fertile districts. It is not solely because of the abundance of produce that this farm is worthy of notice.

2. It supplies an illustration of the effects of manures, for almost every field (as I was told by the most intelligent experimental cultivator) was this year differently manured in different parts. Here may be seen what rape dust, compost, animal and vegetable substances, and above all, what guano will effect. Guano used at the rate of two hundredweight per acre, which costs seven shillings per cwt., has given a growth and luxuriance to all kinds of grain, to turnips, and to grass, which supplies proof that guano may be brought from the Pacific Ocean, and from the most distant parts of the world, and applied at a cheaper rate than other kinds of manure can be collected at home. Science and industry may make further discoveries, and it is not improbable that the qualities which fructify in guano may be readily produced at a very much cheaper rate.

3. Mr. Skelton shows how this produce may be turned to the most advantage to the support of animals, and to make lean cattle fat. He chops his straw and boils his turnips, mixes the boiled turnips with the chopped straw, and pours the liquid upon the compound. This, with a small quantity of linseed cake, he finds most nutritious both to cattle and sheep. By this means of feeding, the same quantity of food nourishes and feeds more than double the number of animals which the raw turnip and straw in its natural state would do; and by this means his yard is filled with excellent manure.

4. Here is exhibited the fact that science and capital applied to agriculture find employment and administer the means of comfortable maintenance to that most deserving and industrious class—the agricultural labourer. The amount of wages for labour on this farm is *not less than 2l. per acre.*

5. Here is an example that Providence is bountiful to the industrious, and that no spot can be found which may not be made a field of labour; and that the skilful application of capital to agriculture will, at all events, supply to individuals the necessaries of life. Agriculture, like trade and speculation, which is a species of gambling, does not produce great and almost immediate changes in the condition of individuals; nevertheless, when followed with skill and industry, it supplies food convenient for the service of man, and perhaps places him, considered as a passenger through this world to another, in the most desirable circumstances of life.—*Leeds Intelligencer.*

AGRICULTURAL REPORTS.

The resplendent weather which has been experienced during nearly, or quite, the whole of this month, has, as might be conceived, worked wonders in the general appearance of vegetation. From all quarters most cheering accounts have reached us respecting the wheat and other crops, which are now in full ear in nearly the whole of our great producing countries. In some few instances, it is true, the wire-worm has been complained of; but the instances are so partial, that any lengthened notice respecting them would be unnecessary. Sufficient for us, therefore, to observe, that a finer prospect for full average crops of nearly every kind of produce was never witnessed than at the present moment. Notwithstanding the large comparative increase which has been observed during the present year, in the arrivals of wheat of home produce up to our various markets of consumption, we are still assured that the supplies of that article still in the hands of our farmers, in those portions of the kingdom generally considered as the large grain districts, are seasonably good. So far, therefore, as present abundance is considered, reports are flattering, but not so as respects future value; for, looking at all the circumstances connected with supply and demand, even after taking into consideration the fact that the quantity of foreign wheat in the kingdom is very small, and the quantities expected to arrive during the next two months by no means large, we are free to admit that, in this particular, we see no cause to expect any material advance in the present currencies of wheat for some time hence: all this, however, is but a speculative opinion, as it is quite certain that much must depend upon the state of the atmosphere from this period to the close of July, or the middle of August. As it is placed beyond a doubt that the available supplies of oats, beans, and peas are small, we are fully of opinion that present rates are safe for some time hence. The hay harvest is now in full operation, especially in those counties south of the Humber. Fortunately for our graziers and others, it is likely to prove one of the best and most productive crops grown for a series of years past.

Our advices from Scotland state that everything relative to farming is going on well. In every part the wheat, barley, and oats, including the beans and peas, are looking remarkably well. The shipments of late to England have been rather limited.

In Ireland, the wheats are coming fast into ear;

while other grain is progressing rapidly. Owing to the low rates lately prevailing at Mark Lane, and the firmness on the part of the holders of that article in the principal Irish ports, fewer oats have been shipped to London and Liverpool than for a very considerable period.

Throughout the United Kingdom the wheat trade has been in rather an inactive state during the principal portion of the month. However, selected parcels have in almost every instance produced full currencies; but other kinds have suffered a decline of from 1s. to 2s. per qr. Grinding barley has supported late rates; but malting and distilling sorts have had a downward tendency. Oats, beans, and peas have moved off steadily at full prices. The flour trade has been in a very sluggish state.

As we have long since intimated would be the case—knowing as we did the great exertions which were making by the Dutch graziers and others to supply us with additional numbers of stock, at the most convenient period—a very large increase has taken place in the imports of live stock from abroad under the new tariff; they having amounted, in the past month, to 1,390 oxen and cows, together with 300 sheep, 20 calves, and 22 lambs. These imports, added to those previously received this year, form the following totals :—

	Oxen and Cows.	Sheep.
London	2,345	1,300
Liverpool..........	6	—
Hull...............	1,264	330
Southampton	—	8
Newcastle	16	10
Totals........	3,631	1,648

In reply to the numerous inquiries made with respect to the general quality of these imports, we have to observe that the beasts still continue in good condition, and to carry a full average quantity of fat; but the consumers complain that the meat is somewhat rancid and otherwise unpalatable. This, we imagine, arises from an attempt being made by the Dutch graziers to force on their stock too rapidly, and from inattention to the quality of the food given to it.

The following is our usual statement of the supplies and prices of fat stock exhibited and sold in Smithfield market. The former have been as under :—

	Head.
Beasts..................	13,476
Cows	458
Sheep and lambs	131,390
Calves.................	2,212
Pigs....................	2,345
Total	149,881

The bullock supplies have been derived from the undermentioned quarters :—

	Head.
Norfolk, Suffolk, &c.	5,400
Northern districts	500
Western and Midland	700
Other parts of England	1,200
Scotland	3,030
Ireland..................	100
Holland	1,390
Total	12,420

The remainder of the supplies, which was small, came from the immediate neighbourhood of the metropolis.

The prices of fat stock have ruled as under :—

Per 8lbs. to sink the offals.

	s. d.		s. d.
Beef ....from	2 10	to	4 8
Mutton	3 8	,,	5 0
Lamb	5 0	,,	6 0
Veal..............	4 0	,,	5 0
Pork	3 0	,,	4 2

We have again to state that the demand for all kinds of live stock has been extremely active, and in most instances, though the value of beef has undergone some large fluctuations, the quotations have been on the advance.

In order to give our readers an opportunity of forming their own conclusions respecting the comparative rates of value, we herewith give the following returns of the supplies and prices in Smithfield for June, 1843 and 1844 :—

June, 1843.

Supplies.

Beasts	11,980
Sheep and lambs	159,400
Calves	2,200
Pigs	2,800

Prices.	s. d.		s. d.
Beef ....from	2 10	to	4 0
Mutton	3 0	,,	4 4
Lamb	4 2	,,	5 4
Veal	3 0	,,	4 6
Pork	3 0	,,	4 0

June, 1844.

Supplies.

Beasts	13,290
Sheep and lambs	169,800
Calves	1,840
Pigs	2,600

Prices.	s. d.		s. d.
Beef ....from	2 2	to	4 0
Mutton	2 4	,,	4 0
Lamb	4 4	,,	5 4
Veal	3 2	,,	4 4
Pork	3 0	,,	4 2

Owing to the firmness in the demand, and the further slight improvement in the quotations, very large supplies of slaughtered meat have been received at Newgate and Leadenhall markets from Scotland, and various parts of England; but we regret to observe that, in consequence of the warm weather, very great losses have been sustained by the shippers — upwards of *ten thousand pounds worth* of meat being thus spoilt in the above markets during the first week of this month. Generally speaking, the demand has ruled active, on the following terms :—

Per 8lbs. by the carcass.

	s. d.		s. d.
Beef ....from	2 6	to	4 0
Mutton	3 0	,,	4 10
Lamb	4 10	,,	6 0
Veal	3 10	,,	5 0
Pork	2 8	,,	4 2

The extent of the receipts is shown in the annexed table:—

	CARCASSES OF			
	Beef.	Mutton.	Veal.	Pork.
Scotland	352	3,500	..	1,770
Yorkshire	180	3,250	..	1,916
Lincolnshire	80	500	..	190
Norfolk	130	720	..	190
Suffolk	145	670	..	240
Cambridgeshire	120	670	..	244
Essex	115	1,040	240	650
Surrey	144	1,150	430	870
Devonshire	20	160	70	150
Wiltshire	155	650	340	340
Other parts	200	1,000	700	590
Totals	1,641	13,310	1,680	7,150

BERKSHIRE.

No one can look attentively through the provincial reports of the *Mark Lane Express*, without observing the consentient evidence of that auspicious beauty of the weather which exists not only in south and north Britain, but also in Ireland. Our fine change came on suddenly, about the 10th; and on that day we first saw an ear of wheat emerging from its sheath. Subsequently, as the temperature became very great, and the heat sultry (from 76° to 82°, according to local observations), the stride made by vegetation was great and rapid. No sooner was an ear fairly exposed, than it showed bloom; the light and springy styles, with their anthers, playing with graceful evolutions. Fragile as are these delicate, fertilizing organs, their strength is prodigious, enduring all the buffets of the wind without injury; though it has been noticed, that a sudden morning frost, after rain, followed by a bright sun, is apt to render them inert, and, consequently, to produce barrenness in several of the florets.

But no such frosts occurred, or threaten to occur: yet the cold, and almost frosty visitation of May, when hail alternated with rain, produced some hints of that striping and discoloration of the leaf which was so universal in 1843. However, the injury is of no material consequence; and, as a whole, if the other corn districts can vie with what we observe in Berkshire, the wheat crop will be great.

After some beautiful showers on the 23rd and 25th of June, the corn must fill rapidly; and the harvest will even be early, should the weather continue so warm and sunny. Spring corn, particularly barley, is very fine and rich; but we observe, that where the ground is strong, and the plants too much drawn up in consequence of overthick sowing, they begin to lodge. We err much by this squandering of seed, and really fail in our avowed object; for wireworm and grub are never so courteous as to devour in thinning order: they attack in mass, and leave the land just as patchy as if the seed had been but partially sown. *Tillering* is the effect which a good husbandman ought to aim at; and it is proved, by reiterated experiment, that wheat sown by dibble in November, nine inches apart seed from seed, will produce from six to eighteen or more stems, each with an ear; some comprising from sixty to seventy seeds.

We think, also, from an experiment now in progress, that the electric buried wires of Dr. Forster induce a degree of intense verdure in the plant, *throughout a plot*, equal to that which is observed in those distinct small patches that exist in most corn-fields.

Hay-cutting progresses rapidly; and the crop, if not very heavy, will go far to supply the lack of last year's supply. Clovers are thin; and no wonder, since the season of 1844 was lost: but there are some magnificent crops of crimson trefoil.

Potatoes promise to be healthy, and most abundant: there are rarely any blanks where entire tubers are sown; and *small* ones are better than sets of one eye, taken from the largest potatoes.

Apples promised to be profusely plentiful; but the trees received a check early in June, just as the amazingly fine bloom was passing; and entire spurs became brown, and perished, blossom, leaf, and stem, even to their junction with the mother branch. This destruction was a most singular phenomenon; and we fear its effects will be found extensively disastrous.

June 27.

AGRICULTURAL QUERIES.

THE WIREWORM.

TO THE EDITOR OF THE MARK LANE EXPRESS.

SIR,—In your paper for May 26th I notice a letter by Mr. C. Hillyard, on the subject of wire-worm; in which he mentions his having defied the turnip-fly for many years to injure him. Now, in this neighbourhood crops of both turnips and rape are materially affected by its ravages, and if Mr. H. will be kind enough to publish, through the medium of your valuable paper, the means he adopts to prevent the ravages of the insect, he will not only confer a favour on me, but the agriculturists at large, I am yours, &c.,

Probus, May 30th, 1845. AGRICOLA.

BY A MIDLAND COUNTIES FARMER.

1st. Is foul lime from gas-works, through which the gas has been purified, good manure for all soils and all crops? If it is not, what are the soils, and what the crops, that it is best adapted for?

2nd. Is it best to use it directly from the works, and to plough it in, and how soon afterwards should the seed be sown—or ought it first to be mixed with rough soil, ditch scourings, &c., and, if so, what should be the proportion of soil, and how long should it lie after being mixed before it is used?

3rd. Is it best for a top-dressing or for ploughing in, and as a top-dressing is it best for wheat, barley, &c., or for grass land, clover, &c.?

4th. What are the chemical ingredients of this impure lime, and are its elementary constituents best fitted for nourishing wheat, barley, &c.—or pulse crops, as beans, peas, &c.—or roots, as turnips, potatoes, &c.?

Perhaps some scientific and practical agriculturist would, through the columns of the *Mark Lane Express*, oblige the querist with solutions to the preceding questions.

ANSWERS TO AGRICULTURAL QUERIES.

TO AGRICOLA.—FOR PREVENTING THE RAVAGES OF THE TURNIP FLY.

Mr. Hillyard, in the 4th edition of his "Practical Farming and Grazing," states, "that after numberless trials to prevent the ravages of the turnip-fly, the only way which I found at all successful is, to collect all the weeds I can on the farm, and lay them in heaps all round the field sown with turnips; on the plants coming up, and showing the least appearance of being attacked by the fly, the heaps to windward are set on fire, brimstone is put in the fire, and thus the strong sulphurous smoke, which is offensive to the insect, is wafted over the crop. If this is continued till the turnips get into rough leaf, they will be safe; but if before this the process is stopped for 5 or 6 hours together, in a fly-working day, the crop most likely will be lost; therefore, I have not scrupled on a Sunday to have the fires lighted before the morning, and also before the afternoon service. By annually adhering to this practice, I did not fail for fifteen years, of having a good crop of Swedes, without ever having, during that time, the necessity of a second sowing. When, some years ago, I mentioned my smoking fly-preventive scheme, after dinner, at our Society's annual meeting, I got a little smoked myself; but having had in 1835 a full crop of Swedes, which was a very rare sight, I had the satisfaction in 1836 to see my plan adopted on the farm of the noble patron of our Society, and on many other farms in the county."

LIME AND SALT.

We think the following quotation contains answers to the queries of our correspondent, "A Subscriber":—"Mr. Benett tells me, in an obliging communication, dated December, 1838:—'My wheat crop of this season has quite convinced me of the value of the mixture of salt and lime. I had it used on twenty-eight acres of wheat, in two situations; eighteen acres of high and dry land, and ten acres of low but well-drained land, both clover ley; twenty bushels of salt, and forty bushels of lime, per acre, were sown a week before the seed, by shovels, from the tail of a low cart. It was mixed dry and continued so in a heap nearly three months, and was turned over four or five times. The land, though in good condition, had no other manure, except one course, of the sheep-fold. The wheat was the strongest and largest in the straw of any I have ever seen. My turnips with salt and lime are quite as good as those with yard dung: I top-dressed a field of wheat, above fifteen acres, in the spring, the ridges being two perches wide; commencing, first ridge, 20 bushels of coal; second ridge, salt and lime; third ridge, 20 bushels of soot; and continued this throughout the field. The result was, that the salt and lime produced the largest grain by 1-30th, the heaviest grain taking similar quantities by 1-25th, and the brightest colour. The coal ashes were the second best, the soot third, though not much difference between the two latter.'"—*Cuthbert Johnson's Fertilizer, p.* 449.

APPLICATION OF SALINE MANURES TO POTATOES.

The writer of the report for the north-east of Scotland begs to inform "An Old Subscriber" that the mixture of sulphate of soda and nitrate of soda referred to in the report was applied "in the rows," or along the drills. The mixture may be put on either as a top-dressing around the plants when they are about two inches high, or it may be thrown over the dung and mixed with it in the drills before the sets are deposited. From several experiments which have been made in this part of the country, and likewise in Renfrewshire, it appears that the latter method is to be preferred. If "An Old Subscriber" intends to try these saline manures for potatoes, we would recommend the substitution of sulphate of magnesia for the sulphate of soda, as likely to give a still more favourable result. And here the dictates of theory have been confirmed by practice; for, as potatoes are known to contain magnesia in large quantity, it is reasonable to believe that it will be better to give magnesia along with nitrate of *soda* than to add an additional quantity of *soda* in the shape of the sulphate of that alkali. The following, then, may be recommended with some confidence, as being likely to give such an increase of produce as to afford a profitable return for the money expended in purchasing the manure:—

Nitrate of soda	1 cwt.
Sulphate of magnesia	1 cwt.

Mixed, for one acre.

The price of sulphate of magnesia (Epsom salts) varies in different parts of the country, and according to the quantity taken, from 8s. to 13s. per cwt.

Our Congleton correspondent, M. R., enquires what was the duty on *bones* for agricultural purposes, prior to the commencement of the present year, 1845?

In 1842, the duty on bones was reduced to 6d. per ton; the duty, previous to that time, had been one per cent., *ad valorem.*

TOTTENHAM GARDEN ALLOTMENT SOCIETY.—The welfare of the labouring classes taken either in connexion with the agricultural interests of this country, or as one of the sources, and perhaps the chief source, from whence flows our national prosperity, must be a subject of particular interest to every true lover of his country, to none more so than to ourselves, connected as we are both by interest and by feeling with agriculture, and the labours of the sons of the soil. These remarks will at once explain to our readers the pleasure we have experienced by the following statement, which we believe to be substantially correct, and which we have extracted from the third half yearly Report of the Committee of the Tottenham Garden Allotment, forwarded to us by Mr. Dean, who takes a most active interest in the society:—"Your Committee have sincere pleasure in laying before you this their third half yearly report, because enabled to inform you that what they had hoped and promised at the formation of the Society, has, in the practical working of the measure, been more than realised, proving beyond all question that, although the last winter was of almost unprecedented duration, there was a less amount of distress among the labouring classes than was ever before known in Tottenham within the memory of the oldest man living, resulting mainly, as your committee believe, from the timely aid which the produce of the allotment gardens afforded them; and in proportion as that distress has been diminished morals have improved, and peace and tranquility reigned in a relative degree. The state of the gardens prove the industry of the tenants, and the reasonable hope of further reward encourages perseverance, hence the great value of the prizes which your bounty enables the Committee to distribute, and hence the pleasure which you must receive from contributing your mite towards the maintenance of a system so beneficial in its results, so God-like in its character, blessed in the giving and blessed in the receiving, encouraging diligence and good conduct in the old, and promoting habits of industry in the young, so essential to their future welfare and prospects in life."

REVIEW OF THE CORN TRADE

DURING THE MONTH OF JUNE.

Since our last, Mr. Villiers has again brought forward his annual motion for a total and immediate repeal of the corn-laws. Though this step on the part of the member for Wolverhampton met with the same fate as his previous attempts on the same subject, viz., a rejection by a very large majority, still there are circumstances connected with the debate calculated to create doubt respecting the stability of the existing laws. As far as the opposition is concerned, there is little or no reason for fear; but the sentiments expressed by the premier and Sir James Graham, on the occasion, were so directly in favour of free trade as to afford ample cause for apprehension. The following extract from the speech of Sir Robert Peel will sufficiently prove what are his ultimate views, and after the delivery of which in the House of Commons, we deem it totally impossible for the agricultural body to place further dependence in even that remnant of protection now afforded them being long continued, if its maintenance must depend on the present ministry.

The passage alluded to runs thus:—"I will not say, I do not say, that agriculture ought to be exempted from the gradual application of those principles which we are applying to other branches of industry. Nay, further, I will own that *I doubt whether we can or ought to attempt to vindicate the maintenance of protection on the ground of rendering ourselves independent of foreign nations.* It would be of very great importance—I should rejoice to see a large portion of our supply of corn derived from our national resources. It would be an advantage if such were the case, an advantage commercially, socially, and morally, were agriculture in such an improved state that we could safely rely on our own internal resources for a great part of our supply. *But to hope to make ourselves independent of foreign corn is quite out of the question.* Sir, I have tried to show during the three or four years during which the government has been in office that they have uttered commercial laws consistently with sound principles, not excepting the laws placing restrictions on the import of foreign corn; I have tried to show that in no instance and in no respect have they increased protection. You say that they have not carried their principles far enough. But *every act which they have carried has been an act tending to establish principles which I believe to be sound only, namely, those embodying the gradual abatement of purely protective duties. I must also claim for them the liberty of continuing the application of these principles. I believe them to be sound. I thought so in 1842, and the experience of the intervening period has but served to confirm my impression.*"

It would be a difficult matter for any man to state more definitely than Sir Robert Peel has, that the maintenance of the corn-laws is not to be thought of; his plan evidently is to make periodical changes all in favour of the manufacturers and prejudicial to the farmers, and it is now abundantly evident that the occupiers of the soil have nothing to expect from the present ministry.

We gladly turn from this distressing subject to one of a more gratifying nature. At the period we last wrote, the weather was, and had for some time previously been, of a character to give rise to serious uneasiness respecting its effects on the growing crop of wheat; but the month of June came in favourably, and a wonderful and most gratifying improvement was speedily wrought in the appearance of the country.

Up to the close of May vegetation was greatly retarded in consequence of the want of genial warmth, and the wheat plant was at least ten days more backward than at the same period of last year; the combination of heat and moisture experienced since then has, however, done much to compensate for the lateness of the spring, and though a very early harvest cannot be expected, a hot dry July would probably bring the crops to maturity at a much earlier period than was at one period deemed possible. The mischief done by the wire-worm, of which so much was said a month or two back, seems to have been a good deal exaggerated; and it is now generally admitted that the prospects as to yield are sufficiently encouraging to lead us to calculate on a fair average.

So much, however, still depends on the weather, that it would be worse than useless to enter into any predictions; and all we wish to be understood to express by the foregoing remarks is, that there is quite sufficient plant on the ground, notwithstanding the trying character of the winter and spring, to make an average crop, if the weather should prove propitious for bringing it to maturity, and a favourable time be experienced for the ingathering.

The sowing of Lent corn having this spring been accomplished under the most auspicious circumstances, and the abundance of rain which subsequently fell having afforded the requisite moisture to insure speedy germination, barley and oats as well as beans and peas came up very evenly.

The extreme heat of this month might have proved somewhat prejudicial to these crops had we not been favoured with occasional showers; but having from time to time been plentifully supplied with moisture, their growth has been exceedingly rapid. Barley is in every point of view a very promising crop, and where oats are grown they are also well-spoken of; whilst beans and peas wear as healthy and vigorous an appearance in all parts of the Kingdom as could possibly be desired. In addition to the generally auspicious promise of the grain crops, farmers have also reason to be well-satisfied with their produce of hay. In the Southern counties a large proportion of the latter has already been carried in excellent order, and we hear the most satisfactory accounts both as to quantity and quality.

The improvement which has taken place in the appearance of the wheat plant since the close of May has had some influence on the trade in that article; but the fall in prices has not been so great as might have been expected. Various causes have been in operation to counteract the influence of the generally favourable weather, and not the least of these has been the belief that the stocks have been reduced into so small a compass as to render it doubtful whether much old wheat will remain in the hands of the growers at the time of harvest. In how far this opinion is well founded it is difficult to determine; but there can be no doubt that merchants, millers, and dealers are almost bare of stocks, and that the farmers must, therefore, for some time have the entire command of the markets. This knowledge has rendered them less eager to part with their property, hence the somewhat firm tone which has characterized the trade throughout the month. The abatement from the highest point attained in May has not exceeded 2s. per quarter, and even that decline has been very unwillingly submitted to: what effect a continuance of such auspicious weather as that lately experienced might have on the minds of the holders of wheat is still to be seen; but should anything occur to give rise to the slightest apprehension as to the probable result of the harvest, the value of wheat would in all probability be materially enhanced. It is, therefore, by no means surprising that farmers should reflect before they make up their minds to submit to lower terms; and, on the whole, we are inclined to think that no further fall of importance from present rates can well occur.

English barley appears to be well-nigh exhausted, and for weeks past the supplies brought forward have been scanty in the extreme: owing, however, to the limited consumption of this grain during the summer months (when the maltsters rarely buy, and comparatively little is required for feeding purposes), the deliveries from the growers, trifling as they have been, have nearly kept pace with the demand, and though prices have on the whole rather tended upwards, no quotable alteration has occurred either in the agricultural districts, or at the chief consuming towns.

Had it not been for the enormous importation of barley from the North of Europe in the autumn of last year, there can be no doubt that our own producers, would have realized much more remunerating rates; and even now the stocks left in granary at several of the principal maritime ports, though greatly reduced, are sufficiently large to prevent any rally taking place in the value of the article. Supplies from abroad still continue to arrive; but since the duty rose to 8s. per quarter on the 29th of May, most of the cargoes have been warehoused in bond, by which the pressure has been somewhat lessened, and we are disposed to believe that prices have at length touched the lowest point.

The scarcity of oats in all parts of England has caused a gradual and progressive advance in their value, and this article is now actually dearer in many of the counties from whence supplies are usually sent to London, than at Mark Lane. Under these circumstances, it may easily be conceived that but few oats of home growth have been brought forward; indeed, buyers from the agricultural districts have appeared at many of those markets which in ordinary years they assist to supply, to secure the requisite quantity for the feed of their stock; and unless Ireland sends us a much larger quantity than the reports from thence would lead us to expect, or the foreign arrivals increase materially, the upward movement is likely to continue. By the latest official account, it appears that on the 5th June there were only 73,660 quarters of oats in bond in the kingdom; and it is an undoubted fact that the stocks of British-grown corn in the hands of dealers are trifling in the extreme. Latterly the averages have begun to show the effect of the rise which prices have undergone, the last general weekly return for the Kingdom being 27s. 7d. per qr. To reduce the duty below 6s. (the present point), it requires an aggregate average of upwards of 23s. per. qr.; and though importers have hitherto entered the cargoes received from abroad at the existing rate, it is not improbable that they may ere long speculate on the possibility of a fall, and land in bond, with a view of furthering that object.

Beans have now become exceedingly scarce, and notwithstanding the universally-admitted fact that the growing crop leaves nothing to be wished for, and the smallness of the consumption at this season of the year, prices have steadily advanced since our last all over the kingdom. The general average price has, since the beginning of May, risen 2s. 6d. per qr., and we have now an aggregate average for the kingdom of over 37s. per qr. The duty has consequently receded to 5s. 6d., with a prospect of its being still further reduced. That our continental neighbours have no beans to spare, is tolerably evident, as the high value of the article in this country, and the low duty, must have proved strong inducements to consign; notwithstanding which, scarcely any supplies have reached us from the Baltic, the foreign receipts having consisted of a few cargoes from Alexandria into London and Liverpool. These must, we think, realize the importers a good profit. If so, they are the only article by which any good has been done.

The stocks of peas appear to have become equally reduced as those of beans; and with only a retail demand, principally for feeding, enhanced terms have been realized. Of maple or dun peas, a sample now rarely makes its appearance at any of the country markets, and the few which have been brought forward from time to time have sold at 37s. to 38s. per qr. The quantity of foreign held at the leading maritime ports is trifling, and on the 5th instant there were only 9,616 qrs. in bond in the entire kingdom. The duty has recently been reduced to 5s. 6d. per qr., below which point it is not likely to fall at present.

Though there has been no very marked difference in the position of the trade at Mark Lane this month, nearly all the principal markets having been influenced alike by the weather, and the other causes referred to in the forgoing part of this article, still we shall not depart from our usual plan of giving a separate notice of the proceedings in the metropolitan market. The arrivals of wheat coastwise into London have, with the exception of one week, been moderate. The threatening appearance of the weather towards the latter part of May, and the unfavourable rumours which were then in circulation respecting the aspect of the plant, induced several of our principal millers to buy rather largely free on board at some of the ports from whence the produce of Lincolnshire and Cambridgeshire is shipped. The greater part of what was then purchased reached its destination between the 2nd and 9th of June, upwards of 15,000 qrs. of wheat having arrived in the port of London during that period. Previous to the latter date, a very great improvement had occurred in the weather, which, with the receipt of so large a supply, caused prices at Mark Lane to recede 1s. to 2s. per qr. Subsequently confidence was in a great measure restored; and from that time up to Monday, the 23rd instant, the value of wheat remained perfectly stationary; then, however, a further abatement of 1s. per qr. occurred. The quantity of wheat exhibited at Mark Lane, by land carriage samples from the home counties, has throughout the month been small; and the farmers in Essex, Kent, and Suffolk either have but little remaining on hand, or feel satisfied that a better time may arrive between now and harvest for realizing: had it not been for the liberal nature of the arrivals from more remote counties, prices would unquestionably have been supported. Our millers are, notwithstanding the receipts alluded to, almost bare of stock, and the consumption of flour being still great, a continual good demand may be calculated on. The transactions in free foreign wheat have been on a comparatively restricted scale; this has been partly caused by the scarcity of really good qualities on the market, and the high terms at which these have been held. For serviceable high mixed Dantzic as much as 58s. per quarter has been asked, and the finer kinds of red wheat have been held at corresponding rates. The actual wants of the millers have, however, compelled them, from time to time, to take off small quantities; and though English wheat has, as already remarked, fallen about 2s. per quarter from the extreme point attained in May, holders of foreign refuse to lower their pretensions. The arrivals from abroad have hitherto been unimportant, and it will be observed, from our notice of the foreign markets at foot, that there is no probability of large supplies for some time to come, quotations being, according to the latest advices, still relatively higher at the Baltic ports than in this country. We, nevertheless, remain of opinion that, sooner or later, rather important shipments will be made from that quarter to Great Britain, more particularly as the demand from Belgium and Holland, which had previously assisted to keep up prices all over the north of Europe, has lately in a great measure subsided.

In the London market, the inquiry for bonded wheat for shipment to the countries named, which, towards the close of May, and in the early part of the present month, was sufficiently active to occasion a rise to take place of about 5s. per quarter, has entirely ceased, and the inclination to make speculative investments having also terminated, scarcely anything has for some weeks been done in parcels under lock. When the excitement was at its height, as much as 42s. per quarter was paid for good high mixed Dantzic; since then, so very little has been done, that quotations have become perfectly nominal; but there can be no doubt that holders would gladly have sold at considerably reduced terms if buyers had manifested the least inclination to purchase.

The stocks of wheat in bond are not large, there being, on the 5th June, 320,281 quarters in the United Kingdom; against which we had last year at the same period 411,399 quarters. Before closing our remarks on the wheat trade, we must direct attention to the increased supplies which have recently reached this country from Australia; not that arrivals from that distant quarter are a novelty, for small parcels have reached this country at various times for years past; but latterly the receipts have been in much larger quantities, and it would appear that we must calculate on a progressive increase in the supplies from the colony. The quality of this wheat is very superior, and some of the parcels lately received weigh as much as 65 lbs. per bushel. The prices realized have varied from 55s. up to 63s., and we believe that for one very fine lot a still higher rate was obtained.

The town millers have experienced considerable difficulty in effecting sales of flour at remunerating rates, the price of the raw material having, during the greater part of the month, been higher than that of the manufactured article. The top quotation has been nominally 45s. per sack; but it has been impossible to induce the bakers to pay that rate, or even 42s. per sack. Ship qualities have met a steady sale at 32s. to 33s. One cargo of flour has already arrived from Montreal, and further receipts from the same quarter may be shortly expected.

The arrivals of English barley into London have been scanty in the extreme; small, however, as has been the supply, it has proved adequate to the demand, the quantity of duty-paid foreign remaining on the market having prevented anything like scarcity being felt. In point of price we have little or no alteration to notice, but within the last week or two holders have displayed somewhat more firmness.

The transactions in malt have been on a strictly retail scale; sellers have, however, insisted on quite previous terms, and choice qualities have, if anything, rather risen in value.

The receipts of oats from our own coast and Scotland have been very small, and until about the 20th of the month comparatively few cargoes came to hand from Ireland. Since then we have had a fair quantity from the latter country, which, with a good foreign supply, has enabled dealers to replenish the almost exhausted stocks. Up to the 23rd inst. prices gradually crept up; but on that day a slight reaction took place, secondary and inferior qualities being then obtainable about 6d. per qr. below the highest point. Nearly the whole of the foreign oats hitherto received have been from the near ports; next month, however, some of the Riga and Archangel shipments will probably reach this country, and should increased receipts from Ireland come forward about the same period (which is not improbable), a temporary depression might perhaps take place.

Beans have, throughout the month, commanded high rates at Mark Lane; good ticks have sold readily at 34s. to 36s., and Harrow-ticks at 37s. to 39s. per qr. The few cargoes of Egyptian received ave been held at 27s. to 28s. per qr. in bond. The quantity under lock on the 5th June consisted of 67,100 qrs. in the kingdom.

Peas have come very sparingly forward. Maple and grey have been a good deal inquired for; the few parcels which have appeared have brought 38s. to 39s., and in some instances even 40s. per qr. White Peas have been comparatively neglected, but fine boilers have brought 42s. In foreign, whether free or in bond, there has been scarcely anything doing.

A similar favourable change of weather to that experienced in this country at the close of May appears to have taken place about the same time all over the north and east of Europe; still, up to the present period, the reports from the countries bordering the Baltic do not speak well of the appearance of the wheat crop. The dull advices from Great Britain, and the effect which is invariably produced by fine weather on the minds of holders, have, however, caused our continental neighbours to become somewhat more reasonable in their pretensions, and at several of the lower Baltic ports the value of wheat has fallen 3s. to 4s. per qr. from the extreme rates of May.

The most recent accounts from Rostock state that sellers had consented to accept 29s. per qr. free on board; notwithstanding which, comparatively few buyers had come forward. At Stettin, the trade had also become exceedingly languid, and prime qualities of Uckermark, weighing 62lbs., which had at one time commanded 32s. to 33s. per qr., had receded to 30s. per qr.

At Danzig, business appears to have been very little influenced by the reports from other places, and with decidedly discouraging advices from Great Britain, Holland, and Belgium, and a great improvement in the weather, sellers of wheat had not alone refused to accept less money, but had actually insisted on enhanced terms. A temporary fall of 1s. to 2s. per qr. took place there early in the month, but on the 17th inst. this was again recovered, fine high-mixed qualities being then held at 40s. per qr. free on board. The total shipment of wheat from Danzig, during May, amounted to 2,790 lasts, of which 471 lasts were for London. 430 for Liverpool, 676 for other British ports, 279 for the Channel Islands, and the remainder to Holland, Belgium, &c. Freight was then 4s. to London, and 4s. 6d. to Glasgow.

Letters from Hamburg state that very few bargains for wheat had been closed, though sellers had manifested a disposition to facilitate business; good to fine qualities of red had been freely offering at from 30s. to 33s. per qr. free on board, without exciting much attention. Barley appears to have become scarce there, particularly Saale; but the inquiry had been very slow, and no advance had occurred in prices. Oats had been inquired for for export to England, and several contracts to ship from Danish and Swedish ports had been closed at 13s. to 14s. per qr. free on board.

From the Mediterranean the accounts are not of the slightest interest; the letters from thence scarcely make any mention of the appearance of the crops, from which we infer that there is not much to complain of.

The intelligence received by the last steamer from the other side of the Atlantic is of much the same character as the previous advices from thence. In the markets of the United States Flour had rather risen than fallen in value, and at New York the article was still quoted 4½ d., equal to 19s. per brl. In Canada the tendency had been downwards, good brands having been sold at Montreal at 22s. to 23s. per brl. The shipments to England would, it was stated, be less than last season; but on these reports we are not disposed to place much reliance.

CURRENCY PER IMPERIAL MEASURE.

JUNE 23.

WHEAT, Essex and Kent, new, red	50	53	White	53	56
Old, red	50	54	Do.	56	—
RYE, old	32	34	New	56	—
BARLEY, Grinding, 22 28 Malting	30	32	Chevalier	33	—
Irish	24	26	Bere	25	—
MALT, Suffolk and Norfolk	58	63	Brown	56	60
Kingston and Ware	60	—	Chevalier	65	—
OATS, Yorksh. & Lincolnshire, feed	23	24	Potato	24	26
Youghall and Cork, black	22	—	Cork, white	23	—
Dublin	22	23	Westport	23	24
Waterford, white	22	28	Black	22	—
Newry	24	25			
Galway	20	21			
Scotch, feed	24	26	Potato	25	28
Clonmel	23	24	Limerick	23	25
Londonderry	23	24	Sligo	23	24
BEANS, Tick, new	38	40	Old, small	40	42
PEAS, Grey	38	40	Maple	38	40
White	38	40	Boilers	38	40

FLOUR, Town-made 42 Suffolk 34 35 per sk. of 280 lbs.
Stockton and Norfolk 34 35 Irish 36 37

SEED, Rape 27*l.* 28*l.* Irish .. 22*l.* 26*l.* per last.
Linseed, Baltic ..38 44 Odessa 45 47
Mustard, white 12 15 brown 10 12 per bush.

FOREIGN GRAIN AND FLOUR IN BOND.

WHEAT, Dantzic	40	—	fine 42		
Hamburg	32	34			
Rostock	33	36			
BARLEY	19	23			
OATS, Brew	17	18	Feed	14	17
BEANS	—	21	29		
PEAS	28	32			
FLOUR, American, per brl	19	—	Baltic	18	—

IMPERIAL AVERAGES.

Week ending	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.	
May 10th	45	10	30	5	21	6	31	4	37	1	36	8
17th	45	9	30	0	21	9	29	7	37	3	37	0
24th	45	9	30	1	21	11	31	0	37	5	37	4
31st	46	3	29	5	22	5	30	1	37	2	36	7
June 7th	47	7	30	2	22	2	33	0	38	0	38	1
14th	48	2	30	3	22	8	31	4	38	1	37	0
Aggregate average of the six weeks which regulates the duty.	46	7	30	1	22	1	31	1	37	6	37	1
Duties payable in London till Wednesday next inclusive, and at the Outports till the arrival of the mail of that day from London	20	0	8	0	6	0	10	6	5	6	5	6
Do. on grain from British possessions out of Europe	4	0	0	6	2	0	1	6	2	[illegible]		0

COMPARATIVE PRICES OF GRAIN.

WEEKLY AVERAGES by the Imp. Quarter, from the Gazette, of Friday last, June 20th, 1845.	s. d.	AVERAGES from the corresponding Gazette in the last year, Friday, June 21st, 1844.	s. d.
Wheat	48 2	Wheat	55 9
Barley	30 3	Barley	31 10
Oats	22 8	Oats	22 6
Rye	31 4	Rye	32 4
Beans	38 1	Beans	36 11
Peas	37 0	Peas	34 1

PRICES OF SEEDS.

June 23.

Nothing of the slightest interest transpired in the Seed trade, and we have no alteration to notice in quotations.

English Cloverseed, red, 45s. to 50s., extra, 52s. to 55s.; white, 60s. to 62s., extra, up to 68s.; Foreign, red, 40s. to 48s., extra, 50s.; white, 50s. to 62s., extra, 75s. per cwt.

Cloverseed nominal at present.

Linseed, English, sowing	52	58			
Baltic	—	—	crushing 40	45 per qr.	
Linseed Cakes, English	11*l*. 0s. to 11*l*. 5s. per 1000				
Do. Foreign	7*l*. 7. to 7*l* 10s. per ton.				
Mediter. & Odessa	40	44			
Carraway	44	46	new .. 48	50 per cwt.	
Coriander	12	18 per cwt.			
Mustard, brown, new	8	12	white .. 12	14 p. bush.	
Rapeseed, English, new	26*l*.	27*l*. per last.			
Hempseed	35	38 per qr.			
Trefoil	17	24	old .. —	new —	
Tares, Spring	6s. 6d. to 7s. 6d.				
Tares, old	—	—	new —	— per qr.	
Canary, 47 48 per qr. fine 51s.					
Rye Grass, English	—	—	Scotch —	— nominal.	

POTATO MARKET.

SOUTHWARK, Waterside, June 23.

The supply to this market for the season is unusually large, and the weather of late has been very fine and productive. The town markets are now abundantly supplied with Peas and vegetables, and the new Potatoes are earlier and better than could have been expected some time back. The trade at the waterside is excessively dull, most of the samples being affected by the dry rot; in consequence of which many lots are unsaleable. The demand is limited, even for the best samples, and the trade is excessively heavy at the following prices:—

	s. s.		s. s.
York Reds	50 to 80	Kent & Essex Kidneys	50 to —
Perth do.	40 to 50	Wisbeach Kidneys	40 to 50
Late Devon do.	70 to —	Guernsey Blues	40 to 50
Jersey Blues	40 to 50	Prince Regents	25 to 40

PRICES OF HOPS.

BOROUGH, Monday, June 23.

Betting on the Hop duty is very slack here, and instead of giving the lead to the provinces, the backers seem more inclined this year to take it from them; so that their estimate of the probable amount is about the current one here. The accounts from the Plantations are exceedingly favourable on the average, and this checks business.

WORCESTER, June 21.—We have had a steady demand for Hops to-day and during the week, but prices have advanced but slightly, although the reports of blight are fully confirmed, the attack having extended nearly throughout the whole plantation, and in many gardens the bine is already literally covered with vermin. The plant however is growing, and with favourable weather may yet recover from the attack. Our prices are now at 7*l*. to 7*l*. 7s. per cwt.

EAST RETFORD, June 18.—Not having hitherto noticed the state of the hop plantations in the North Clay district during the present year, we may premise that during the early portion of the late backward spring the bine made but little progress, and great complaints existed amongst the planters of the unevenness which existed, and of the probability that the crop (if one should be gathered) would turn out the same. In several of the plantations which lay in low and exposed situations, it was found that considerable quantities of dead stock existed, which of itself would be detrimental to a full crop being ultimately realized. This latter state of things yet exists, but the former complaints appear to be entirely done away with. Within the last fortnight or three weeks this fickle plant has abundantly participated in the glorious weather with which a kind Providence hath blessed us; and although there has been a fair sprinkling of fly, yet the bine has scrambled up the poles in utter defiance of this their deadliest enemy, and at the present moment we never saw a fairer prospect of a crop than now presents itself through the length and breadth of the district. The bine itself is luxuriant and of a capital colour, whilst the foliage is more gross and fully developed than we ever before recollect to have seen it. During the last ten days, with the thunder showers and most extraordinary warm weather we have experienced both by night and day, the growth of the bine has been so rapid as to outstrip belief, and even to astonish the planters themselves. We have no desire to lead our readers astray by over-drawing the picture, knowing, as we well do, that, like Jonah's gourd, it is liable to "come up in a night and to perish in a night." We only speak of time present, being well aware that it would be futile to do otherwise; yet present appearances are greatly in favour of a crop, and we do not wish to disguise it. At the same time speculation is afloat, and the duty of the kingdom is fully backed at 165,000*l*. In this district very few old hops remain on hand; only a stray bag is here and there to be met with, and where they are found to be rather colouring command 8*l*. to 9*l*. per cwt. Fewer old hops were never known in this district since hop planting commenced.—*Doncaster Gazette.*

WOOL MARKETS.

BRITISH.

LEEDS, June 20.—We have not any alteration to report in this branch of trade during the present week. The demand is steady, and prices are stationary.

WAKEFIELD, June 20.—There is no variation in the value of wool or in the state of the market this week. The small stock in the market of some sorts of light wool has caused consumers to begin the new market to the growers at a higher range of prices than have recently ruled here.

YORK, June 19.—We have again to report a good show of wool at this day's market, for which there has been a very fair demand; nearly all was sold at prices bearing much on those of last week's.—Super hog, 15s.; hog and ewe, 13s. 6d. to 14s. 6d.; locks and cots, 8s. 6d. to 10s 6d. per stone.

PONTEFRACT, June 14.—There was part wool at our market to-day, with a thin attendance of buyers from the clothing districts; prices may be quoted 6d. per stone cheaper, except for the finest samples.

HULL WOOL MARKET.—On Tuesday last the supply was larger than on either of the preceding market days; there were plenty of buyers, and all sold at fully last week's prices, excepting one small parcel, the holder of which stood off, as he has done for several years, for a higher price than was offered.

LIVERPOOL, June 21.

Scotch. — There continues the same retail demand for Laid Highland Wool that we have had to report for some weeks past. The stocks are, however, light, and prices, consequently, well supported. White Highland is still neglected. There have been a few inquiries for good crossed and Cheviot Wool, and a few transactions to clear off stocks before the new year's clip comes in.

		s.	d.		s.	d.
Laid Highland Wool, per 24lbs		9	0	to	9	6
White Highland	do	12	6		13	0
Laid Crossed	do.. unwashed....	10	6		12	0
Do.	do..washed	12	0		13	6
Do. Cheviot	do. unwashed	11	0		12	9
Do.	do..washed	13	9		17	9
White Do.	do................	22	0		26	0

Foreign.—We have two arrivals from the colonies this week, and we anxiously look for two more. when our public sales will be announced. The demand for all kinds of fine Wool continues good; and, if anything, we have had more doing in laid, and at fully late rates.

FOREIGN.

The accounts from the manufacturing districts are satisfactory; and from the continent we hear of the Wool fairs going off briskly.

Accounts of June 11 from Stralsund (Germany) state that the Wool market had gone off well. A large proportion had previously been purchased by parties who visited the agricultural districts for the special purpose. The quantity of wool brought to market was 3,200 cwt. Prices ranged at about 14 rix dollars per stone, some sales being made under and others rather over that mark. Generally the quotations were 2 to 3 dollars per stone higher than last year. The washing was very good in most instances, and, so far, much superior to that of last year.

From Stettin, under date of June 13th, we learn that business opened well, and before the fair commenced nearly all the Wool was sold; although not allowed to be weighed off until the 16th, prices were fully up to the previous currency, mid. being the principal description at market, which realized last year 55 to 60 rix dollars, was sold at 65 to 75 rix dollars per cwt. at the fair now under review, and the average advance was 12 to 15 dollars per cwt.; and even, in a few instances, rather more; while fine qualities only got up 8 to 10 per cent.

Intelligence of June 10th, from Landsberg (au der W.), apprises us of the Wool fair having proved exceedingly favourable. The supply was about 20,000 cwt., and had a very quick sale, so that at the date above very little remained unsold. Good mid. Wool was in especial demand, and of this the supply chiefly consisted. Fine was 85 to 90 rix dollars, fine mid. 72½ to 77½, and ord. 50 to 57½ rix dollars. Lower prices were paid in very few instances, and only for small parcels, and the rise, compared with last year's corresponding fair, was 12 to 15 rix dollars. The wools received were principally from Marh, Pommerania, a portion of the Grand Duchy of Posen, and the province of West Prussia, and were all well got up.

From Posen we learn under date of the 10th inst. that the quantity of wool offered was 3,087 cwt. Fine sold at 60 rix dollars and upwards, mid. at 30 to 60 rix dollars, and ord. up to 30 rix dollars. The purchases were by French, Belgian, Rhenish, and Berlin houses. The Englishmen present bought very little.

Accounts of July 12 from Dresden state that 20,274 stone were at market. Very superior sold at 28 rix dollars, the average was 24 to 27 rix dollars, and mid. 16 to 19 rix dollars, being higher than last year.

LEEDS, June 20.—We have only to confirm our last report. A steady business has been done in foreign wools, considering the indifferent choice that is yet in the market, and prices are very firm.

AUSTRALIAN WOOL MARKET.—The "General Hewett" bringing the conclusion of the October sales, and the state of the market up to the end of the month, has caused a declension in price on all low descriptions to the extent of 7½ per cent, while the better sorts remain at from 1s. 3d. to 1s. 4d., but do not find a very ready market. Shipping being scarce has been the means of preventing purchasers from being over anxious to accumulate a stock. There has been an immense quantity of wet wool received during the week, and it is necessary that the bales should be well examined before shipping, which can only be done by opening them, as the carriers invariably dry them outside before they reach Sydney. The accidents that have occurred should be sufficient warning to the captains and owners to be careful in cases where sent direct from the interior. The market having fallen in London, and more goods arriving here, have affected the exchange, and 5 per cent. discount is readily given for advances against wools, being an improvement of 2½ per cent. during the last six weeks.—*Sydney Herald, Feb.* 14.

TIMBER.

	£	s.	d.		£	s.	d.
Baltic Timber, per load of 50 cubic feet..	3	15	0	to	4	5	0
Yw. Deals, per standard hundred .	16	10	0	..	19	0	0
Deck Deals, per 40 feet 3 in.	1	1	0	..	1	7	0
Crown ditto ———	0	0	0	..	0	0	0
Pipe Staves, per mille	95	0	0	..	110	0	0
Lathwood, per fm. of 4 feet........	7	10	0	..	8	0	0
Petersburgh, Riga, and Archangel .... Yw. Deals, per stand. hundred ..	17	0	0	..	19	10	0
White............................	15	0	0	..	15	10	0
Yw. Battens......................	18	0	0	..	19	10	0
Riga Logs, for 18 feet cube	5	0	0	..	5	12	6
Stettin Staves, per mille of pipe..........	100	0	0	..	112	10	0
Gothenb. Yw. Deals, per 100 12f. 3in. 9in...	24	16	0	..	27	0	0
White ditto...... ——	23	10	0	..	25	10	0
Yw. Battens, per hd. 12 ft. 2½ in. 7 in.	15	0	0	..	17	10	0
Christiania Yw. Deals, per hd. 12ft. 3in. 9in.	29	10	0	..	30	0	0
White.... ——	27	10	0	..	28	0	0
Yw. Battens, per hd. 12 ft. 2½ in. 7in.	0	0	0	..	0	0	0

PRICES OF MANURES.

Subjoined are the present prices of several sorts of Manure:—

Hunt's Bone-dust, —s. per qr.
Hunt's Half-inch Bone, —s. per qr.
J. T. Hunt's Artificial Guano, 9*l*. per ton
Hunt's Stuff Graves, 3s.6d. cwt.
Rape Dust, 6*l*. 6s. per ton
Rape Cake, 6*l*. per ton
Rags, 4*l*. to 4*l*. 10s. per ton
Graves, 6*l*. 10s. per ton
Gypsum, at the waterside, 35s. per ton
Agricultural Salt, 32s. per ton
Carbon, 12s. per qr.
Humus, 14s. per qr.
Soap Ashes, 10s. per ton
Patent Disinfected Manure, 13s. 6d. per qr.
Highly Concentrated Manure, 30s. per qr.
Nitrate of Soda, 16s. per cwt.
Nitrate Potash (saltpetre), 25s. to 26s. per cwt.
Petre Salt, 4*l*. 10s. per ton
Willey Dust, 4*l*. 4s. per ton
The Urate of the London Manure Company, 4*l*.4s. per ton
New Bristol Manure, 8s. per qr.
Hunt's new Fertilizer, 13s. 4d. per qr.
Preparation for Turnip Fly, 10s. 6d. per pakt., sufficient for three acres
Chie fou, 21s. per cwt.
Wolverhampton Compost (Alexander's), 12s. per qr., subject to carriage to London, or forwarded from Wolverhampton
Guano, Peruvian, 10*l*. 10s.; Bolivian, 9*l*.; African, 6*l*.6s. to 7*l*. 10s. per ton, according to analysis
Potter's Guano, 10*l*. per ton.
Muriate of Ammonia, 20s. to 24s. per cwt.
Muriate of Lime, 6s. per cwt.
Clarke's Compost, 3*l*. 12s. 6d. per hhd., sufficient for three acres
Alkalies, 28s. and 42s. per cwt.
Soda Ash, 14s. to 16s. per cwt.
Chloride Lime, 28s. per cwt.
Sulphuric Acid, 1½d. per lb.
Sulphur for Destroying Worm on Turnips, 12s. per cwt.
Sulphate Soda, 6s. per cwt.
The Liverpool Abattoir Company's Animalized Manuring Powder, 2*l*. 10s. per ton
Manure Powder, 16s. per qr.
Boast and Co.'s (Bow) Inorganic Manures, from 6s. to 11s. per cwt., according to crop
Boast's Guano, 9*l*. 9s. per ton
Fothergill's Gypsum, 35s. per ton.
Fothergill's Phosphate of Lime, 14s. per cwt.
Superphosphate of Lime, 8s. do.

PRICES OF SHARES.

Shares.	Div. last half year	RAILWAYS.	Price per Share.
		Aberdeen... 2½l pd	4⅛ a 4
24,000§		Armagh, Coleraine, Portrush 25l sh 1⅞l pd	2¼ a ⅜
9,500	2l 0s p sh	Birmingham and Gloucester 100l sh pd	135 a 2
10,000	10s	Do. New, iss. 7½ dis... 25l sh 17½l pd	
		Ditto Half Shares... 50l sh 3l pd	4 a ½
9,500		Brighton, Lewes, & Hastings, 50l sh 20l pd	26 a ⅞
15,000	1l 8s p sh	Bristol and Exeter ... 100l sh 70l pd	94 a 6
		Ditto New... 2l pd	10½ a 12
6,610	12s p sh	Bristol and Gloucester .. 50l sh 30l pd	
36,000		Caledonian... 50l sh 5l pd	11⅞ a 12⅛
50,000		Cambridge and Lincoln... 25l 1½l pd	4⅛ a ⅜
42,000		Chester and Holyhead... 50l sh 15l pd	16⅝ a ¼
		Chichester and Brighton.. ... 10l pd	28 a 7½
50,000		Churnet Valley... 20l sh 2l pd	5⅛
		Covntry, Bedwrth, Nuneaton 25l sh 1¼l pd	5 a 1¾
		Coventry and Leicester ... 1½l pd	2 a 1⅞
		Cornwall... 3l pd	4½ a ¾
		Direct Northern... 50l sh 2½l pd	3⅜ a ½
35,000		Direct Norwich... 20l sh 1l pd	
10,000		Diss, Beccles, & Yarmouth. 25l sh 1½l pd	1¾
19,000		Dublin & Belfast Junction. 50l sh 2½l pd	10
		Ditto and Galway... 50l sh 2½l pd	3¼ a 3
15,000		Ditto and Mullingar... 50l sh 2½l pd	5½ a ¾
144,000	4s p sh	Eastern Counties .. 25l sh 14l 10s pd	21¼ a 1
144,000		Do Perpetual.. 6l 13s 4d sh 4l 13s 4d pd	1¼ pm
144,000		Ditto ditto, No. 2 .. 6l 13s 4d 13s 4d	
4,000		Eastern Union... 50l sh 10l pd	
		Ditto Extension... 25l sh 1½l pd	2⅝
10,800		Ely and Bedford ... 25l sh 1¼l pd	2¼
10,918	5l per ct	Grand Junction ... 100l sh pd	
10,918	5l per ct	Ditto Half Shares ... 50l sh pd	
10,918	5l per ct	Ditto Quarter Shares ... 25l sh pd	
20,000		Gt. Southrn & Westn. (Irelnd) 50l sh 10l pd	23½
		Ditto Extension... 50l sh 2½l pd	13
		Ditto Additional... 50l sh 2½l pd	
10,000	3l p sh	Great North of England... 100l sh pd	247½ a 50
	10s p sh	Ditto New ... 40l sh 5l pd	
		Ditto New ... 30l sh 2l pd	34½ a 5
25,000	4l per ct	Great Western ... 100l sh 80l pd	202½ a 5
25,000	4l per ct	Ditto Half Shares ... 50l sh pd	116 a 15
37,500	1l per ct	Ditto Fifths... 20l sh 20l pd	45 a 6
20,000		Guildfd, Farnhm, Portsmth, 50l sh 2½l pd	5⅜ a ½
10,500		Harwich ... 20l sh 1l pd	1½
12,000		Hull and Gainsborough.. 25l sh 1⅝l pd	
8,000	1l 15s p s	Hull and Selby ... 50l sh pd	106¼ a 7½
8,000	8s9d p sh	Do. Quarter Shares... 12½l sh pd	22 a ½
		Do. Half Shares ... 25l sh 2l pd	25 a ½
5,000		Kendal Windermere ... 25l sh 1½l pd	
18,000		Kentish Coast... 25l sh 1⅞l pd	
16,000		Lancaster and Carlisle... 50l sh 20l pd	45½ a 7
8,000		Leeds and Bradford ... 50l sh 5l pd	
5,100	4½l per ct	Liverpool & Manchester... 100l sh pd	
7,968	4½l per ct	Ditto Half Shares ... 50l sh pd	
11,475	4½l per ct	Ditto Quarter Shares ... 25l sh pd	
4125000l	5l per ct	London & Birmingham... Stock	243 a 2
41,250	5l per ct	Ditto New Thirds... 32l sh 2l pd	47 a 6⅞
54,450	5l per ct	Ditto New Quarter Shares 25l sh 2l pd	34¼ a 5
48,000	3s	London & Blackwall .. Av. 16l 13s 4d	11⅞ a 11
36,000	30s p sh	London and Brighton ... 50l sh pd	74⅜ a ½
4,500		Ditto Consolidated Eighths 50l sh 25l pd	44 a 2½
33,000	8s0d p sh	London & Croydon ... Av. 18l 15s 9d	20 a 19¾
35,000		Do. Guaranteed 5 per Ct.. 9l sh 6l pd	7 a ⅛
43,077		London & Greenwich .. Av. 12l 15s 4d	
11,136	10s	Preference or Privilege.. Av. 18l 17s 2d	
40,200	2l 0s p sh	London & South West... Av. 41l 6s 10d	83½ a 2½
	5s p sh	Ditto New Consol. Eighths, 40l p sh 12l pd	32¾
		Ditto New... ... 50l sh 2½l pd	16 a 15¾
		Ditto New... 40l sh 2l pd	12¼ a ½
100,000		London and York ... 50l sh 2½l pd	4⅛ a 3⅞
10,000		Londonderry & Coleraine, 50l sh 2½l pd	
10,000		Londonderry & Enniskillen 50l sh 2½l pd	4¾ a ⅝
8,000		Lynn and Ely ... 25l sh 2½l pd	6 a ¼
		Do. Dereham... 25l sh 1⅞l pd	2⅝ a ⅜
13,000	2l 16s p s	Manchester & Leeds .. 100l sh 73l pd	168 a 7
13,000	21s0d p s	Ditto Half Shares ... 50l sh 32l pd	78
13,000	2s	Ditto Quarter Shares ... 25l sh 2l pd	24⅞ a 6
22,750		Ditto Sixteenths... 6l 5s sh 3l 5s pd	9¼
30,000	1l p sh	Manchester & Birming.. 40l sh 40l pd	62 a 1¼
30,000		Do. ½ Shares... 10l sh 4l pd	9½
4155000l	3l per ct	Midland ... Stock	186½ a 7
		Ditto Fifths ... 2l pd	
		Ditto New... 40l sh 2l pd	29¼ a 8½
§978500l	46s3d p c	Ditto Birmingham & Derby... Stock	
20,000		Newcastle & Berwick. 25l sh 1l 10s pd	18½ a 18
	2l p sh	Newcastle and Carlisle... 100l sh pd	
20,000	10s p sh	Newcstl & Darlingt Junc... 25l sh 25l pd	55 a 3½
	17s5d p s	Ditto New (Brandling).. 25l sh 10l pd	34½ a 5
		Newry and Enniskillen ... 2½l pd	5⅜ a ⅞
21,000		Newark and Sheffield ... 25l 1½l pd	2¼ a ⅞
36,000		North British ... 25l sh 12½l pd	25 a 4⅝
		Ditto New... 1l pd	6⅞ a ½

Shares.	Div.	RAILWAYS.	Price.
10,256	1l 10s	Northern & Eastern ... 50l sh 45l pd	70 a ½
3,136	22s 6d	Do. Scrip .. iss. 5 dis... 50l sh 30l pd	.
12,208	7s 6d	Do. ¼ Shares ... ... 12l 10s sh pd	
		North Kent... 50l sh 2½l pd	4⅛ a ¾
12,000		North Wales... 25l sh 1½l pd	
19,000		Norwich and Brandon... 20l sh 12l pd	20⅞ a ½
19,000		Ditto New... 10l sh 1l pd	
		Oxford and Worcester... 2½l pd	5¾ a 6
2,600		Preston & Wyre ... 50l sh	
		Richmond & WestEnd Junct. 20l sh 1l pd	
		Rugby, Worcester, and Tring 20l sh 1l pd	2⅝ a ½
		Scottish Central... 50l sh 2½l pd	6¼ a ⅜
12,000		Scottish Midland... 25l sh 1½l pd	3¼
26,000		Sheffield and Lincoln... 25l sh 1¼l pd	
7,000		Sheffield and Manchester 100l sh 82½l pd	
		Ditto ¼ Shares ... 25l sh 8l pd	
18,000		Shrews., Wolverham., Dudley, Birm., 50l sh 2½l pd	4½ a ¾
22,000		South Devon... 50l sh 15l pd	25½ a 6
56,000	15s6d p s	South Eastern and Dover.. Av. 33l 2s 4d	47½ a 8
28,000	1s11d p s	Ditto New, iss. at 32l No. 1, 50l sh 8l pd	18¾ a ⅞
42,000		Ditto New 33l 6s 8d.. No. 2, 50l sh 7l pd	17¼ a 17
126,000		Ditto New 30l ... No. 3, 50l sh 2½l pd	8¾ a 9⅛
50,000		South Wales ... 50l sh 2½l pd	5¾ a ⅞
		Staines and Richmond .. 20l sh 1l pd	
		Waterford and Kilkenny, 20l sh 1l pd	3⅞ a ⅝
9,000		West Cornwall ... 20l sh 1½l pd	
45,000		Trent Valley... 20l sh 2l pd	18¾ a 19
		Trent Valley & Holyhead Junc. 1⅝ pd	2½ a ¼
7,500	10s	Yarmouth and Norwich 20l sh 20l pd	29½ a ¾
1,875	2s 3d	Ditto New ... 20l sh 11l pd	
6,700	5l per ct	York & North Midland ... 50l sh pd	109½ a 9
6,700	5l per ct	Ditto Half Shares... 25l sh pd	54½ a 5
		Ditto Scarboro' Branch.. 25l sh 25l pd	54
	5l per ct	Ditto Selby ... 50l sh 20l pd	74½ a 5
25,300		Ditto Extension... 25l sh 1½l pd	20¾ a ½

FRENCH RAILWAYS.

150,000		Bordeaux and Toulouse.. 20l sh 2l pd	2¼ a 2
240,000		Bordeaux, Toulouse, & Cette, 20l sh 2l pd	2¼ a 2
75,000		Boulogne and Amiens... 20l sh 4l pd	9⅜ a 9
		Dieppe and Paris Junction... 2l pd	
300,000		Great Northern of France, 20l sh 4l pd	5½ a ⅛
120,000		Lyons and Avignon... 20l sh 2l pd	2⅜ a ⅛
		Orleans and Vierzon ... 20l sh 6l pd	16¾ a 17
130,000		Orleans and Bourdeaux .. 20l sh 2l pd	10½ a 10
125,000		Paris and Lyons (Laffite) 20l sh 2l pd	3
		Paris & Lyons (Ganneron's) 20l sh 2l pd	2⅜ a ⅛
		Paris and Lyons (Calon's) 20l sh 2l pd	
120,000		Paris and Strasbourg ... 20l sh 2l pd	2⅜ a ⅛
		Paris and St. Quentin... 20l sh 2l pd	
80,000		Paris and Orleans ... 20l sh pd	47
72,000	1l	Paris and Rouen... 20l sh 20l pd	42½
		Royal North of Spain ... 2l pd	2⅛ a ¼
40,000		Rouen and Havre ... 20l sh 16l pd	30¾
31,000		Sambre and Meuse... 20l sh 4l pd	9 ex-nw
84,000		Strasburg and Bale... 14l sh pd	
70,000		Tours & Nantes (Mackenzie) 20l sh 2l pd	2⅜ a ⅝
		Ditto Ditto (Levevres) 20l sh 2l pd	

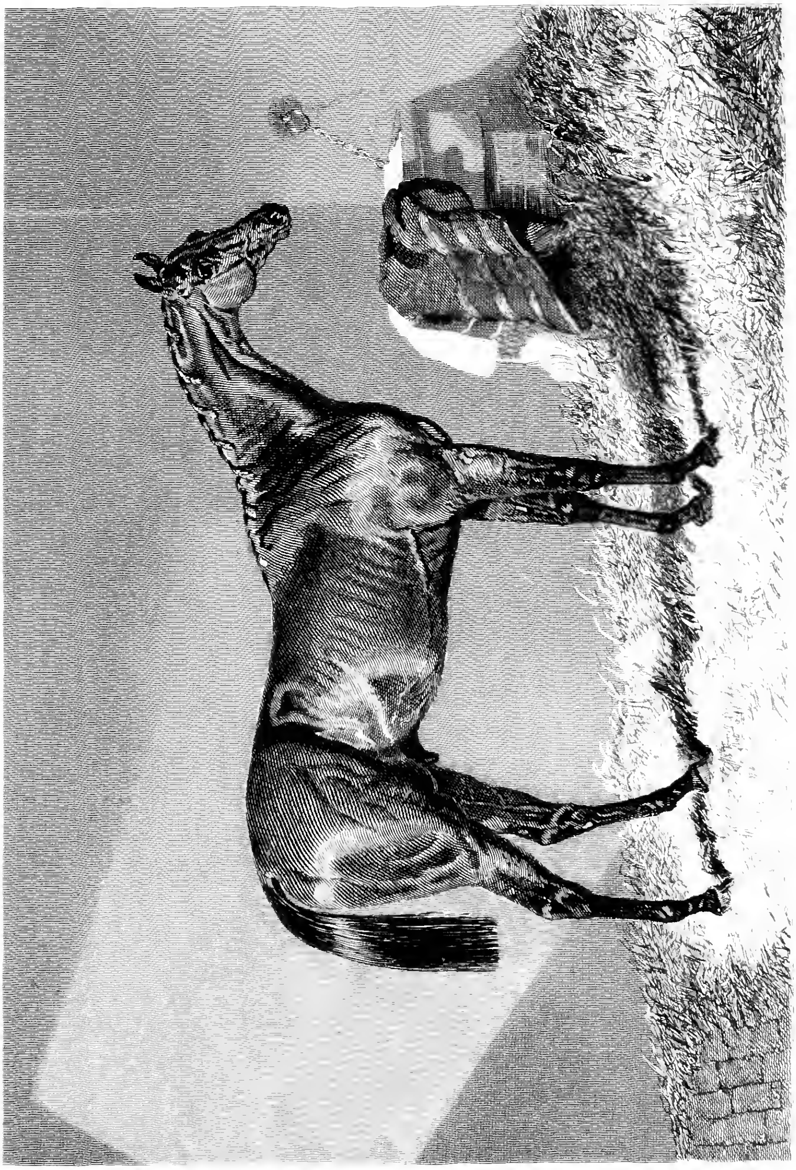
SCOTCH RAILWAYS.

	Per Ann.		
18,000	4½l per ct	Edinburgh & Glasgow ... 50l sh pd	60
18,000	4½l per ct	Ditto Quarter Shares... 12½l sh pd	19
		Ditto New ¼ Shares... 12½l sh 2½l pd	7½
5,000		Edinburgh, Leith, & Granton, 20l sh pd	15¾
12,500	4½l per ct	Glasgow & Ayrshire... 50l sh pd	66
16,000	2l per ct	Ditto and Greenock ... 25l sh pd	19
4,000	5l per ct	Ditto and Garnkirk... 25l sh pd	38
4,000	5l per ct	Dundee and Arbroath... 25l sh pd	36

MISCELLANEOUS.

10,000	1l 4s	Anglo Mexican Mint ... 10l sh pd	
		Ditto New Half Shares .. 5l sh 2½l pd	
10,000	1l 15s	Australian Agricult... 100l sh 30l pd	
5,709	6l per ct	Australian Trust Comp.. 100l sh 35l pd	
6,000		British Ameri. Land .. 50l sh 35½l pd	
10,000	6l per ct	Canada ... 100l sh 32½l pd	
10,000	5l per ct	Upper Canada Bonds ...	
	5l per ct	Ditto ...	
	4l per ct	City Bonds ...	
10,000	5l per ct	Comp. Copper Miners in England 100l sh 2l 10s pd	
5,000	5l per ct &2lbs.	General Rever. & Invest... 100l sh pd	110
2,700	4½ per ct	Equit. Reversionary .. 100l sh 80l pd	
20,000	1l 8s and 2s 6d bs	Gen. Steam Navigat... 15l sh 14l pd	27¼
8,000	5l per ct	London Reversionary Int. 50l sh 20l pd	
		Mexican & S. American .. 10l sh 7l pd	
20,000		New Brunswick (Land) ... 75l pd	
	7l per ct	Peninsular & Orient Steam.. 50l sh pd	
		Ditto ... .. 50l sh 10l pd	
	4½l per ct	Reversionary Int. Soc ... 100l sh pd	99¾
	1l 10s	Royal Mail Steam ... 60l pd	46 a 5½
14,000	6l per ct	South Australian ... 25l sh 20l pd	

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London.



THE FARMER'S MAGAZINE.

AUGUST, 1845.

No. 2.—Vol. XII.] [Second Series.

PLATE I.

A GUERNSEY OX, OF THE PURE BREED.

The subject of the plate is a five years old Guernsey ox, for which the first prize was awarded at the Christmas show held in that island in 1844, bred by Mr. T. Le Poidwin, of the Vale Parish, in the island of Guernsey, and whose cows have long been distinguished for their superior dairy qualities. The following was the weight of the animal when slaughtered: Loosc fat, 165 lbs.; hide, 103 lbs.; four quarters, 1,146 lbs.; together, 1,414 lbs. English weight.

PLATE II.

THE MERRY MONARCH.

Pedigree.—The Merry Monarch was bred by his present owner in 1842, and is by Slane, out of The Margravine by Little John; her dam by Phantom, out of sister to Election by Gohanna—Chesnut Skim by Woodpecker—Herod. The Margravine is own sister to Frederick—another forty to one outsider—with whom Mr. Gratwicke won the Derby in 1829, Forth riding him, and running second with The Exquisite. The Margravine has been in the stud ten years, and thrown seven or eight foals, the winner of the last Derby, however, being the only one of any repute. Slane is by Royal Oak, dam by Orville, out of Epsom Lass by Sir Peter, her dam Alexina by King Fergus. He is also the sire of The Princess (winner of the Oaks last year), Murat, and many other winners, and is one of the most fashionable stallions of the day.

The Merry Monarch is a bright bay horse, sixteen hands high, with good lean head, very light neck, high in his withers (unusually so for a young horse), large ribs, deep brisket, oblique shoulders, good arms, and flat legs; turns his toes a little out; good open feet; straight back, tail well set on, long quarters, large thighs and gaskins, and clean hocks, which in walking he rather twists outwards.

Performances.—In 1844, The Merry Monarch, then two years old, first appeared in the Ham Stakes at Goodwood, for which he was not placed, tke Duke of Richmond's Refraction winning, Mr. Wreford's Winchelsea second, and Colonel Peel's Hersey third. Six others also ran. In 1845, The Merry Monarch, ridden by F. Bell, won the Derby Stakes at Epsom, of 50 sovs. each, h-ft. (138 subs.); beating Mr. A. Johnstone's Annandale (2), Mr. Gully's Old England (3), Mr. Mostyn's Pantasa (4), and twenty-seven others not placed—the largest field ever set a going for the Derby. Value, clear of the stakes, £3,975.

ON REAPING AND HARVESTING GRAIN-CROPS.

BY THOMAS SULLIVAN.

There is certainly no department of husbandry to which so much interest and importance are attached, as to that which forms the subject of the following pages—there is none that demands the exercise of so much skill and vigilance on the part of the farmer, and for it most other agricultural operations are merely preparatory. The period of harvest has been regarded with peculiar interest ever since the cultivation of the soil became the chief occupation of civilized man, and the principal means of procuring his subsistence. It is at harvest that the industrious husbandman hopes to reap the fruit of his toil and outlay during the other seasons of the year; and it is then that an abundant return rewards, gladdens, and encourages the judicious and enterprising cultivator, or that a scanty crop disappoints and disheartens the unskilful and the prejudiced. It is at harvest, too, that the difference between liberal and systematic cultivation, on the one hand, and slovenly, penurious management on the other, becomes most strikingly apparent. The grateful soil, in most cases, amply rewards the intelligent husbandman for the generous treatment it may have received at his hand during the course of the preceding seasons; but if it has been niggardly dealt with, inadequately manured, or saturated with superfluous moisture, it cannot reasonably be expected that the produce will be otherwise than scanty and unremunerating. But the farmer may expend his capital with a liberal and judicious hand, adopt every well-authenticated means of improvement, effectually relieve his land from the baneful influence of superabundant water, and apply enriching manures to restore, sustain, and increase its fertility; and yet, unless the utmost attention is bestowed, and the most unceasing activity exercised during that critical period when the various labours of the harvest are being carried on, the maximum advantage cannot be secured from the cultivation of the soil. It requires no arguments to prove that an incalculable quantity of grain is annually lost, or greatly deteriorated in quality, in consequence of not being reaped at the period when it is of the greatest value as an article of food, nor afterwards secured in a careful and judicious manner. The loss sustained by individual farmers, and consequently by the public generally, from these causes alone, would be truly astounding could it only be reduced to figures. There cannot, I conceive, be a better criterion by which to estimate the agricultural character of any particular district than the manner in which the various operations of the harvest are conducted; and upon the same principle, the character of individual agriculturists may readily be ascertained, by an inspection of their respective stack-yards after the ingathering of the grain crops. There are some farmers who have seldom or never any damaged grain in their possession, except in very unpropitious seasons; while others, of less judgment and vigilance, are as rarely without it. The loss annually sustained by some negligent farmers, and, through them, by the public at large, in consequence of careless management in securing the different grain crops, is in fact incredibly enormous.

The labours of the harvest are of such vast and general importance, that any practical remarks upon the subject cannot prove uninteresting to the readers of an agricultural periodical; and, under this impression, the following observations are penned. Although very considerable advances have undoubtedly been made within the last few years in many parts of the kingdom towards the adoption of a more judicious and economical mode of conducting the various operations of the harvest, it is universally admitted that most of the different methods of cutting down and securing grain-crops which at present prevail throughout the country are extremely defective in many particulars, and very ill-calculated to secure the maximum advantage in grain and straw from the produce of the soil. In the following observations I shall advert as briefly as possible to the most essential particulars connected with this important subject; and, although it is probable that my remarks may not contain anything new to some readers, yet it is hoped they may be useful to others, and not wholly destitute of interest to any.

The first, and doubtless the most important consideration connected with the harvesting of grain-crops, is the state of ripeness in which the different kinds ought to be cut. The proper determination of this point is of the utmost importance to the farmer, and demands his best attention, as it is now well known that the period of reaping has a most material effect upon the quantity and quality of the produce, both in grain and straw. This is a subject, however, in reference to which much diversity of opinion and practice prevails among farmers, from not having any general or established criterion by which to ascertain the proper degree of ripeness. A great deal has of late been said and written in regard to the state of maturity in which grain-crops ought to be cut, and much light has recently been thrown upon the subject, both by the experiments of practical and the researches of scientific men. It is scarcely necessary to observe, that until within a very late period the almost universal practice of farmers was to allow their corn to attain full maturity, or to become thoroughly ripe before reaping; and this course, which at first sight does not seem to be very erroneous, is still to a greater or less extent adhered to in all parts of the kingdom. But it is now satisfactorily ascertained that grain, particularly wheat, attains its maximum value as an article of food a considerable time previous to its becoming dead or thoroughly ripe. Too much importance can hardly be attached to this fact in regard to the period of reaping wheat, as that valuable crop constitutes the staple produce of a large extent of this country; and hence, any means whereby its quantity or quality could be enhanced would be productive of immense advantage to agriculturists, and the subject is therefore well entitled to their most serious consideration. It would obviously be improper to cut this crop prematurely, but it is a still greater and more prevalent error to allow it to stand until it becomes over ripe. When wheat is cut in too green a state, the grain is apt to shrink on becoming dry, and an inferior quality is the necessary consequence; besides the straw when reaped in a green, succulent condition, is very difficult to get sufficiently dry for the stack, especially in unfavourable harvests. But, on the other hand, if allowed to become over ripe, incalculable loss may be sustained, by much of the grain being shaken off the stalks by high winds occurring before the crop has been cut; and much will also be necessarily lost in performing the several processes of reaping, carrying, and stacking, so that in fact a considerable loss of grain is inevitable at every stage of the harvest, in consequence of allowing the crop to attain extreme ripeness. Not only is the quantity of grain thereby diminished, but its quality is also materially deteriorated, the sample being always found to be coarse and thick-skinned, and to yield a larger proportion of bran and less of fine flour than if it had been cut at the proper period. The value of the straw is likewise considerably diminished as an article of food for live stock, as large proportions of its nutritive ingredients are necessarily lost before the grain becomes thoroughly ripe; in short, it is now satisfactorily ascertained by experience, and confirmed and supported by the inductions of science, that when wheat is allowed to remain uncut until it is perfectly matured, the grain and straw are materially diminished both in quantity and quality; and the practice is, therefore, disadvantageous and improper in every point of view.

A peculiar state or colour of the straw is very commonly regarded as a criterion of sufficient ripeness in corn-crops; but this cannot in all cases be depended on, as it is not unusual in some seasons to find the straw exhibiting all the appearances which are generally held to indicate sufficient ripeness, while the grain still remains imperfectly matured. This circumstance not unfrequently occurs in wet seasons, particularly on rich land, the crop in such cases being apt to be lodged by the joint action of the wind and rain, aided by its own luxuriance. Hence the necessity of carefully discriminating between the ripeness of the straw and that of the grain; but it is obvious that when the straw has arrived at the stage referred to, the crop can derive no further benefit from the soil, as the circulation of sap to the ear is then entirely cut off. The grain may certainly become somewhat better hardened by being allowed to stand uncut for some time longer; but should the crop be lodged, as it generally is in such cases, the difficulty of reaping and drying the straw is considerably increased by suffering it to stand; and should unfavourable weather ensue, the grain itself may be seriously damaged, whilst the straw stands a great risk of being either rotted or greatly impaired in quality. This may be thought an extreme case, and so perhaps it is in the fine climate of certain parts of England; but such instances are by no means uncommon in the northern division of the island, where, as it is well known, the climate is much more humid and capricious, and the harvest in consequence more hazardous and protracted. The most advisable course in all cases of this kind seems to be to cut the crop as soon as convenient after it has been perceived that the straw can no longer convey nourishment from the root to the ear. In the great majority of instances, however, the grain becomes sufficiently matured long before this, or before the entire length of the straw has lost its green colour; and, as already remarked, it is highly injudicious and improper to allow the crop to remain uncut until the whole of the straw has assumed a uniform yellow or whitish hue. It is now held as an established and incontrovertible opinion by the most intelligent agriculturists, as well as by their customers—the millers and the bakers—that wheat has attained a quite sufficient degree of ripeness when the straw begins to shrink and three or four inches of the upper extremity of the stem under the ear have become white and sapless. Then the heads incline slightly downwards, and the grain, though not yet quite hard, feels firm and elastic when pressed by the finger upon the palm of the hand.

That wheat ought to be cut before the entire length of the straw has lost its green colour, or before the grain has attained thorough maturity, is an opinion that has been current among some intelligent agriculturists for a lengthened period; but its truth and importance had not been generally recognized by farmers until most conclusively demonstrated by the experiments instituted in 1840 and 1841 by Mr. J. Hannam, North Deighton, near Wetherby, Yorkshire, with the view of ascertaining the proper period for reaping wheat. The results of these experiments, which are detailed at length in the *Quarterly Journal of Agriculture*, have already been widely circulated; but, as they appear to have been conducted with uncommon care and judgment, and recorded with the utmost fidelity they cannot be made too well known to every agriculturist in the kingdom. I therefore deem no apology necessary for introducing in this place a brief summary of the results of Mr. Hannam's interesting experiments, without entering into the details, which are very full and explicit.

Mr. Hannam commenced his experiments on a small scale in 1841, by cutting three lots of wheat in the following stages, viz:—

No. 1.	Green........	cut	Aug. 4
2.	Raw	„	Aug. 18
3.	Ripe	„	Sept. 1

These samples, when thrashed and exposed at market, were valued at the following prices respectively:—

	£	s.	d.	
No. 1.........	3	1	0	per qr.
2.........	3	4	0	„
3.........	3	2	0	„

From the results of this experiment, Mr. Hannam infers that wheat reaped a *fortnight* before it is fully ripe has the following *advantages* over the ripe, viz.:—

	per cent.
1. In weight of gross produce........	13⅓
2. „ equal measures, nearly	0½
3. „ equal number of grains, nearly	2⅓
4. In quality and value, above	3⅓
5. In weight of straw, above..........	5

On the other hand, wheat reaped a *month* before it was fully ripe gave an advantage of 22 per cent.

in weight of straw compared with the ripe; but on every other point it had the *disadvantage;* namely:

		per cent.
1.	In weight of gross produce of	$11\frac{5}{13}$
2.	,, equal measures, above..	$0\frac{1}{3}$
3.	,, equal number of grains, above	$13\frac{1}{6}$
4.	In quality and value, above	$0\frac{4}{5}$

This experiment having proved so far satisfactory, Mr. Hannam was induced to continue his investigations, on a more extensive scale, in 1841. In the harvest of that year five lots of half a rood each were cut, as follow:—

No. 1.	Very green......	Aug. 12
2.	Green..........	Aug. 19
3.	Raw	Aug. 26
4.	Raw	Aug. 30
5.	Ripe	Sept. 9

These lots having been thrashed, the different samples proved of the following characters, namely:—Nos. 1 and 2 (cut green), fine in the skin, but small; No. 5 (ripe), bold, but coarse; and Nos. 3 and 4 (raw), equal in boldness of grain to No. 5, and superior in clearness of skin, being unexceptionable as a sample. The several samples were subsequently valued at the subjoined prices, viz.:

		£	s.	d.	
No. 1.	At the rate of	11	17	0	per acre.
2.	,, ...	13	6	0	,,
3.	,, ...	14	18	0	,,
4.	,, ...	14	17	4	,,
5.	,, ...	13	11	8	,,

Thus showing a gain of £3 1s. per acre upon No. 3 over No. 1, and of £1 6s. 4d. upon the same lot as compared with No. 5. Upon being ground, the weight of flour, bran, &c., in a 100lbs. of each sample, was as follows, omitting fractional parts:—

	Flour.	Bran.	Pollard.
No. 1 gave	75lbs.	17lbs.	7lbs.
2 ,, ...	76	16	7
3 ,, ...	80	13	5
4 ,, ...	77	14	7
5 ,, ...	72	15	11

It was found that a bushel of No. 3 gave more flour than a bushel of No. 5 by $6\frac{1}{7}$lbs., showing a gain of $15\frac{1}{7}$ per cent. in weight of flour upon equal measures of grain; and there was also an advantage of nearly 8 per cent. of flour in favour of No. 3, upon equal weights of wheat. In grinding, it was found that No. 5 (cut fully ripe) ground the worst of all, and it contained 50 per cent. more of flinty particles than the raw-cut grain. Besides those now enumerated, Mr. Hannam says the other advantages of cutting wheat a fortnight or so before it is thoroughly ripe are a better quality and greater quantity of straw, a better chance of securing the crop, and a saving in securing it.*

Although Mr. Hannam is justly entitled to the credit of being the first who has shown, by satisfactory and conclusive experiments, the advantages to be derived from cutting corn in a *raw* state, or rather the loss sustained by allowing it to become dead or thoroughly ripe, his interesting experiments merely corroborate an opinion that has long been entertained upon the subject by some intelligent farmers; but, owing in a great degree to the difficulty of overcoming the strong prejudice which invariably opposes the introduction of every new improvement regarded in the odious light of a useless innovation, and the consequent tardy pace at which improvement in agriculture advances, the advantages of cutting wheat in a greenish state, or in that medium condition between immaturity and full ripeness denoted by the term *raw*, have been little known or appreciated by the generality of farmers; and, in fact, the practice of green cutting is still regarded with suspicion, and its utility discredited, in many quarters, so ardent is the attachment of most people to established usages and time-sanctioned opinions, and so great their dread of innovation.

In order to show that the advantages of reaping corn before it is thoroughly ripe have been long since known and proved, I may mention that, about twenty-four or twenty-five years ago, Mr. Brodie, an extensive farmer in East Lothian, cut down a field of wheat of upwards of 20 acres in a green state, as an experiment, which he was induced to make in consequence of having frequently found that when, in order to finish a field, he had cut a part of it in a state that he considered too green, yet, when it came to be thrashed, the quality was not perceptibly inferior to that which was completely ripened. Owing, however, to the strong prejudice that then existed in that locality against the new practice of cutting corn in a green state, Mr. Brodie received 2s. per qr. more for the wheat that was allowed to attain the usual degree of ripeness than for that which was cut green or raw.

In 1823, Mr. Brodie continued his experiments on the wheat crop by cutting one-half of a large field on the 2nd of September, when the corn was "just beginning to break into spots," being then considered as within eight days of proper ripeness; the other half, which did not arrive at the ordinary degree of maturity at the time expected, was not cut until the 12th. The first-reaped portion was carried to the stack-yard on the same day the last was cut; the last stood nine days before it was stacked, and sustained no injury in the stook. Upon being thrashed, there was little difference in quantity between both lots; and when exposed for inspection in Haddington market, the farmers were generally in favour of the ripe. The bakers and corn-dealers were however more divided in their opinions, some favouring one and some the other; but Mr. Brodie thought they all agreed that the difference was so small, that they would give the same price for the one as for the other. Parcels of both kinds were subsequently exhibited in Dalkeith market, Mid Lothian; and, though the prevailing opinion of the farmers was still in favour of the ripe-cut wheat, yet the bakers, and those who were considered the best judges, gave the preference to the other sample. Upon being ground, the latter yielded 4lbs. per boll more of fine flour than the

* For more minute details of Mr. Hannam's experiments, see the "Quarterly Journal of Agriculture" for June, 1841, and for September, 1842.

former, and the baker was also satisfied that its flour baked better.

From his experiments, Mr. Brodie concludes that cutting the wheat crop eight or ten days before the usual time would be attended with the following advantages :—First, the wheat will be of a better quality, and equally productive; secondly, it will not spring nearly so soon in the stack, in case of wet weather; and, lastly, the risk from shaking winds will be greatly diminished. "All these advantages combined," continues Mr. Brodie, "are certainly of considerable importance: and though it is impossible to form any accurate estimate of the extent of advantage that might be derived from adopting this system of early cutting, yet I should suppose, taking an average of years, that, were it possible to reap all our wheat exactly in the state I have described, a saving of nearly ten per cent. would be the consequence."*

It will, no doubt, be interesting to the reader to compare the conclusions arrived at upon this important subject, in 1824, by Mr. Brodie, East Lothian, with those drawn from the experiments made in 1840 and 1841 by Mr. Hannam, Yorkshire; and certainly such practical statements must be regarded as conclusive evidence in favour of cutting the crop before it is fully ripe. The propriety of this practice is also amply confirmed and supported by the testimony of science, it being now well known that the last change which takes place in the ripening of wheat is an increase of bran or husk, and a relative diminution of farinaceous matter or flour. Hence the immense difference in the produce in flour between that of the grain of a field of wheat cut down at the proper time and another allowed to become over-ripe. Professor Johnston accounts for the results of Mr. Hannam's experiments by a reference to the chemical changes which take place in the ear. "The ear," says the learned Professor, "which is sweet and milky a month before it is ripe, gradually consolidates, the sugar changing into starch, and the milk thickening into the albumen and gluten of the flower. As soon as this change is nearly completed, or about a fortnight before ripening, the grain contains the largest proportion of starch and gluten: if reaped at this time, the bushel will be heavier, and will yield the largest quantity of fine flour and the least bran. At this period the grain has a thin skin, and hence the small quantity of bran; but if the crop be still left uncut, the next natural step in the ripening process is to cover the grain with a better protection, a thicker skin; a portion of the starch of the grain is changed into woody fibre, precisely as in the ripening of hay, of the soft shoots of the dog-rose, and of the roots of the common radish. By this change, therefore, the quantity of starch is lessened and the weight of husk increased: hence the diminished yield of flour and the increased produce of bran. Theory and experience, therefore, indicate about a fortnight before full ripening as the most proper time for cutting corn. The skin is then thinner, the grain fuller, the bushel heavier, the yield of flour greater, the quantity of bran less, while, at the same time, the straw is heavier, and contains more soluble matter than when it is left uncut until it is considered to be fully ripe."*

I am not aware of any experiments having been instituted purposely to ascertain the proper stage of ripeness at which the barley crop ought to be reaped; but the almost universal practice is to allow it to remain uncut until it is dead or thoroughly ripe. The great objects to be kept in view in the culture of barley are to secure the maximum weight per bushel, evenness of sample, and uniformity of colour. It is especially necessary that all the grain should be of an equal degree of ripeness before being cut, as it is a point of considerable importance in malting barley that it should all sprout simultaneously; and this object can be secured only by allowing the crop to become almost thoroughly ripe. The sample also increases in weight (which is a matter of no trivial importance) the longer it is left standing, at least up to a certain period; but, after the grain has attained a particular state of ripeness, very considerable loss may be sustained by allowing it to remain uncut for any length of time. Barley is not so liable to shed its seed as either oats or wheat; but when it gets over-ripe, the heads are readily broken off in reaping, and much loss may be thereby sustained. The criterion of sufficient ripeness in barley is when the grain and awns become of a uniform yellow colour, and the rachis somewhat rigid, and, as indicated by the straw, when the upper portion of the stem has lost its green colour and become sapless. Many farmers allow their barley crop to stand uncut until the whole of the straw has assumed a uniform yellow hue, with the view of obtaining the greatest possible weight of produce; but before the straw has arrived at this stage, the grain, in many cases, will have lost that peculiar colour to which so much importance is attached by maltsters; and when the crop is over-ripe, considerable loss may be sustained by the heads breaking off during the process of reaping, especially when the scythe is employed for that purpose. There is, therefore, an error in allowing barley to become over-ripe, as well as in cutting it prematurely; and the intelligent farmer will studiously avoid both extremes. The crop may be said to be over-ripe when the heads droop and fall down against the stem, or when the whole length of the straw has lost its green colour and become quite yellow.

With regard to the state of ripeness in which oats ought to be cut, the same diversity of opinion and practice prevails among farmers as in the case of reaping wheat. It has been shown, in a preceding part of this article, that wheat yields the greatest proportion of fine flour when cut ten days or a fortnight before it is thoroughly ripe; but in regard to oats, on the other hand, it is generally found that they produce most meal from equal measures of grain when allowed to stand until almost fully matured. This crop is now, however, usually cut, by all good farmers, some time before the grain has become dead ripe, or the straw en-

* Nineteenth Report of the United East Lothian Agricultural Society.

* Elements of Agricultural Chemistry and Geology, p. 188, third edition.

tirely white. The oat, it is well known, is much more liable to shed its seeds than either wheat or barley, owing to its being less firmly attached to the stems; and on this account very considerable loss is frequently sustained from shaking winds, when the crop is suffered to stand until quite ripe. It is also well known that the value of the straw is very materially enhanced as food for live stock by being cut in a green state, or while the stems still retain much of their nutritive juices. The greener, in fact, the crop is cut, the heavier and more nourishing will be the straw, which is a circumstance of no small importance to the farmer, as oat-straw is very generally used as provender in all parts of the kingdom, and for every description of stock.

In determining the proper period for cutting this crop, something will obviously depend on the state and immediate prospects of the weather, and also on the variety of oats. If it were cut in a green, succulent state, and wet, unpropitious weather to ensue, it would be found extremely difficult to get t sufficiently dry for preserving in the stack. Allowing the crop to become pretty well ripened, consequently, facilitates the process of drying, especially in unfavourable harvests; and this remark applies also to wheat. There are some early varieties of oats, such as the potato, whose seeds are more slightly attached to the stems than those of others, and are therefore more easily shaken by high winds, and while undergoing the different processes of reaping, carrying, and stacking. Hence, when any of these sorts is grown, it is necessary to cut it somewhat earlier than would be proper or advisable in the case of the later varieties. If the potato oats, for instance, is allowed to attain the degree of ripeness necessary for other kinds, the top-pickles, which are always the most valuable, stand a great risk of being shaken off; and, indeed, a considerable loss of grain is unavoidable at every stage of the harvest, from the process of reaping to that of stacking. This remark regarding the shedding of the top-pickles of the potato oat applies also, though generally in a less degree, to over-ripe oats of every kind, and it furnishes a strong argument in favour of early cutting. It is a well known fact to practical farmers, that wheat yields the most flour and sweetest bread when thrashed out before it has been stacked; and this circumstance also generally holds true in regard to oats, which in most cases are found to weigh heavier per bushel, and produce a greater proportion of meal, when thrashed from the stook, than after they have been for some time in the stack. This probably arises from the heating of the corn, in a greater or less degree, in the stack, whereby the quality of the grain, as well as that of the straw, is of course impaired, which shows the utility of providing adequate ventilation in corn-stacks. Before dismissing this part of my subject, it may be proper to observe that it would be injudicious to allow oats intended for seed to attain the same degree of ripeness as is necessary when the grain is to be used for the ordinary purposes of making meal or of feeding horses. It is considered that oats may be cut for seed with propriety and advantage even before the whole of the husk has lost its green colour.

When the farmer is satisfied that a portion of his grain crops has attained sufficient maturity, the operation of reaping is commenced. Corn is cut down either by the sickle, the common scythe variously equipped, the Hainault or Flemish scythe, or by machinery contrived for the purpose. The sickle is the oldest and most generally employed of these instruments; but the use of the reaping-scythe is fast gaining ground in many districts, and bids fair shortly to supersede the sickle altogether, at least in reaping oats and barley. Wheat, on account of the hardness of its stems and other causes, is seldom cut by the scythe, the sickle being most generally preferred for that crop. In certain localities, however, every kind of corn is cut down by the scythe, no other reaping instrument being used. But, whatever method may be adopted, it is of great advantage to the different persons engaged at harvest-work that the farmer should be particularly assiduous in eradicating or destroying at the proper period all sorts of weeds that may make their appearance amongst the corn. The complete extermination of weeds should in all cases be attended to before their flower-buds are developed. It is hardly necessary to observe that one of the most essential departments of husbandry, though perhaps the most neglected one, is the destruction of all the useless and injurious weeds that infest the soil and appropriate to themselves aliment intended exclusively for the nourishment and support of the valuable plants which are the objects of the farmer's care and solicitude. The judicious cultivator will, therefore, incessantly wage an exterminating war against all sorts of weeds, which he well knows to be the greatest exhausters of the soil, and consequently the greatest enemies with which his crops have to contend. There are various kinds of weeds which infest corn-fields, but the most troublesome to reapers are different kinds of thistles. If not previously eradicated, they not only annoy and interrupt the reapers at all stages of the harvest, but are also highly impoverishing on the land. The biennial spear-thistle (*Cnicus lanceolatus*) is peculiarly troublesome and disagreeable to reapers, on account of its hard, sharp spines; as is also the corn dead-nettle (*Galeopsis tetrahit*), which is most painful and dangerous to the hands. The most advisable course for the farmer is, in all cases, to prevent as far as possible the appearance of these and other weeds: and fortunately it is in his power to do so to a great extent, so that he has his own negligence solely to blame for allowing them to exhaust his land, injure the corn, and annoy the reapers in harvest. The most effectual method of eradicating thistles and other deep-rooted weeds is to plough the land infested with them to the depth of twelve or fourteen inches, should the nature and quality of the subsoil admit of doing so. This may be accomplished when giving the first ploughing before winter for green crops, or it may be done in the spring or early summer months, when the further preparation of the ground is resumed. The whole, or greater portion of the roots are thus brought to the surface and destroyed, after which very few will appear for a considerable time. By cultivating turnips and other green crops in rows or drills, and using the horse-hoe frequently during the growth of the plants, thistles and all other weeds must shortly disappear. But when they make their appearance amongst the corn, the most certain way of eradicating them is to pull them up with as much of the roots as possible, either with a weed-hook adapted for the purpose, or, in moist weather, by the hand, protected with a coarse cloth or a strong glove. The usual method, however, of destroying thistles amongst corn is by partly pulling, and partly cutting them with the weed-hook; and this should in all cases be attended to before the seeds of the weeds have begun to form, or previous to the appearance of the flowers,

I may also observe in this place that, when it is intended to reap corn by the scythe, it is necessary that the ground be made even upon the surface by rolling it. either immediately after the requisite harrowings have been given to cover the seed, as in the cases of oats and barley, or at some period during the growth of the crop, as in the case of wheat. All rough clods are thus reduced or crushed down, and the surface rendered smooth and even for the action of the scythe. Small stones are also pressed into the ground by the weight of the roller, but all the larger-sized stones should be removed off the land before the plants attain any considerable height, that the scythe may not be interrupted or endangered in cutting the crop.

Before proceeding to describe the most approved methods of reaping corn, it will be necessary to make a few remarks upon the different kinds of instruments with which that important operation is executed. The oldest, most simple, and certainly not the least efficient, of these is the sickle or reaping-hook; and though various attempts have been made from time to time to supersede it by the invention and partial employment of machinery for more economically and expeditiously performing the process of reaping, it still maintains its ground in many localities. No instrument or machine has yet been contrived that does the work in so clean and perfect a manner; and, were it not so very tedious and expensive as it is, no better method of reaping could be desired. These are, however, weighty objections against its use, in the estimation of most farmers.

There are various forms of the sickle, the principal differences being in the curvature of the blade and the nature of the edge. There are, however, but two distinct classes—namely, the serrated or toothed sickle, and the smooth-edged, or scythe-hook, as it is sometimes termed from the resemblance of its edge to that of a scythe. The former kind is so generally known and employed throughout the country as to render any description of it unnecessary in this place. It is made of different sizes, and of various degrees of curvature. The blade is composed principally of iron, with an edging of steel; but cast steel has recently been used with advantage in forming the whole of the blade. The smooth-edged sickle differs from the serrated one in being ground on both sides, in having a thin and sharp edge, and in being somewhat broader and thinner in the blade.

Some diversity of opinion exists among farmers in regard to the comparative merits of the serrated and the smooth-edged sickle, each kind having its respective advocates. When the former is used, the reaper is obliged to cut the corn by single handfuls, which, in a great degree, insures the accomplishment of the work in the most perfect manner; the stalks are laid evenly in the sheaves, and comparatively few are left upon the ground to the rake or the gleaner. But, on the other hand, the serrated sickle is more laborious and difficult to work with than the smooth-edged hook, especially in cutting the hard stems of wheat; and is, therefore, less expeditious and economical. The reapers, generally, make tighter and cleaner work with the former than with the latter instrument, particularly in short corn; but when the crop is of ordinary luxuriance, the smooth-edged sickle is decidedly superior to the other, as by it the straw is cut with much less exertion; and, besides, when the ground is soft, inexperienced reapers, with toothed hooks, are apt to uproot part of the straw. For these reasons, the serrated sickle has been for several years past almost entirely laid aside in some parts of the country, it having been found by the farmers that reapers could with equal ease to themselves cut down from a fourth to a third part more in the same time by the smooth-edged hook.

The only objection that can be urged against the use of the latter instrument arises from the circumstance that reapers seldom cut the corn by it in handfuls, as they are obliged to do with the other; and a great number of stalks is, in consequence, left upon the ground. An entirely different method of reaping has, in fact, been introduced since the smooth-edged hook became so generally employed, and from which it is now very difficult to prevent some reapers, as they find it to be much easier and more expeditious for themselves. Instead of cutting the straw by small handfuls, as with the tooth-sickle, they strike down the corn in a peculiar manner—provincially termed *slashing*, or *dinging-in*, in some localities—a method of reaping which seems to be essentially the same as that known in many parts of England by the name of *bagging*. Some reapers become so expert at this mode of cutting, that no fault can be found with their work; the straw is cut very close to the ground, and an experienced, active man will in most cases do from one-third to one-half more than is usually accomplished by the common mode of hand-reaping. But in the manner in which "slashing," or "bagging," is generally done, it is an extremely imperfect and objectionable system of reaping, and is strictly prohibited by all correct farmers. In order to put an effectual stop to this method, the smooth-edged hook is now falling into desuetude, and the serrated sickle again coming into use in some districts in which the latter had been altogether abandoned; but it is now found a difficult matter to reconcile reapers to its use. Considerable improvement has, however, been recently effected in the toothed sickle, the serratures being now made much finer, and the blade itself somewhat broader than formerly, which renders it less irksome and more agreeable to the reapers.

The next reaping instrument to be noticed is the scythe, which has been for some time past extensively employed in many quarters in cutting down all kinds of corn, especially oats and barley. The wheat crop is also occasionally reaped by the scythe, but the preference is most generally given to the smooth-edged sickle, for reasons already assigned. I shall not stop here to point out any of the many advantages in point of economy and despatch attending the use of the scythe as compared with the sickle in cutting down grain crops, as the comparative merits of both methods of reaping can be discussed with greater propriety in a subsequent part of this article. I shall, therefore, merely advert at present to the instrument itself, and the manner of equipping it for work. The common hay-scythe is that generally employed for the purpose of mowing corn; but there is usually attached to the lower extremity of the handle, or to the heel of the blade, what is termed a *cradle*, the use of which is to support and gather the corn after it has been cut, and to lay it down in regular, compact swathes, preparatory to the binding of it into sheaves. This apparatus generally consists of a light wooden standard, seven or eight inches high, attached to the lower end of the handle, or jointed to the heel of the blade, in such a manner as to be vertical when the scythe is at work. Into this upright stem are inserted three slender and slightly curved teeth, or rails, from eight to fourteen inches long, the uppermost one being longest, and the others diminishing in length towards the undermost. These teeth should be parallel to the blade of the scythe; and, as they must combine lightness with strength and durability, they should be made of the finest ash. The upper end of the standard is supported and maintained steadily in its place by means of a light rod about twenty inches long, passing from it to the handle, where it is secured by a small screw-nut.

The common cradle-scythe has, however, been superseded in some districts, particularly in some of the northern counties of Scotland, where a scythe, mounted in an entirely different manner, has for a lengthened period been the only instrument employed in reaping. Instead of the long, straight handle, which is generally attached to the common scythe, that of the one referred to consists of two short *helves*, the one projecting from the other, which, by placing the mower in a less constrained and more upright position, enables him to exert his strength to the best advantage. Both helves combined constitute what is technically called the "sned," or "sneath," of which there are various forms. The helves are invariably of unequal lengths; and sometimes the longer one, to which the blade is attached, is quite straight, except at the lower extremity, where it is slightly bent upwards; but in the majority of sneds the longer helve has a peculiar curve to the left-hand side, at the upper end. The right helve, which is mortised into the left one, also differs very much in length and form, as well as in the distance from the lower end, at which it is inserted. In some sneds the left helve is attached to the right one at the distance of from eighteen to twenty inches from the handle of the latter; while in others it is inserted within ten inches of the heel of the blade. The length of the left or longer helve, to which the scythe-blade is attached, is generally about forty-four inches; and that of the other from ten to twenty inches, according to its position. The distance between the helves, at the handles, varies from eighteen to twenty-two inches, the standard breadth being the length of the workman's arm from the elbow to the extremity of the fingers. The blade is commonly three inches broad, and from forty to forty-four inches in length. The *setting* of the scythe for reaping is a point of considerable nicety, and requires some experience to do it accurately. The rule generally observed, is to make the point of the blade, the heel, and the left handle, form, as nearly as possible, the extreme points of an equilateral triangle; thus, the blade being forty-four inches in length, and the left helve, from the heel to the handle, about forty-four inches; the distance of the point of the blade from the left handle should also be about forty-four inches. Another rule observed in setting this scythe is, that when the helves, with the blade attached, are laid flat upon a level surface, with the handles turned upwards, the point of the blade should be from nineteen to twenty-one inches above it. When accurately equipped, in accordance with these rules, the scythe should balance itself exactly on both sides of the right handle; I may, also, add that the weight of a scythe-blade, forty-four inches long, is from two-and-a-half to three pounds; and that of the blade and sned together, from seven to eight pounds. The helves should be made of the finest quality of ash, and as light as is consistent with a due regard to strength and durability.

An attempt was some years ago in the north of Scotland to substitute iron for wood in the construction of the sned of the reaping-scythe, but it proved unsuccessful, and was soon abandoned, it having been found that the labour of mowing was rendered more fatiguing on the workman, in consequence of the tremor produced at every stroke of the scythe, owing to the elasticity of the iron.

When the practice of cutting corn by the scythe was first introduced, a cradle similar to that already described was deemed an indispensable accompaniment, and it is considered so still in many quarters; but experienced mowers seldom or never use a cradle or any appendage whatsoever with the scythe just described. Sometimes, however, when the corn is more than usually short and thin upon the ground, a *bow*, consisting of a light rod of iron, or of tough and flexible young wood, is attached to the sned and blade, with the view of enabling the mower the better to gather the stalks and lay them tightly in swathes after being cut; but when the crop is of ordinary luxuriance and thickness, a cradle, or bow, is wholly unnecessary for this purpose, and is seldom or never resorted to by expert mowers. Such appendages are not only useless, but cumbersome to experienced workmen, inasmuch as they act as a sort of a drag upon the scythe, and thereby increase the labour of cutting and laying over the corn in the swathe, especially when the crop is heavy.

Exertions were made, some twenty years ago, to introduce the practice of reaping with the Hainault scythe into Scotland; but although Flemish reapers were employed to instruct some of the Scottish labourers in the use of the instrument, and had itinerated for that purpose from one district to another, the attempt proved completely unsuccessful, and the Hainault scythe is now little known or employed in that country. Nevertheless, a brief description of that instrument and of the mode of using it may be interesting. It consists of a blade, of about half the length of a common scythe-blade, attached to a bent handle made of wood about an inch and a quarter in diameter. The blade is about two feet long, and 2¾ inches broad at the middle; the straight part of the handle is from sixteen to twenty-two inches long, according to the height of the mower, and is attached to the blade in such a manner as that its plane makes an angle with that of the latter, by which means the mower is able to cut a little upwards, but almost close to the ground, without stooping, while the handle inclines to the horizon about sixty or seventy degrees; the line of the crooked part of the handle, if produced, would nearly pass through the point of the blade, which gives the workman considerable power in directing the instrument. There is a leathern loop attached to the handle, into which the forefinger is introduced for the purpose of supporting the weight of the handle; and the projecting part, which, by pressing against the back of the arm, serves to keep the blade steady, terminates in a bulb or knob, which would prevent the hand slipping off, if the loop should break, or the finger slip out of it. A necessary accompaniment to this scythe is, a light staff terminating in an iron hook, which is used for pressing upon the corn while the cutting is being proceeded with. In working, the mower uses both together; with the scythe in his right hand and the hook in his left, he presses slightly upon the corn at about the middle of its height, and stepping gradually backwards, strikes it close to the ground with the scythe, laying the cut stems against the standing corn; and, by means of the hook, he, at the same time, gathers the cut stalks towards him, and with it and the assistance of the foot and scythe, the corn is placed upon bands to be bound up into sheaves.

Although it has been found and admitted that a saving of about twenty-five per cent. might be effected by the use of the Hainault scythe, as compared with the sickle, in the cutting of corn, yet the strenuous exertions made by the Highland and Agricultural Society to introduce that instrument among the Scottish farmers have, as already observed, proved wholly unsuccessful, it having in no part of the country come into any thing approaching general use. This almost universal rejection by the industrious farmers north of the Tweed of the Hainault scythe for reaping, may be attributed to various causes; partly, no doubt, to the well-known difficulty of overcoming popular prejudices and of reconciling workmen to the use of new implements; but chiefly, it is believed, to the circumstance, that that instrument, though confessedly surpassing the common serrated sickle in point of despatch, is, nevertheless, every way inferior to the scythe in the hands of an expert mower, and not, perhaps, much superior to the improved smooth-edged reaping-hook. The system of cutting corn with the Hainault scythe is practised principally in Flanders, but it bears a strong resemblance to the method of reaping, which prevails in certain districts in England under the provincial name of "bagging."

Attempts have been made at different periods to diminish the expense of manual labour in harvesting grain crops, by the invention and partial employment of machinery designed for the purpose of cutting corn; but, although it appears that implements or machines of some kind or another were resorted to for this purpose by the Romans and other nations of antiquity, a reaping-machine of a really effective construction is yet a desideratum in agricultural mechanics. Modern ingenuity has been racked to supply this desideratum, but has hitherto proved inadequate to the task. There are powerful motives, however, to induce mechanists to persevere and endeavour to perfect what has already been effected towards the attainment of the object in view. The variable climate of these countries, and the high rate of wages in some quarters, cause despatch to be of incalculable advantage during harvest; and this, added to the utility of reaping grain crops at the precise period when they attain the proper degree of ripeness, would obviously render the acquisition of a really effective reaping-machine of immense importance to the agricultural interest of Britain; and, considering the numerous appliances of mechanical skill, and the ingenuity and perseverence of British mechanists, we have reason to hope that the period is not very remote, when farmers shall have the advantage of an efficient horse machine, adapted, at least, to the reaping of standing corn. The operations of the machines which have hitherto been invented for the purpose of reaping have been attended with considerable success, when the crop to be cut was presented in an upright position, and the surface of the ground quite level; but when the corn has been in any degree lodged or entangled by the wind and rain, or the ground uneven, the use of machinery has as yet been an entire failure in most cases.

It would not, I conceive, serve any useful purpose, to occupy the valuable columns of the *Farmer's Magazine* with dry details of the successive attempts that have been made to produce an effective reaping-machine, as they have, with few exceptions, proved completely abortive. The only machines of this class with the least claims to usefulness are those invented by Mr. Smith, late of Deanston, near Stirling, and the Rev. Patrick Bell, a Scottish clergyman. A detailed description of these ingenious attempts cannot be given in this place; but a short summary of the leading features of their construction may be interesting to the general reader.

Smith's reaping-machine displays great ingenuity and simplicity of construction; and the well-known mechanical skill and perseverance of the inventor afforded strong grounds to hope that he would eventually succeed in rendering his machine a most valuable acquisition to agriculturists. But various circumstances have conspired to prevent Mr. Smith from perfecting his invention. It appears that he made the first trial of his machine on a small scale, during the harvest of 1811: it was then wrought by two men. In 1812, he contrived one of larger dimensions, to be worked by a horse but, though it cut down several acres of oats and barley with considerable ease, it was found that when met by an acclivity the horse could not move the machine with proper effect. In 1813 he made a more successful attempt with an improved machine, worked by a man and a pair of horses; and in the following year it was still further improved by an additional apparatus, tending to regulate the application of the cutter when working on an uneven surface. This ingenious machine was again tried during the harvest of 1815, before a joint-committee of the Highland and Agricultural Society, and of the Dalkeith Farming Society, the latter having previously offered a premium of £500 for a perfect reaping-machine. On that trial the machine operated with very considerable effect: but, though much approved of in a general view, was not considered so complete as to warrant the committee to award the premium. Mr. Smith's machine continued for a number of years to be the only one at all effective; but, as it did not possess the requisite qualities for perfect reaping, it did not come into actual use beyond a very limited extent. The cutter of this machine is circular, and operates horizontally; it is attached to an axle, with which it revolves with a velocity that makes one revolution for every two that the machine travels over the ground. The cutter is surmounted by a light sheet-iron drum about three feet in height, which serves as the collector or gatherer of the machine, its blade projecting some inches beyond the periphery of the lower end of the drum; and the machine is so constructed as to communicate, in moving forward, a rapid rotary motion to this drum and cutter, by which the stalks are cut, and, falling upon the drum, are carried round and thrown off in regular rows. The motion of the cutter and gathering is derived from a pair of carriage-wheels fixed upon an axle, which carries a toothed bevel-wheel, and from this last by a pinion to an horizontal shaft and second pair of bevel wheels, the last of which is fixed upon and gives motion to the cutter-shaft. The carriage-wheels with their axle bear all the frame-work and gearing of the machine, with a slight preponderance forward; and this preponderance is supported by a small roller placed under the fore part of the frame-work, near the centre of the cutter, serving to preserve the uniform height of the cutter from the ground; a pole projects backward from the body of the machine to which two horses are yoked, one on each side, by a splinter-bar, pushing the machine before them; and as the pole projects a few feet behind the horses, it serves as a rudder to the machine in the hands of the driver.

At a subsequent period, Mr. Smith effected various improvements on his reaping machine, and in 1837 it was exhibited in operation at Ayr, before a committee of the Highland and Agricultural Society, where it performed to the satisfaction of all present, both in cutting and gathering; but, at the same time, it showed marks of unwieldiness, especially from its great length, which is about twenty feet, that still rendered its general application doubtful. The chief point of its improvement at this trial lay in the gathering drum being now adapted to revolve separately from the cutter, with a velocity at its periphery equal to the progressive velocity of the machine; and in the drum also being armed with rakes or wooden teeth inserted all over its circumference, which supported and carried the cut grain round to the proper point of discharge.*

Bell's reaping machine is the most recent as well as the most perfect invention of this description. It appeared in operation in 1827-8, and received the sanction of the Highland and Agricultural Society in 1829 by a premium of £50. This machine acts upon the clipping principle, the cutter being a series of scissors, the upper blades of which are immovable; the lower or fixed cutters are made triangular, of solid iron, edged with steel; they are fifteen inches long from the point to the extremity, four inches broad at the base, and nearly one-fourth of an inch thick. The upper cutters like the under ones are made of good iron, edged with steel as far back as the hole where the bolts upon which they turn pass through; they are three inches broad where the hole is pierced, and behind the cutter-bar they are bent down about two inches to allow the rollers and canvas to operate. Both under and upper cutters are sharpened on both sides similarly to a pair of scissors; the under ones upon the upper side, and the upper ones upon the lower side, thus forming, when the cutters are screwed to their places, a perpetual cutter upon that principle. There are twelve moveable cutters and thirteen fixed ones, with intervals of six inches between the points of the latter, so that the breadth of the machine is exactly six feet: but this breadth, from the principle of the machine, may be either increased or diminished, according to the nature of the farm upon which the machine is intended to operate. Upon a perfectly level farm the machine might be made broader; but upon a farm of sloping or uneven surface, one of six feet in breadth will be found to be work enough for two horses. Motion is communicated to the cutters from the wheels upon which the frame-work is mounted: there are four wheels, the two principal ones being three and a half feet in diameter, and the two minor wheels, which support the cutters and fore-part of the machine, fourteen inches in diameter. The gathering process is accomplished by an endless web of canvas, which is placed above and behind the cutter, revolving either to the right or left; it receives the grain as it falls from the cutter, and is regularly carried to one side and dropt in a continuous swathe. To ensure the falling of the cut corn upon the web, there is a light four-leaved vane placed in front of the machine, and is made to revolve by means of a band; the leaves of this vane press gently upon the yet uncut grain, gathering it towards the web until it is severed below by the cutters, when the web carries it off. The wooden pole to which the horses are yoked is firmly fixed to the cross rails upon the top of the frame, and is ten feet long from its extremity to the frame of the machine. The horses are yoked by swing-trees of the usual form, and as their heads are necessarily towards the machine, they, in appearance, push the machine before them, but, in reality,

* Book of the Farm, vol. iii. p. 1077.

they are drawing it as in the plough. About six or eight yards of the field require to be cut at the ends to allow the machine to turn without injuring the corn, which may be done by the machine itself. If the corn is standing nearly upright, a convenient number of ridges may be taken in and cut by going round them; but if the corn is standing, and the field free from deep furrows, it may be cut by going round and round it till it is finished in the middle. One man is sufficient to manage the whole work of driving the horses and directing the machine.

For some years Bell's reaping machine was held in great estimation, particularly by the farmers of Forfarshire, in which county it was publicly tried on several occasions. It was also tried in Perthshire and Fifeshire, where it gave very considerable satisfaction. In September, 1828, the machine was tried in Powrie, in the county of Forfar, before between forty and fifty landed proprietors and practical agriculturists, who signed a declaration to the effect, that the machine cut down a breadth of five feet at once, was mowed by a single horse, and attended by from six to eight persons to tie up the corn, and that the field was reaped by this force at the rate of an imperial acre per hour. It was again tried in September, 1829, at Monckie, in Forfarshire, in the presence of a still greater number of persons, who attest that it cut in half an hour nearly half an English acre of a very heavy crop of oats, which were lodged, thrown about by the wind, and exceedingly difficult to harvest.*

But, notwithstanding the favourable opinions that were entertained of this machine shortly after its invention, it is now almost entirely laid aside, being very rarely employed at harvest work. Its utter failure of becoming so generally used as was at first anticipated, is attributed to the complicated structure of the cutter, which is liable to be easily deranged, while being difficult and expensive to rectify. More recent attempts have been made to produce a really effective reaping machine, but with scarcely any better success; so that machinery is now very seldom resorted to for the purpose of cutting down grain crops. The necessarily high price of the existing machines also operates as a great barrier to their employment by even extensive farmers, while it amounts almost to a prohibition of their use by the middling and small farmers. Besides, it is not to be expected that any reaping-machine will be capable of cutting down corn in every state in which it may be placed, by the combined effects of wind and rain; and the quantity of standing corn annually to be cut upon small or medium-sized farms hardly warrants the purchase of a reaping-machine, even could a really efficient one be obtained, which, as already observed, is a desideratum in agricultural mechanics that still remains unsupplied. The sickle and the scythe must, therefore, be regarded as the only practicable means at present of cutting corn, and the following observations shall be restricted to a description of the most approved methods of reaping by these well-known and really efficient instruments.

(To be continued.)

* The reader who desires further information on the subject of reaping-machines, may consult the early volumes of the Prize Essays of the Highland and Agricultural Society, and of the Quarterly Journal of Agriculture. A minutely-detailed description, with plates, of Bell's reaping-machine is given also in Loudon's Encyclopædia of Agriculture, pp. 422-427.

CHEMISTRY FOR FARMERS.

BY JOHN SPROULE.

AUTHOR OF A "TREATISE ON AGRICULTURE," AND OF PRIZE ESSAYS ON "FLAX," "MANURES," &c. &c.

VI. Inorganic Constituents of Plants, and their Compounds.

Having now examined the organic constituents of plants, the consideration of the inorganic ingredients which they contain next demands our attention. Most vegetable substances, after burning, leave a small residuum or ash behind, the elementary substances already considered being driven off by combustion; and this ash or fixed portion is composed of certain inorganic matters. The proportion of them existing in plants is very various, sometimes not exceeding one per cent. in their dried state, while in others it may amount to ten or twelve per cent. Being thus present in exceedingly small quantity, it was long considered that the inorganic matter was of no essential or vital consequence to the vegetable structure; the roots of which, being supposed to be incapable of rejecting any substances presented to them in solution, in this manner absorbed those mineral matters which they are found to contain; but that such matters are merely adventitious, depending upon locality, and that they might or might not be contained in the juices and solid parts of plants, without materially affecting either their growth or luxuriance. Subsequent investigations, however, and a more correct knowledge of the vegetable economy, showed that such opinion was entirely without foundation. In the bones of animals inorganic substances are present in large proportion; in fact, the organic matters only exist in such proportion as to impart the due degree of tenacity and strength to the former. But all animal matters are originally derived from plants, there being no other source from which their inorganic ingredients could be derived; and this clearly shows that they are also an essential constituent of plants. Moreover, the quantity of inorganic matter found in the ash of plants has been found to be singularly constant in the same species, under whatever circumstances they may have been produced; but if it was merely adventitious, both the quantity and quality would evidently vary according to the nature of the soil on which they grew. Hence the obvious conclusion that the inorganic substances existing in the vegetable structure are really essential parts of it, and that without a due supply of such matters being available healthy development cannot take place. The straw of wheat and other cerealia, for example, requires certain mineral matters, as well as the bones of animals, to impart strength and solidity, and enable it to perform the functions which nature requires of it; and if the necessary ingredients for this purpose do not already exist in an available state, to insure their being absorbed by the roots, the stem will not possess the required degree of strength to maintain its erect position, as well as the plant generally being otherwise unhealthy and unproductive.

Nature for the most part only requires that art should assist in giving increased facility to her operations. To supply the vegetable kingdom with the required quantity of the organic matters already noticed, the necessary conditions to secure the access of the atmosphere as fully as possible, and the proper supply of moisture, should be fulfilled; but the inorganic ingredients, which form so much the smaller portion of the structure of plants, is to a much greater extent within the province of art to regulate. The supplying of organic matters has hitherto been the chief care of the husbandman, the then state of physiological knowledge not enabling him to understand the immense proportion of them which water and the atmosphere unquestionably supply; and that much of the beneficial effects of his applications of organic matters depended on their operation on the texture of the soil, as imparting to it that degree of consistence best calculated to promote the operations of nature being carried forward. Organic matters are, however, seldom or never supplied without intermixture with inorganic substances, the latter often forming the most valuable part of the manure, though the contrary was supposed to be the fact.

For the illustration of this important subject we are chiefly indebted to the celebrated German chemist Sprengel, whose researches in this department of science have been of great practical value. They have taught the husbandman that the supply of those matters formerly considered to be merely adventitious are in reality absolutely essential in such cases as they do not already exist in abundance. They have also, to use the words of a late valuable author on the subject, established, as it were, a kind of clear relationship between the kind and quality of the crop and the nature and chemical composition of the soil in which it grows. This important information demonstrates what soils ought to contain, and, therefore, how they are to be improved; it explains the effect of some manures in permanently fertilizing, and in some crops in permanently impoverishing, the soil; it illustrates the action of mineral substances upon the plants, and shows how it may be, and really is, in a certain measure, supported by the dead earth: over nearly all the operations of agriculture, indeed, it throws a new and important light. Certain mineral substances, which have from the earliest times been applied to the soil with the best effects, have hitherto been valued as *stimulants* only, increasing the action of the more immediate elements of nutrition already existing in an inert state in the soil; but these are now justly regarded as part of the food of plants themselves, and quite as necessary as any other part which they are found to contain.

The number of inorganic elementary substances found to exist in plants is much greater than that of the organic; but some of the former only exist in certain cases, and in very small proportion. The following list, as given by Professor Johnston in his Lectures, exhibits the substances with which these inorganic elements combine, as found in plants, with the names of the combinations thus formed:—

Inorganic Elementary Substances.	In combination with	Resulting Compounds.
1. Chlorine	Metals	Chlorides
2. Iodine	Do.	Iodides
3. Sulphur	Do.	Sulphurets
	Hydrogen	Sulphuretted hydrogen
	Oxygen	Sulphuric acid
4. Phosphorus	Do.	Phosphoric acid
5. Potassium	Do.	Potash
	Chlorine	Chloride of potassium
6. Sodium	Do.	Chloride of sodium
	Oxygen	Soda
7. Calcium	Do.	Lime
8. Magnesium	Do.	Magnesia
9. Aluminum	Do.	Alumina
10. Silicon	Do.	Silica
11. Iron, and	Do.	Oxides
12. Manganese	Sulphur	Sulphurets

The foregoing elementary substances, with the single exception of sulphur, are not found to exist in nature in an uncombined state, nor can the compounds in which they usually exist be decomposed by any process going forward within the structure of plants during their growth. It is, therefore, as compounds that we have chiefly to regard them in considering their effects upon vegetation. It may further be remarked that in no state do they naturally exist in the atmosphere; and that, therefore, the only source whence plants can derive their supply of such substances is the soil.

Chlorine.—This substance, when uncombined, is only known to exist in the gaseous form; but it is by artificial means that it is procured in this state, existing in nature only in combination with other substances. It is procured with facility by adding sulphuric acid (vitriol) to a mixture of common salt and black oxide of manganese, when, if a clear flask or bottle be used, the gas will be given off, gradually filling the flask, which assumes a greenish-yellow colour from the gas which it contains. As the disengagement of the gas proceeds, after having filled the flask, it will become intermingled with the atmosphere in which it is prepared, producing a pungent and disagreeable smell, and somewhat astringent taste. It is highly irritating and injurious when respired, exciting cough and great irritation of the lungs, even when considerably diluted with atmospheric air. Water absorbs an equal bulk of chlorine, the aqueous solution thereby produced being powerfully antiseptic, and destroying contagious and infectious matter and bad odours of every kind. On this property depends the power which chlorine has of decomposing these noxious compounds, and resolving them into others which are harmless. For this purpose chlorine may be prepared as directed, and diffused through the atmosphere of infected chambers, or infected goods may be exposed to it, when all traces of infection will disappear.

One of the most important properties of chlorine is its bleaching power, it being peculiarly distinguished by its action on animal and vegetable colours, reducing them to a uniform white or whitish yellow; and when the colour is once destroyed, it can never be again restored. Chlorine has, however, no bleaching power unless water be present, as may be proved by subjecting a slip of dry litmus paper to the action of the gas, and it will remain unchanged; but if the litmus paper be moistened, the colour will quickly disappear. This property renders chlorine of much importance in the art of bleaching, for which purpose it is employed in union with lime, in the form of a solution of chloride of lime.

In combination with hydrogen, chlorine enters into the composition of *hydrochloric* or *muriatic acid*, one of the ingredients of common salt, as well as of many other saline substances, and in this way it is concerned in the economy of vegetation. Muriatic acid (the spirit of salt of the shops), in its undiluted state, is poisonous to both vegetables and animals; but in combination with soda it forms common salt, an article of essential importance both to vegetable and animal life. In a dilute state it has, in some cases, been beneficially applied to the soil; but being considerably more expensive than sulphuric acid, it is not probable it can ever be extensively employed for that purpose.

Iodine bears a considerable resemblance to chlorine in its chemical actions. It is frequently met with in nature in combination with potassium or sodium, and thus occurs in many salt and other mineral springs. At common temperatures it is a soft friable opaque solid, of a bluish black colour and metallic lustre; being very sparingly soluble in water, requiring about 7,000 times its weight of that liquid for its solution. With starch it presents a very peculiar action. When these substances meet in solution, they unite and form a deep blue precipitate, which property affords a very delicate test of the presence of iodine. Existing so largely in the waters of the ocean, iodine may be supposed to have some influence on the vegetation of marine districts.

Sulphur.—This is the only one of the elementary inorganic substances influencing the growth of plants which occurs in nature in an uncombined state; but in its pure state sulphur has no effect on vegetation. As this substance is so well known, it is not necessary to enter into any further particulars here; and we shall, therefore, pass on to its comparatively more important compounds.

Sulphur, in combination with oxygen, has already been seen to form *sulphuric acid*, an article of vast importance in the arts; and, combined with potash, soda, lime, and magnesia, it forms sulphates, which exist abundantly in nature, and are beneficially and profitably employed as manures. When sulphur is burned in the atmosphere, suffocating fumes are disengaged, which, when absorbed by water, convert it into sulphurous acid; and if the combustion be carried on in close chambers, when an additional portion of oxygen can be supplied, sulphuric acid is produced. The additional supply of oxygen is generally procured by the addition of nitre, from which it is obtained while the process of combustion is carried forward; the bottom of the apartment in which it is conducted being covered with water, to absorb the fumes thereby disengaged; and when this liquid is distilled, it becomes the sulphuric acid, or oil of vitriol of commerce.

Sulphuric acid is intensely acrid and caustic; it acts speedily upon the cuticle, occasioning a biting sensation, and in taste, even when very largely diluted, it is extremely sour. It displaces the greater number of other acids from their combinations; and probably in consequence of its strong affinity for water, it destroys most animal and vegetable substances. Besides entering into the composition of the sulphates, this acid, when largely diluted, has been used with good effect in composts of organic matters, and is thus of considerable importance in agriculture.

Sulphur combines with hydrogen, *forming Sulphuretted hydrogen*; the compound assuming the gaseous form, and being easily distinguished by its exceedingly unpleasant smell, resembling that of rotten eggs; and so diffusable is this gas, that a single cubic inch diffused through the atmosphere of a large room, is soon everywhere perceptible. It exists largely in some mineral waters, and is found in foul sewers and putrid eggs. In night soil it is also present in considerable quantity. In a pure state sulphuretted hydrogen is exceedingly noxious to animal and vegetable life; but from the luxuriance of vegetation in the vicinity of sulphurous springs, it has been supposed to act beneficially when present in a very diluted state.

Phosphorus.—This element is distinguished by its affinity for oxygen, combustion spontaneously taking place when it is exposed to the atmosphere, a whitish vapour resembling garlic being thereby produced, and the phosphorus itself gradually disappearing. It can only, therefore, be preserved under water; and when it is necessary that any manipulation should take place with it, the precaution of handling it under water should be adopted. Phosphorus is a principal ingredient in bones, from which it is usually prepared; and is possessed of many interesting properties to the chemical student, which cannot be noticed in a general sketch like the present.

By the combustion of phosphorous over water, *phosphoric acid* is obtained, similar to the preparation of sulphuric acid from sulphur. It is colourless, intensely sour to the taste, reddens vegetable blues, and neutralizes alkalies; but it does not destroy the skin like the sulphuric and nitric acids.

Phosphoric acid does not occur in nature in an uncombined state; but it exists abundantly in combination with numerous bases, forming the salts termed *phosphates*. In these states of combination, it is, indeed, almost universally diffused, entering largely into the bones of animals, and into the shells which abound to such a great extent in the ocean. Many of these phosphates are known to be powerful and valuable manures.

Potassium, in combination with oxygen, forms potash, a compound well known in the arts. The metal potassium is obtained with much difficulty from its oxide, and it is not less difficult to prepare than to preserve, in consequence of its remarkable affinity for oxygen, with which it enters rapidly into combination when exposed to the air. On this account it must be preserved in glass tubes, hermetically sealed, or under the surface of liquids, such as naptha, of which oxygen is not an ingredient. Potash, as one of the earths, was long regarded as a simple substance, until the researches and experiments of Davy showed that it was merely an oxide, the substance with which the oxygen was combined having the usual metallic properties.

The *oxide of potassium,* or *potash,* does not also exist in a pure state in nature, in consequence of the affinity which it possesses for carbonic acid, which it rapidly attracts when exposed to the atmosphere. It is a white solid substance, intensely caustic when applied to animal matter; and hence the common appellation of *caustic potash* applied to it in surgery. It is extremely deliquescent, rapidly liquefying when exposed to the air, by absorbing moisture from it. It is one of the most powerful of the alkalies, neutralizing the acids completely, attracting them more powerfully than most other bases, and rendering the vegetable blues green. Like the other alkalies, it is distinguished by its attraction for oily, fatty, and resinous matters, forming with them *soaps,* which are more or less soluble in water; while the oils are perfectly insoluble. The solution of potash is possessed of similar properties to that substance itself, and either can only be preserved by being closely corked up from the atmosphere.

There are numerous *salts of potash* of very great importance in the arts, several of which are also found in the ash of plants, and may therefore be supposed to exercise very considerable influence on vegetation. That which is most abundantly obtained in this manner is the *carbonate,* a principal source of which is the combustion of wood in counties where timber is so abundant as not to be much valued. This is the *pearl ash* or potash of commerce, so extensively employed in many processes of art. It is extremely deliquescent on exposure to the atmosphere, and is dissolved in less than its own weight of water at ordinary temperatures. It is difficult to obtain carbonate of potash in a pure state from the ash of plants, in consequence of the large number of other salts with which it is then combined. It has long and successfully been employed as a fertilizer, there being no substance with which we are acquainted, not even farm-yard manure itself, more universally a vailable for the purpose than the ash of plants.

The *nitrate of potash,* or *saltpetre,* is another salt having potash for its base. It is an abundant natural product, found chiefly in warm countries, in situations where animal matters are being decomposed in contact with potash; the nitric acid being formed by the action of the nitrogen and oxygen of the air on animal compounds. It is also formed artificially in nitre beds, when animal matters are exposed along with compounds of lime. Nitrate of lime is formed in the first instance, which being mixed in solution with carbonate of potash, yields, by a double decomposition, nitrate of potash and carbonate of lime. Exudations containing saltpetre are not uncommon on new walls, when it appears to arise from the decomposition of animal matter contained in the mortar. When heated strongly, nitrate of potash yields its oxygen; and if in contact with inflammable matter, deflagrates, imparting oxygen, and promoting its rapid combustion. Hence its importance in the preparation of sulphuric acid and gunpowder. It has been employed successfully as a manure, and is known to be an agent of considerable importance in promoting vegetation.

But it is not necessary to enumerate or describe the various other salts of potash which are found in greater or less quantity in plants. It may be remarked of them generally that they are highly soluble in water, though perhaps less so than the salts of ammonia.

Sodium resembles potassium in many particulars. It has the same powerful affinity for oxygen, and can only be preserved by similar means—in hermetically sealed tubes, or in the vapour of naptha. In combination with oxygen it forms *soda.* In consequence of the strong affinity soda possesses for carbonic acid, it is never found, in nature, in a pure state; the oxide, on exposure to the atmosphere, rapidly attracting that acid, and being thus converted into carbonate. Soda, like potash, is extremely caustic; but it may, in general, be distinguished from the latter, by forming an *efflorescent* paste when exposed to the atmosphere, while potash under similar circumstances *deliquesces.* Caustic soda is, to a certain extent, formed by the former, in mixing quicklime and common salt, or chloride of sodium. The latter is thereby deprived of its chlorium, which enters into combination with the lime, forming chloride of lime, caustic soda being formed at the same time, which, however, gradually becomes changed into carbonate, as already noticed.

As the caustic soda is only procured by artificial means, and preserved with difficulty, it is but little known, and the term *soda* is generally applied to the *carbonate.* This useful salt, as most of our readers are aware, is procured from kelp or barilla, which is the ashes of burnt sea-weed. Barilla is the ash procured from the *Salsola soda, Salicornia herbacea,* and other plants growing on the shores of the Mediterranean, and containing a larger proportion of carbonate of soda than kelp, which is procured by the incineration of several species of *Fucus* cast ashore in our own country. The carbonate of soda is also prepared from common salt, by the abstraction of the chlorine; but more commonly from the sulphate, by the addition of powdered chalk and charcoal. The lime of the chalk having a stronger attraction for the sulphuric acid than the soda, the sulphate of soda is decomposed on a powerful heat being employed, sulphate of lime and carbonate of soda being thereby formed, after which the latter is procured in a tolerably pure state by filtration, the sulphate of lime being insoluble. The carbonate of soda is well known in domestic economy, both in the preparation of several summer beverages, and in the manufacture of bread, its adaptation for these purposes depending on the carbonic acid which it contains, and which it parts with so readily, either by the addition of any other acid, or by the application of heat. It exists to a considerable extent in nature, and is supposed to exercise an important influence in the process of vegetation.

Common salt, or chloride of sodium, is another important substance widely extended, and exerting the most beneficial influence, both on man and animals. This substance is much employed in the arts. It is used as a seasoning, and to preserve meat from putrefaction, being powerfully antiseptic. It exists as a mineral under the name of *rock salt*, is the chief ingredient of sea water, and is contained in many saline springs. From these sources are derived the numerous varieties of common salt, such as rock, bay, fishery, and stoved salt, which differ from each other only in degrees of purity and modes of preparation. The rock and bay salt are the purest varieties; but they always contain small quantities of sulphate of magnesia and lime, and chloride of magnesium.

Common salt has been used as a fertilizer from the earliest period, and when judiciously employed, it may be said, invariably with success. All fertile soils contain it in greater or less quantities, and it is a constituent of all vegetables and animals.

The *sulphate of soda*, or Glauber's salt, is usually prepared from common salt, by pouring upon it diluted sulphuric acid, and applying heat. It is, however, also a natural product, being found in several countries, and occurring in many mineral waters. It is also found in the ashes of some plants, and in some of the animal fluids.

The *nitrate of soda* is analogous in its composition to the nitrate of potash previously noticed, and is possessed of many of the properties of the latter salt. It is plentifully found in the soil in some parts of India: and in Peru it covers large districts, and occurs in immense quantity. It has hitherto been chiefly employed as a substitute for the nitrate of potash, being somewhat cheaper; but latterly it has attracted very considerable attention as a manure, with, however, a very varying reputation for that purpose.

Calcium.—This is the metallic base of lime, which was supposed to be a simple substance, until decomposed by Davy, in the same manner as potash and soda. Calcium is still more difficult to prepare than either potassium or sodium, and requires the same means to be employed for its preservation. It does not, of course, in its elementary state, exercise any influence on vegetation; but it is no less wonderful than interesting to consider that lime, so largely employed in agriculture and the other arts of civilized life, is merely the oxide of a metal which might itself be turned to many valuable purposes, did it not possess such a very powerful attraction for oxygen, as to enter into combination with it, the moment these substances come into contact with each other.

The oxide of calcium—or *quicklime*, as it is usually termed—is also not a natural product: it is only obtained by artificial means, chiefly from the carbonate: and it can only be preserved by exclusion from the atmosphere, the carbonic acid of which it rapidly attracts, again returning to its former state of carbonate. Pure quicklime is white, or of a very pale grey tint; it is acrid and caustic, and has a powerful alkaline reaction on the usual tests. By the addition of water it is converted into a hydrate of lime, a great rise of temperature accruing while the water is being added, caused by the solidification of a portion of the water, a great increase of bulk in the lime also taking place. This constitutes the process of slaking so well known. The hydrate of lime thus obtained is very sparingly soluble in water and, contrary to what is usually experienced in the case of similar substances, it is more soluble in cold than in hot water; so that in a concentrated solution of lime water, a deposition would take place.

The importance of lime as an agent of almost universal fertility is well known. It materially hastens the decomposition of vegetable matter when air and moisture are present, carbonic acid and other compound substances being thereby produced, capable of exciting a beneficial influence on the growth of plants. When applied to the soil in the state of quicklime its action is energetic, but it soon becomes effete, and changed into a carbonate, or some of the other salts of lime, according as it may meet with acid matters in the soil.

The greater portion of the lime existing in nature is in the form of *carbonate*, and to this substance our attention is now to be directed. This is an abundant native compound, forming, it has been calculated, about one-eighth part of the crust of the earth. All the varieties of marble and limestone consist essentially of carbonate of lime; of these, white granular limestone, or primitive marble, is most esteemed in the arts; there are also many coloured varieties of extreme beauty. These are distinguished from secondary limestone by the absence of organic remains, and by its granularly foliated structure.

Carbonate of lime is nearly perfectly insoluble in water, 16,000 parts, or more, of water, being required to dissolve one part of the carbonate; but, as previously stated in considering the properties of carbonic acid, it is sparingly soluble in water containing that acid in solution; and the excess of carbonic acid being given off by exposure to the air, the carbonate of lime is then precipitated. Hence the deposits of marble and limestone, the stalactites depending from the roofs of caverns, bridges, &c., and many petrifactions of organic bodies impregnated with water containing carbonate of lime in solution.

The preparation of quick lime from the carbonate is effected on a large scale in kilns constructed for the purpose, in which any of the numerous varieties of limestone are introduced, having been previously broken into pieces, and subjected, in the kiln, to a red heat, by being intermixed with fuel as the work of filling the kiln is carried forward. The pieces of limestone descend towards the bottom of the kiln in proportion as the fuel is burned away, being in the mean time kept at a pretty full red heat. At this temperature the water and carbonic acid are driven off; and by the time the limestone arrives at the bottom of the kiln, which happens, usually, in about forty-eight hours, it is rendered perfectly caustic. The door above the grate is then opened, and the lime below the next descending stratum of fuel is raked out; the remaining contents of the furnace sink down, and a fresh charge is laid on at the top. The compact limestone, after having undergone this process, though much lighter and more porous than before, still retains its figure unaltered; hence it readily separates from the ashes of the fuel, and is sufficiently hard to be carried from place to place without falling to pieces. Lime is usually combined with other matters in greater or less proportion in the solid rock, and the loss in weight by burning is, to some extent, a criterion of the degree of purity in which it exists. Other carbonates may exist, and frequently do; and so far as they are concerned, this test will be of no value, as they, too, part with their carbonic acid on the application of heat; but the decrease in weight will afford a tolerably accurate test of the extent to which other substances are present. Pure carbonate of lime will lose about 44 per cent. of its weight by burning.

Chloride of calcium is a natural product, formed by the combination of quicklime and muriatic acid. It has already been seen to be produced by the mixture of common salt and lime. It occurs in sea-water, and is also found to exist in plants and in the soil. This substance is largely employed in the arts, it being the form in which chlorine is chiefly used for bleaching, as already stated when considering the properties of that element. It is very soluble in water, and extremely deliquescent.

Sulphate of lime is another very important substance which occurs as an abundant mineral deposit in many parts of the globe. It is easily formed artificially by dropping sulphuric acid upon lime, in which case there is a great evolution of heat. It is somewhat more soluble than the carbonate, but still very sparingly so. Nearly all spring and river water contains this salt, and in those waters which are called *hard* it is abundant; it gives to them a slightly nauseous taste, and renders them unfitted for washing or for culinary use. It contains nearly 21 per cent. of its weight of water, which it loses on being exposed to a red heat. It is then easily reduced to powder; in which state, so readily does it again combine with the water which it had lost, that when formed into a paste it rapidly sets; and hence its adaptation for making casts and various other kinds of ornamental work. Gypsum, the name by which the sulphate of lime is usually distinguished, exists in considerable quantity in some of our cultivated plants, and in certain cases it is extremely valuable as a manure.

The only remaining compounds of lime which it is necessary to notice here are the *phosphates*. Lime combines with phosphoric acid in several proportions, forming as many different compounds. The most important of them is the *sub-phosphate* or *earth of bones*. This phosphate exists in bones and other parts of animals, and is obtained from the former by calcination after every thing combustible has disappeared; it constitutes about 57 per cent. of the dried bones of the ox, is present in lesser quantity in the horns, hoofs, and nails, but is never absent even from the flesh and blood of healthy animals. A native phosphate of lime, identical in composition with that obtained from bones, occurs crystalized and massive, of singular beauty, in certain parts of Cornwall and Devonshire. It is one of the most beautiful of the phosphorescent minerals, and when fragments of it are placed upon a hot iron, they shine in the dark with a pale green light. This phosphate is white and insipid, and where recently precipitated and boiled in water, a trace of it remains in solution, and if gelatine or starch be present, a very sensible portion is taken up.

Magnesium and its compounds.—Magnesium resembles the metallic substances already noticed as being the basis of magnesia, which is merely the oxide of that metal. Magnesia differs much in its properties from either potash, soda, or lime. It exists in the state of a white insipid substance, known as the calcined magnesia of the shops, and may be obtained by heating the carbonate to redness. Though possessing a considerable degree of affinity for carbonic acid, it does not attract it nearly so rapidly as the oxides just named, nor is it possessed in any degree of caustic properties. It is extremely insoluble, requiring no less than 5,000 times its weight of water to dissolve it.

Carbonate of magnesia is also a tasteless earthy compound, existing in considerable quantity in some places, forming rocky masses and veins of considerable thickness. It occurs so largely in certain limestone formations, as to cause them to be distinguished as *magnesian limestone,* and these are regarded as of very inferior value for agricultural purposes. It is soluble in about 48 times its weight of water after exposure to the air, though when dry it is nearly insoluble; it is more soluble in water impregnated with carbonic acid gas. The other salts of magnesia are in some degree similar to those of lime, and need not be separately noticed here.

Aluminum and its compounds.—The term aluminum has been applied to the metallic base of the earth alumina, a substance of common occurrence in the mineral world, and of great importance in its applications to the arts. It somewhat resembles the metallic bases of lime; but as it never occurs in nature, and is produced by art with great difficulty, it is not necessary to enter further into the consideration of its properties.

Alumina, or the earth of alum, the oxide of aluminum, is a colourless, insipid, infusible, and insoluble, powder. It has a powerful affinity for water, attracting moisture from the atmosphere with avidity, and for a like reason it adheres tenaciously to the tongue when applied to it. Mixed with a due proportion of water, it yields a soft cohesive mass, susceptible of being moulded into regular forms, a property upon which depends its employment in the art of pottery. When once moistened it cannot be again rendered anhydrous, except by exposure to a full white heat; and in proportion as it parts with water its value diminishes. It forms a large proportion of all clayey soils, to which it imparts the property of tenacity by which they are so eminently distinguished. Though occurring so largely in nature, it does not appear to be continued in any sensible proportion in the ash of plants; it is, therefore, to be, perhaps, chiefly regarded as valuable on account of its mechanical properties. Sandy or gravelly soils, deficient in alumina, are rarely remarkable for their fertility, but, on the contrary, they are usually distinguished for very opposite qualities.

It is to the presence of alumina that certain kinds of earth are susceptible of being manufactured into bricks and tiles, and it may be regarded as a bountiful provision of nature that the facility for the formation of such materials exists where they are most required. In combination with silica, it enters into the composition of the various kinds of earthern ware, of which it is the chief ingredient. Minerals or earths containing these bodies are ground to very fine powder, made into the consistence of cream with water, and evaporated until a softish mass remains, which can be cut with a knife, and easily worked by the hand. A lump of this is moulded by the hand, and after acquiring the desired shape, for producing which a turning-lathe is also often used, it is heated in a kiln, when the greater part of the water is driven off, and the ware is hard. By succeeding processes colours are laid on where they are desired, and a second heating, after the necessary materials for the glazing have been applied, usually completes the process.

Alumina is not found to exist in any considerable quantity in any of its other combinations in the soil, nor have the effects of them on vegetation been ascertained to such an extent as to require further notice.

Silicon and its compounds.—Silicon does not exist in nature in an uncombined state, and is known only as the base of silica. This is the chief ingredient in all sand stones, and in nearly all sands and sandy soils. Flints are nearly pure silica, and quartz is only another form of the same substance, while the colourless and more or less transparent varieties of rock crystal and chalcedony present it in a state of almost perfect purity. In its ordinary state, it is a harsh white powder, insoluble in water, and in most other solvents. It does not affect the vegetable colours, but has the general chemical relations of acids, expelling carbonic acid from the carbonates by the aid of heat, and combining with the alkalies and earths. Hence it is frequently termed *silicic acid.*

In combination with potash and soda, silica exists in many mineral substances, such compounds being termed silicates; they also exist in glass in different proportions. Notwithstanding their insolubility, they exist in the stem and leaves of plants generally. They are abundant in the stems of the grasses, especially in the straw of the cultivated grains, from the ash of which they may be obtained after burning. Silicates of lime, alumina, and magnesia, also exist in soils, and are found to a greater or less extent in the stems of growing plants.

Of these silicates it may be remarked that besides being produced by various natural agents, constantly in operation in the disintegration of rocks and the consequent formation of soils, they are also formed in the soil itself when the necessary ingredients for their formation are present. The addition of potash or soda to the land may, therefore, cause the production of the silicates of these alkalies, which water may, to some extent, dissolve and carry to the roots of plants. The silicates of potash and soda are those only in any degree soluble.

Iron and its compounds.—Iron is well known to exist in the soil in various propertions, often indeed to such an extent as to prove extremely injurious to the vegetation produced thereon. On exposure to the air and moisture it is well known that a rust is formed on it, produced by the combination of oxygen with the iron, to which the term of *oxide of iron* is applied. Two compounds of this nature are formed—the protoxide and the peroxide. The reddish sediment seen in streams where iron exists in the soil is formed by the peroxide, which is insoluble. In combination with acid substances, these oxides form soluble salts, which frequently are attended by very injurious effects.

Iron also enters into combination with sulphur, forming sulphurets, which occur occasionally in boggy and marshy soils, in which salts of iron exist. In coal formations sulphuret of iron is also extremely abundant, and is the source of the sulphurous smell which many varieties of coal emit while burning. These sulphurets absorb oxygen from the atmosphere, and form sulphuric acid, and this again, combining with the iron, forms sulphate of iron, or green vitriol, or copperas, as it is usually termed. This substance is extremely injurious to vegetation, but its effects may be neutralized by the application of lime, which, having a greater attraction for the sulphuric acid than the iron, decomposes the sulphate, forming again oxide of iron and sulphate of lime. This is one of the numerous important functions fulfilled by lime in the hands of the judicious cultivator.

When sulphate of lime in solution is exposed to the atmosphere, a pellicle of a yellow ochry colour is seen to form on it, which is gradually deposited; the sediment thus produced consists of peroxide of iron, containing a little sulphuric acid, which, in consequence of the sourness it imparts to the soil, is attended by the worst possible effects. Here, drainage and the application of lime will correct the evil.

Manganese.—This is the only remaining inorganic substance found to exist in plants. It is also a metallic substance, but from its peculiar properties it is not an object of manufacture, nor is it supposed to exert any considerable influence in nature, though abundantly diffused, yet for the most part existing only in small quantity. It combines with oxygen in several proportions, forming oxides which are insoluble in water. Salts of manganese are also formed by the addition of acids to these oxides, but they are not distinguished by any peculiar qualities. It is in the form of an oxide that manganese is generally found in vegetables, which being insoluble it may be supposed that it is taken up in combination with some of the acids, and by decomposition in the vegetable structure the acids are disengaged, and oxygen takes their place.

Hereford Farmers' Club.—At a recent meeting of this club, on the discussion of the subject of "The best system of tenure adapted for landlord and tenant," the members were unanimously of opinion that "A system of *leases upon corn rents* was the best that could be adopted for the interest of both landlord and tenant."

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A Weekly Council was held at the Society's House in Hanover-square, on Wednesday, the 25th of June, present: His Grace the Duke of Richmond, K.G., President, in the chair; Earl of Lovelace, Viscount Torrington, Lord Portman, Lord Bridport, Lord Lovaine; Hon. R. H. Clive, M.P.; Hon. Capt. Spencer; Hon. G. Agar; Sir John V. B. Johnstone, Bart., M.P.; Sir R. Price, Bart.; Sir D. Baird, Bart.; T. Alcock, Esq.; R. Archbold, Esq., M.P.; Col. Austen, M.P.; J. Baines, Esq.; T. R. Barker, Esq.; E. Buller, Esq., M.P.; F. Burke, Esq.; Dr. Calvert; Col. Challoner; F. C. Cherry, Esq.; W. A. Cherry, Esq.; J. Cotes, Esq.; J. Dean, Esq.; H. Drummond, Esq.; E. W. Etheredge, Esq.; C. Eyre, Esq.; J. H. H. Foley, Esq.; A. E. Fuller, Esq., M.P.; H. Gibbs, Esq.; B. Gibbs, Esq.; J. B. Glegg, Esq.; W. Ormsby Gore, Esq., M.P.; G. F. Heneage, Esq.; W. Fisher Hobbs, Esq.; E. Holland, Esq.; T. Houlding, Esq.; M. H. Jenner, Esq.; J. Kinder, Esq.; Col. Mac Douall; A. Ogilvie, Esq.; E. W. W. Pendarves, Esq., M.P.; F. Pennington, Esq.; E. S. Chandos Pole, Esq.; P. Pusey, Esq., M.P.; F. Pym, Esq.; W. Pyne, Esq.; Prof. Sewell; W. Shaw, Esq.; J. V. Shelley, Esq.; S. Solly, Esq.; W. R. C. Stansfield, Esq., M.P.; T. Turner, Esq.; T. Tweed, Esq.; W. W. Whitmore, Esq.; H. Wilson, Esq.; Jos. Yorke, Esq.

The following communications were laid before the Council:—

1. On barking and felling pine timber. By George Turner.
2. On the evils resulting from over-feeding animals for public exhibition; their remedy, and the advantages to be derived therefrom. By George Drake.
3. Description of a double-action grooved land-roller. By John Steward Hepburn.
4. Facts and suggestions relative to ammoniacal manures. By E. Nash.
5. On the cultivation of flax. By J. H. Dickson.
6. On a machine for draught on uneven ground. By G. Beaumont.
7. On a grub ravaging the Swedish turnip crops in the Island of Anglesey. By R. Prichard (communicated by A. E. Fuller, Esq., M.P.)
8. Suggestions for a prize on the subject of paring and burning. By T. Beale Browne.

Thanks having been ordered for these communications, the President stated that a book constantly lay on the table for the purpose of receiving suggestions from any member of the Society on any topics connected with the objects of the Society; and, although the Council could not pledge themselves to the adoption, in every case, of such recommendations, they would not fail to receive from them every consideration and attention.

The following Committees also held meetings on the same day:—

The General Shrewsbury Committee, the Right Honourable Earl Spencer in the chair; at which the general arrangements for the ensuing country meeting, and an inquiry into the best modes of conveyance for passengers and stock, were taken into consideration.

The Collection Committee, Mr. Pym in the chair, at which further progress was made in carrying out the system of a local collection of the subscriptions.

The House Committee, Mr. Raymond Barker in the chair; at which orders were given for the preparation of alphabetical and classed catalogues of the library, and of glass cases and guard books for the preservation and exhibition of the Society's collection of Wheats.

The Show-yard Committee, Mr. H. Gibbs in the chair; at which various points of detail connected with that department were brought under consideration.

The President gave notice that a Special Council for deciding on the Prizes for the Newcastle-on-Tyne Meeting in 1846, would be held on Saturday, the 28th of June.

The Weekly Council adjourned to Wednesday next.

A Special Council was held on Saturday, the 28th of June, for the purpose of deciding, agreeably with the tenour of the bye-laws, the Prizes to be offered for the Society's Country Meeting, to be held in 1846, at Newcastle-on-Tyne, for the northern district; comprising the counties of Northumberland, Cumberland, Durham, Westmorland, (including Berwick-on-Tweed): present, His Grace the Duke of Richmond, K.G., President, in the Chair; Lord Worsley, M.P.; the Hon. R. H. Clive, M.P.; Sir Robert Price, Bart.; Samuel Bennett, Esq.; F. C. Cherry, Esq.; W. A. Cherry, Esq.; Humphrey Gibbs, Esq.; Brandreth Gibbs, Esq.; C. Hillyard, Esq.; Professor Sewell; John Villiers Shelley, Esq.; and John Hearle Tremayne, Esq.

Prize-Sheet.—The Council decided on the terms and amount of the various prizes for 1846; of which the following is a summary statement, including the amount of Prizes for Essays decided at a former meeting:—

Short-horned cattle	£125
Hereford cattle	125
Devon cattle	125
Cattle of any breed	85
Horses	125
Leicester sheep	115
Southdown sheep	115
Long-woolled sheep	115
Mountain sheep	50
Pigs	70
Wool	30
Agricultural Implements	300
Prize Essays for 1846	320
	£1,700

Conveyance to Shrewsbury.—The President called the attention of the Council to the arrangements in progress for the conveyance of passengers and stock to the Shrewsbury Meeting; and to the extremely liberal and handsome manner in which the Chairman and Board of Directors of the London and Birmingham Railway had signified their willingness to promote the objects of the society, by granting a free transit along their line of railway to the Stock and Implements intended for exhibition; and the coaches and horses required to complete the journey to Shrewsbury from the terminus of either Stafford or Wolverhampton.

The noble Duke then read to the Council the following letter:—

London and Birmingham Railway,
Office, Euston Station, June 27, 1845.

Dear Sir,—Referring to your letters of the 19th and 25th inst., I am instructed to inform you, that the Directors have consented to the free conveyance over this railway of Stock and Implements, entered bona fide for show at the country meetings of the Royal Agricultural Society; and for the free passage of carriages and horses belonging to coach-proprietors, for use between Shrewsbury and Stafford, or Wolverhampton, by parties who have travelled to either of these stations by railway. I am, dear Sir, yours, faithfully,

(Signed) R. Creed, Secretary.

To James Hudson, Esq.

A Monthly Council was held on Wednesday, the 2nd of July; present—his Grace the Duke of Richmond, K.G., President, in the chair; Earl of Lovelace; Lord Hatherton; Hon. R. H. Clive, M.P.; Sir Francis Lawley, Bart.; Sir John V. B. Johnstone, Bart., M.P.; Sir Charles Lemon, Bart., M.P.; R. Archbold, Esq., M.P.; Colonel Austen, M.P.; J. Baines, Esq.; T. Raymond Barker, Esq.; T. W. Bramston, Esq., M.P.; W. R. Browne, Esq.; Col. Challoner; F. C. Cherry, Esq.; W. A. Cherry, Esq.; R. W. Corringham, Esq.; Wilbraham Egerton, Esq.; A. E. Fuller, Esq., M.P.; H. Gibbs, Esq.; W. Ormsby Gore, Esq., M.P.; S. Grantham, Esq.; W. Fisher Hobbs, Esq.; W. H. Hyett, Esq.; S. Jonas, Esq.; G. Kimberly, Esq.; J. Kinder, Esq.; Col. Mac Douall; R. Milward, Esq.; E. S. Chandos Pole, Esq.; P. Pusey, Esq., M.P.; Prof. Sewell; W. Shaw, Esq.; J. V. Shelley, Esq.; W. R. C. Stansfield, Esq., M.P.; J. Manners Sutton, Esq.; C. H. Turner, Esq.; and F. Woodward, Esq.

Finances.—Mr. Raymond Barker, Chairman of the Finance Committee, presented to the Council the Report of the Committee on the State of the Funds of the Society on the last day of the month of June; from which it appeared that the amount of invested capital in name of the trustees stood at 8,200*l.* stock, and the current cash balance in the hands of the Bankers at 3,912*l.* (including a special balance of 780*l.* on the Shrewsbury account).

Shrewsbury Meeting.—Earl Spencer, Chairman of the General Shrewsbury Committee, transmitted to the Council the Report of the Committees for the selection and recommendation of the Judges of Stock and Implements at the ensuing country meeting. This Report was taken into consideration by the Council, and the appointments finally declared. Mr. Humphrey Gibbs was appointed one of the Stewards of Implements in the place of Mr. W. Miles, M.P., who, from injuries he had so unfortunately sustained in the recent accident on the Great Western Railway, would be unable to attend to the arduous duties of that department at the Shrewsbury meeting.

The President having laid before the Council the letter received from the London and Birmingham Railway Company, in reference to the free conveyance over their line of the stock and implements of exhibitors, and the coaches and horses of coach proprietors, for the completion of the route to Shrewsbury, it was unanimously resolved, that a vote of the best thanks of the Council should be conveyed to the Chairman and Directors of that Company, for the extremely liberal concessions they had made in favour of the Society, and for the promotion of its objects.

The Council then proceeded to take into consideration their Resolution of the 4th of December last, carried on the motion of the Hon. Capt. Spencer, namely :—

"That after the awards of the Judges of Cattle shall have been delivered to the Director of the Yard by the several Stewards, such Members of Council (not being exhibitors) whose duties for the Society prevent them from seeing the cattle when the public are admitted, who shall be named by the Council prior to the meeting, shall be admitted to view the Cattle from five o'clock till seven of the Wednesday (provided the awards shall have been delivered); but that the awards shall not be declared before the usual time, namely, after the Council dinner."

The Council declared the following to be the parties to whom such special privilege should be granted, viz., Lord Portman (Steward of the Pavilion and Council Dinners), Colonel Austen, M.P. (Steward of Finance), Mr. Raymond Barker (Steward of Receipts and Admission to Show Yards), Mr. Henry Wilson (Steward of the Sale of Tickets), and Mr. Hudson (Secretary of the Society).

Rotation of Districts.—Mr. Fisher Hobbs having called the attention of the Council to the importance of deciding on the future districts for the Country Meetings, on the near termination of the present schedule, it was resolved on the motion of Mr. Shelley, seconded by Mr. Shaw, that the following committee should be appointed to consider the succession of districts to be adopted after the year 1847, viz.: Duke of Richmond, Earl Spencer, Sir John Johnstone, Mr. Shelley, Col. Challoner, Mr. Fisher Hobbs, and Mr. Shaw.

Newcastle Meeting.—The following General Newcastle-on-Tyne Committee was appointed, for the Meeting at that town next year:—The Duke of Richmond (Chairman), Sir Matthew White Ridley, Bart. (Vice-Chairman), Earl Spencer, Lord Portman, Hon Capt. Spencer, Sir John Johnston, Bart., M.P., Col. Austen, M.P., Mr. Raymond Barker, Col. Challoner, Mr. H. Gibbs, Mr. B. Gibbs, Mr. Grey (of Dilston), Mr. Fisher Hobbs, Mr. Miles, M.P., Mr. Pusey, M.P., Mr. Ramsay (of Newcastle-upon-Tyne), Mr. Shaw, Mr. Shelley, and Mr. Thompson.

Various communications, having reference to the business of the Weekly Council, were postponed for consideration and discussion, to Wednesday next, the 9th of July.

A weekly Council was held at the Society's House in Hanover-square, on Wednesday, the 9th of July, present: His Grace the Duke of Richmond, K.G., President, in the chair; Lord Portman; Hon. R. H. Clive, M.P.; Hon. G. Agar; Sir C. Lemon, Bart., M.P.; Sir M. W. Ridley, Bart.; R. Archbold, Esq., M.P.; Col. Austen, M.P.; J. Baines, Esq.; T. R. Barker, Esq.; R. Beman, Esq.; J. Benett, Esq., M.P.; F. Burke, Esq.; Dr. Calvert; Col. Challoner; F. C. Cherry, Esq.; W. A. Cherry, Esq.; G. Cottam, Esq.; Col. M'Douall; J. Dean, Esq.; C. Etheredge, Esq.; F. W. Etheredge, Esq.; T. B. Glegg, Esq.; W. Fisher Hobbs, Esq.; E. Hussey, Esq.; J. Kinder, Esq.; Capt. Langley; H. Price, Esq.; W. Pyne, Esq.; Prof. Sewell; S. Solly, Esq.; Prof. Spooner; W. Stace, Esq.; W. R. C. Stansfield, Esq., M.P.; J. H. Tremayne, Esq.; T. Turner, Esq.; T. R. Tweed, Esq.; and J. L. Wight, Esq.

1. Plans and illustrations of a machine recently invented by Mr. Ridley, a settler at Adelaide, for the purpose of reaping corn, by threshing the ears of the standing crops. Communicated by the Right Hon. Lord Stanley, Her Majesty's Secretary of State for the Colonial Department.
2. Copies of Mr. Foote's prize essay on the Manufacture and Application of Manures, for such of the members of the Council as had expressed a desire to possess copies of that work on its presentation to the Council at a former meeting, by His Excellency the Hon. Edward Everett. From Henry Colman, Esq.
3. Specimens of draining tiles and pipes, made in Mr. Dixon's yard, at Witham, in Essex.
4. Specimens of ornamental harness mounting, manufactured by Mr. James Marlow, of Walsall.
5. Proposal for the construction of a machine for the two-fold purpose of pulverising the soil, and clearing it of stones. From Mr. Joseph Wright, of Brompton.
6. Specimen of earth transmitted from North Wales, by the Rev. E. O. Hughes, Vicar of Llanbadrig, with a statement that it had been formerly fetched away, at a considerable distance, and with some difficulty, from that part of the country, in small bags, on account of its estimation as a manure. From Mr. Kimberley.

7. Analyses of Lincolnshire Marl, and the surface and sub-soils of a field in Norfolk, made by Dr. Playfair, consulting-chemist to the Society.
8. A letter from Mr. Bullen, Secretary of the Royal Agricultural Improvement Society of Ireland, stating that the ensuing annual country meeting of that society would be held at Ballinasloe, on the 30th of September next, for which all stock and implements would be conveyed, by way of Dublin, free of expense, by the steam-boat and canal companies, to the place of meeting.
9. A letter from Mr. Fuller, M.P., in which he stated that the grubs destroying the Turnip crops in Anglesey, and which were exhibited by him at a former meeting, had been submitted to the inspection of Mr. Curtis, who informed him that they were not of the same kind as those which destroyed the crops four or five years ago, but totally different, being the larvæ of a large gnat called the crane-fly. Mr. Curtis thought there was no remedy against them but that of hand-picking, which might be performed by children at a trifling expense.
10. A communication from Mr. Hillyard, on the advantages derived from encouraging cross-breeding in animals.
11. A statement by Mr. Raymond Barker of the result obtained by a friend of his in the West Indies, who had imported the best Devon bulls he could procure from England, and crossed them with the native cows in those islands. The produce had all the appearance and qualities of the pure Devon breed of the males, without any traces of the inferior character of the females from which they were bred.
12. The following communication from Mr. G. T. Hume, of Parkgate, Cheshire :—

Experiment by Mr. Morton and Dr. Lyon Playfair.

(1). Five sheep were fed in the open air, between the 18th of Nov., 1842, and the 9th of March, 1843, consuming $75\frac{1}{2}$ gallons of Oats and 1,912 lbs. of Swedish Turnips, putting up in the time 23 lbs. of meat.

(2). Five sheep were housed and fed in the dark, for the same period, consuming $75\frac{1}{2}$ gallons of Oats, and 886lbs. of Swedish Turnips, putting up in the time $25\frac{3}{4}$ of meat.

The balance was accordingly in favour of house-feeding: $2\frac{3}{4}$lbs. of meat being gained, 1,026 lbs. of food saved, and the whole manure reserved.

13. An offer of services for promoting the objects of the Society during his residence at Stanley, Frederickton, New Brunswick, from Mr. P. Hayne, one of the members of the Society.
14. Mr. Hillyard transmitted specimens of the cultivated Gold of Pleasure Flax, and a troublesome weed in his neighbour's crops, to which it bore a strong resemblance.
15. Mr. Fisher Hobbs, Mr. Benett, M.P., Sir Charles Lemon, Bart., M.P., Mr. Tremaine, Mr. Solly, Mr. Stansfield, and Mr. Cherry, favoured the Council with highly interesting statements connected with the cultivation of flax; and Mr. Clive, Mr. Fisher Hobbs, Mr. Etheredge, and Mr. Benett, on results of experience in draining.
16. Mr. Raymond Barker reported the arrangements made by the General Shrewsbury Committee for conveying passengers to the ensuing meeting, by coaches and omnibus sent down to Wolverhampton to work the ground at stated fares from that station to Shrewsbury; places being secured at the Euston station of the London and Birmingham railway.
17. Mr. Pears, of Cambridge, communicated a statement on the occurrence of ergot in grasses.
18. The Rev. Joseph Nodder, a letter on the epidemic among cattle; referred to Professor Sewell.
19. A letter from the Agricultural Society of St. Michael's, in the Azores, requesting communication with the Society. The journals of the Society were ordered to be sent.
20. A suggestion to reprint a collection of American tracts on agricultural subjects.

The Council then adjourned to Wednesday, the 30th of July.

NEW MEMBERS.

Sir Charles Douglas, M.P., of Wilton-crescent, was elected a Governor, and the following gentlemen Members of the Society :—

Austin, William Hazledine, Manor House, Woore, Drayton, Salop
Brittain, George Dawes, Ercall-Park, Wellington, Salop
Butcher, Richard, Longville, Wenlock, Salop
Chambers, William Mellish, Hodsock Priory, Bawtry, Notts
Cope, William, Shiffnal, Salop
Corbett, Edward, Longnor Hall, Shrewsbury
Corbett, Vincent, Worthy, Sheffield, Yorkshire
Coyne, Charles, Coyney Hall, Loughton, Staffordshire
Craigh, Rev. J., Chipeprton, King's Langley, Herts
Crespigney, P. C., Wootton-under-Edge, Gloucester
Dashwood, Henry, Kirtlington, Woodstock, Oxon
Dent, John, Worcester
Dent, Villiers, Avon Cottage, Ringwood, Hants
Dixon, Peter, Holme-Eden, Carlisle
Drury, J., Shawbury, Shrewsbury
Eden, John, Beamish Park, Chester-le-street, Durham
Egerton, Rev. Thomas, Middle Rectory, Shrewsbury
Fowler, F. E. H., 28, Sackville-street, London
Freme, James, jun., Shrewsbury
Gardener, Joseph, Oxford Arms, Kington, Hereford
Grace, Henry, Gates, Ewhurst, Northiam, Sussex
Hamer, David, Glanafon, Salop
Hamer, John, Glanafon, Salop
Harries, Francis, Jun., Cruchton Hall, Shrewsbury
Hastings, John Ker, Hereford
Honeywill, Henry, Itchington, Thornbury, Gloucestershire
Hope, Thomas Henry, Netley, Shrewsbury
Howells, Thomas, Fox Farm, Shrewsbury
Hughes, John, Fennant, Wrexham, Denbighshire
Humphreys, John, Warwick-road, Upper Clapton, Middlesex
Johnson, Walter, Eastfield, Alnwick, Northumberland
Jobson, Thomas, Bank Farm, Shrewsbury
Kenyon, Hon. Thomas, Pradoe, Oswestry, Salop
Leigh, Capel Hanbury, Pontypool Park, Monmouthshire
Leven and Melville, Earl of, Melville House, Fifeshire
Loomes, Edward, Whittlesey, Cambridgeshire
Lovett, Joseph Venables, Belmont, Oswestry, Salop
Majoribanks, Dudley Coutts, Bushy Hall Farm, Watford, Herts
Marsland, Henry, M.P., Stockport, Cheshire
Maurice, R. M. Bonnor, Bodynfoll, Oswestry, Salop
Nicholl, Rt. Hon. John, Merthyr-Mawr, Glamorganshire
Onslow, Phipps V., Suckley, Worcester
Owen, William, Wem, Salop
Parry, Robert, Bower's Hall, Wrexham, Denbighshire
Peel, William, Taliaris Park, Llandilo-fawr, Carmarthen.
Rawlinson, John, Andover, Hants
Sheppard, Joseph, Horton Lodge, Shrewsbury
Smith, Thomas, Maddeley, Shiffnall, Salop
Surplice, Samuel, Beeston, Nottingham
Taylor, Henry John, Haygate, Wellington, Salop
Thornes, Henry, Argoed, Nescliffe, Shrewsbury
Tisdale, Thomas, Shrewsbury
Tyrrell, Sir John Tyssen, Bart., M.P., Boreham House, Chelmsford
Warner, Henry, The Elms, Loughborough, Leicester
Warter, Henry De Grey, Meole, Shrewsbury
Watton, John, Chronicle-office, Shrewsbury
Wilding, James, High Ercall, Wellington, Salop
Wynford, Lord, Leesans, Chiselhurst, Kent

ANNIVERSARY DINNER OF THE FARMERS' CLUB AT THE CROWN AND SCEPTRE TAVERN, GREENWICH.

The anniversary of the foundation of the London Farmers' Club was celebrated, on Monday, June 29, by a white bait dinner at the Crown and Sceptre Tavern, Greenwich, which was served in Messrs. Lovegrove and Quartermain's best style; to which nearly a hundred members sat down shortly before six o'clock.

Mr. Fisher Hobbs presided on the occasion; and was supported by Mr. Smith, of Deanston, Mr. Shaw, Mr. Purser, Mr W. Purser.

The musical arrangements, under the direction of Mr. F. N. Crouch, were of a more than usual degree of excellence. Amongst the ladies who contributed to the entertainment of the evening were Mrs. Newton, Miss Moriatt O'Connor, and Miss Julia Warman. The two last named ladies are pupils of Mr. Crouch, and did both him and themselves infinite credit by their vocal and instrumental performances during the evening; and amongst the gentlemen, Mr. Collyer, Mr. George Genge, Mr. James Turner, and last, but not least, Mr. Crouch himself; who, after the principal toast of the evening, sang Mr. Thompson's spirited song, called "The Harvest Cup;" the music of which is composed by Mr. Crouch: it elicited the warmest applause, and formed a feature in the *agrémens* of the evening.

As soon as the cloth had been withdrawn, and "Non nobis Domine" given with beautiful effect by the principal professional gentlemen present,

The Chairman rose, and said the first toast which he had the honour to propose was one which was always received in the company of British agriculturists with loyalty and respect; and he was sure that in the present company of British farmers it would be received with enthusiasm *(cheers)*. He had great pleasure in proposing the "Health of her most gracious Majesty the Queen, and might her reign be long, prosperous, and happy" (*loud cheers*).

The toast was drunk with three times three enthusiastic cheers, and was followed by the National Anthem; Miss M. O'Connor taking the principal verse.

The Chairman again rose, and said, that the next toast which it was his pleasing duty to propose was the health of an illustrious personage; who, by her private virtues and extended benevolence, had endeared herself to the heart of every true Englishman; he meant, her Majesty the Queen Dowager (*cheers*). He begged, without further preface, to give the "Health of the Queen Dowager" with three times three.

The toast was drunk with all the honours.

Glee: "Sleep, gentle Lady."

The Chairman said, the next toast which he begged to submit to the company was the "health of his Royal Highness Prince Albert and the rest of the Royal Family" *(cheers)*. He need say but little to recommend to their approbation the health of an illustrious prince who had so immediately connected himself with the agriculture of this country; and, from the manner in which he had come forward to advance the cause of science over the entire globe, he doubted not that he would prove equally zealous in his efforts to promote the prosperity of agriculture (*cheers*). He begged to propose the "health of the Farmer-Prince, Prince Albert, Albert Prince of Wales, and the rest of the Royal Family" (*loud cheers*).

The toast was drunk with three times three hearty cheers, and was followed by the glee—"Here's a health to the Prince and the Queen."

The Chairman, after a short interval, again rose, and said, when he entered that room, little did he expect to be called upon to take any active part in the business of the evening, still less to occupy the distinguished position to which they had done him the honour of calling him. He had with some reluctance complied with their flattering request that he should preside over them, and in asking their kind indulgence, he trusted that his zeal in their cause would afford his best apology for any defects of conduct in the chair (*cheers*). The toast which he was now about to propose to them was that of "Success to the Farmers' Club" *(loud cheers)*, and in submitting to them this toast, he was happy to say, as one of the members of the Committee who had taken an active part in the proceedings of the institution since its formation, that he believed that it had been the means of diffusing and disseminating much agricultural knowledge throughout the country (*Hear, hear*). They met at their club as practical farmers, coming from different parts of the country, and collecting, comparing, and diffusing information; and he felt sure, that, as the institution advanced in years it would increase in usefulness, and that year after year, as it became better known and more appreciated, they would have every sound practical farmer join them, for the laudable purpose of forming a body which should be of the most essential service to the cause of agriculture *(loud cheers)*. He trusted that they should assemble for many years to come, and that the London Farmers' Club would become a firmly united and extensively useful body (*renewed cheers*). He had great pleasure in proposing "Success to the London Farmers' Club," with three times three.

The toast was drunk with all the honours, and much enthusiasm.

Song: "The Harvest Cup:" composed and sung by Mr. F. N. Crouch.

The Chairman said, the next toast which he had the pleasure of proposing to them, was one in which he was sure every agriculturist would unite; for although they might differ in their opinions on the question of "protection," as to the mode or shape of that protection, and as to whether its amount ought to be little or much, they would all agree, he thought, in the opinion that the Royal Agricultural Society of England had afforded much encouragement to improvement in agricultural science (*cheers*). He had therefore great pleasure in proposing success to that noble institution. *(Loud cheers)*. He could safely say, as one of its members, that he believed the Royal Agricultural Society, by the establishment of annual meetings in different parts of the country, and by the circulation of their journals, were steadily advancing the cause of agriculture, and doing a vast amount of good by the diffusion of important practical knowledge. *(Hear, hear)*. He was, however, one of those who thought that great improvements yet remained to be effected; for if they travelled about they would still see many instances of bad farming; it was, therefore, evident that the English farmer still required a stimulus to greater exertion, and he knew no body so capable of supplying this stimulus as the Royal Agricultural Society. *(Hear, hear)*. He begged, in conclusion, to propose "Success to the Royal Agricultural Society," and to connect with the toast the name of Mr. Shaw. *(Loud cheers)*.

The toast was drunk with three times three enthusiastic cheers, followed by a song from Mr. Turner, "In England when the Curfew Bell."

Mr. Shaw rose to return thanks. He said it would be quite impossible for any one, however high his position in society, not to feel himself flattered by having his name associated with an institution which, whether it had or had not carried out its objects, enrolled in its list of members 7,000 individuals, embracing some of the wealthiest landed proprietors and best practical farmers in England, whose object was the improvement of agriculture for their own advantage, and still more for the general benefit of their common country. *(Hear)*. He perfectly concurred in what had fallen from their Chairman, to the effect that in the few years during which that Society had been established it had made considerable progress in exciting attention to agricultural improvement, and by stimulating the British farmer to greater efforts, had enlarged the basis of national prosperity. *(Hear)*. But it was not merely in point of agricultural improvement that advances were to be made through the instrumentality of that Society; it would, he hoped and trusted, by bringing together the landlord and the practical tenant farmer—not once a year merely, but, as the facilities of communication increased, week after week—accomplish that which he (Mr. Shaw) had long desired to see, namely, a school in which to form the mind of the landlord, and give him knowledge and experience in agriculture. *(Hear, hear)*. They had agricultural schools for the tenant farmer, but none for the landlord; they were told that it was the tenant farmer only that had something to learn; he (Mr. Shaw), however, hoped they would be prepared to teach the landlord also. He knew that this was viewed with suspicion by some who thought that the landlord might be taught too much, and that it was not well to put him in possession of a knowledge of the tenants' profits. He held, however, that the more he knew, the better; and the better he was acquainted with the subject, the more likely would he be to make a bargain with his tenant, which should be mutually advantageous (*hear, hear*). For his own part, as a tenant, he would rather deal with a landlord who was a man of business than with one who was ignorant (*cheers*). He recommended the Society to take every opportunity of getting good sound practical farmers into the council, because by doing this they would put others in the right road, and imbue the minds of the landlords with practical knowledge and experience. When landlords generally should become such men as the late Earl of Leicester and the present Earl Spencer, the tenantry would be treated with more consideration than they were by men who scarcely knew a plough-handle from an oar (*hear, hear*). He had great pleasure in responding to this toast, and was not a little proud at seeing that they had mustered this evening in larger numbers than they did last year (*cheers*). He doubted not that this Club was the *nucleus* of a body which would be instrumental in the greatest and most important improvements in agriculture; he hoped it would continue as it had begun—a union of tenant farmers only. He did not wish to say anything disrespectful to the landlords, but he must say, that in that Club he had heard more independent observations, more remarks in the spirit of what men really felt, in one week, than he had heard in the Royal Agricultural Society in a whole twelvemonth (*cheers*). He rejoiced in the prosperity of this Club, because he felt that it would increase the independence of the farmer (*hear*). Occurrences were daily taking place which showed that the rights and interests of the tenants would be more respected, that they were no longer to be the relics of bygone feudalism, and dependants upon the lords of the soil, but that they should take that position of independence which, from their capital and intelligence, they were justly entitled to occupy (*hear, hear*). The bargain between landlord and tenant ought to be for the benefit of both; and he trusted that the day would soon arrive when every tenant would enjoy, not merely in name, but in reality, that amount of independence which ought to attach to every English farmer (*loud cheers*).

The CHAIRMAN said the next toast which he had the honour of proposing, was "Success to the Highland Society of Scotland;" and he felt persuaded that they would agree with him, in saying that that society had been productive of great benefits to the agriculture of that country (*hear, hear*). It was doubtless to the instrumentality of that society that was to be attributed the high state of perfection to which agricultural science had been brought in Scotland; and he trusted that agricultural improvement would be carried on in the same ratio in this country under the auspices of the Farmers' Club (*cheers*). He was proud to see at their board this evening a conspicuous member of that society (Mr. Smith, of Deanston). That gentleman was well known in England, as in Scotland, for the great advances he had made in the science of draining (*cheers*). He had great pleasure in giving "Success to the Highland Society of Scotland, connecting with it the name of Mr. Smith, of Deanston" (*loud cheers*).

The toast was drunk with three times three, and much enthusiasm.

Mr. SMITH, of Deanston, rose to return thanks, and said he felt it a very high honour to have his name connected with the Highland Society of Scotland (*cheers*). It was now just about 100 years ago since the last efforts were made to restore the Stuarts to dominion in that country, and the clans sprung from the mountains for that purpose; in the course of events, however, they were not successful, and he would not stop to inquire whether it would have been better or worse for that country that they should have succeeded. One thing was quite obvious, and that was—that Scotland had advanced very much in prosperity since her union with England (*cheers*). It was some years after this that a number of philanthropic gentlemen thought the interests of the country could be advanced by turning the attention of the people to the improvement of agriculture, and from some eight or ten gentlemen, thus associated together, sprung that society which had conferred such great benefits upon Scotland (*Hear, hear*). The first-fruits of the society were confined to the Highlands of Scotland; but subsequently—nearly four years ago—the society had turned its attention to the Lowlands also. No doubt many of the low countries had made considerable progress in agriculture before they attracted the attention of the Highland Society; but, from the very year that the society extended its efforts, a marked improvement commenced (*cheers*). By offering premiums, and giving portions of their own funds in aid of the objects in view, the society produced the most wonderful effects throughout Scotland. But it was not until they commenced their itinerant meetings and shows that the full extent of its usefulness was discovered; they now held meetings and had cattle-shows in different districts in successive years, as in England. Much good was done in this way, and, above all, by bringing people together from distant parts of the country to see the wonderful things which could be accomplished in improving the different breeds of cattle. This excited competition and emulation, and imbued their minds with a spirit of improvement (*cheers*). He was not desirous of claiming for his country greater credit than she was entitled to, and he did not mean to assert that agricultural England had not made great advances before she had any connection with Scotland; but there was this peculiar characteristic in England: there were almost as many systems as counties; and at this very day there was a greater variety of systems of cultivation in England than in any other country in the world (*Hear, hear*). He did not say this was a disparagement; for it showed that each endeavoured to improve agriculture according to his own notions; and a great variety of improvements had been the result. But they had not until recently begun to study agriculture upon the scientific principles which they were now adopting, and which would bring about a much greater similarity between the systems of the two countries (*Hear, hear)*. He knew that people were coming to England for the purpose of seeing the new paths that were struck out in the science of agriculture ; some persons had lately arrived from the West Indies, in order to ascertain what these improvements were, and to adopt such as might be suitable to the colonies; this would no doubt tend to the improvement of colonial agriculture generally; and nothing was more calculated to set aside slavery than the introduction of our improved system of agriculture (*Hear, hear*). He perfectly agreed with the observations of their worthy founder (Mr. Shaw), with respect to the necessity of colleges and schools for teaching the science of agriculture to the landlord. He had himself long wished to see such schools; and until they did instruct the landed proprietors in these principles, their progress would be slow indeed (*Hear*). There was, no doubt, a very natural desire among the young heirs of the soil to spend their time in pleasures and sports, but if they were brought up in a scientific knowledge of agriculture, they would, as they got up in life, profit by the education they had received, and turn it to good account (*Hear, hear)*. There ought to be no fear on the part of the tenant, of an increase of intelligence in the landlord : a lease should be as a bargain between man and man. Let the landlord do what he ought, and the tenant what he can. A tenant would be much less likely to suffer by making a bargain with an intelligent man, than with a man without intelligence (*Hear, hear*). There was one thing which ought to be universal—namely, the practice of granting leases : there was no reliance on either side unless there was a lease (*Hear, hear*). There could be no true independence, no satisfactory employment of means, without a fixed and specific lease. No man would exert himself to do the best for the farm, unless he had a guarantee that himself or his family would reap the fruits of his exertion and outlay. Great progress had been made of late in this respect. There was a much greater disposition to grant leases than formerly ; and he trusted that the time would shortly arrive when all difficulty would be overcome in this respect. He thought he might predict, that from the moment the practice of granting leases became general, the progress of improvement in agriculture would be great indeed (*loud cheers*). In Ireland they had leases of every possible and conceivable variety of duration ; and in many cases no leases at all. But where there were no leases there was no prosperity (*Hear*). Where there were leases of from 19 to 21 years, there was great prosperity. Sometimes they were extended to 40 or 50 years ; but this he thought was running into mischief again. He felt satisfied that a period of 19 or 21 years was that which was best calculated to secure the prosperity of the tenant (*Hear, hear)*. After some further observations, he expressed a desire that the three societies might go hand in hand in promoting the interests of agriculture, and concluded by repeating his thanks for the manner in which they had drunk the toast, as well as for the honour which they had done him personally by associating his name therewith (*cheers)*.

Mr. Shaw again rose, and said, that at the request of their excellent chairman he was about to propose the next toast, which was "The Local Farmers' Clubs of England" (*cheers)*. In speaking of the London Farmers' Club they must not forget that the local clubs of the country had commenced operations before them ; and that, however greatly the former might have been instrumental in advancing the interests of agriculture, those who had watched the progress of the local farmers' clubs must acknowledge that they had long before done much which the London Club desired to do on a more extensive scale. There was great advantage in men meeting and "rubbing their minds together" as the members of these clubs did, for it was utterly impossible that half a dozen men could assemble for such objects as those contemplated by these clubs, without going away in some measure bettered and improved. Much had been done in this way for general science, and he saw no reason why the principles of agriculture and practice should not be advanced by the same means. He concluded by giving "The Local Farmers' Clubs of England," with three times three (*loud cheers*).

The toast having been duly honoured,

Mr. Smith, of Watford, rose to return thanks. He quite agreed with the remarks which had just been addressed to them respecting the importance and benefit of the local clubs, and he hoped every gentleman present would do the utmost in his power to promote them (*hear, hear*). He sincerely thanked them for their good wishes, and resumed his seat amid cheers.

Mr. Anderson next rose to propose a toast, to which he said he was quite sure every one in the room would most heartily respond—he meant that of "Health and long life to their excellent Chairman," who had this evening so ably performed the duties of president (*loud cheers*). All who knew that gentleman, whether at the Royal Agricultural Society's meetings or in his own county of Essex, must have seen that he was heart and soul in the cause of agriculture (*cheers*). He did not approve of long speeches, and he should therefore, without further preface, call upon them to drink the health of the Chairman, with three times three, hoping that they should see him in a similar position many years to come (*loud cheers*).

The toast was drunk will all the honours, and much enthusiasm.

The Chairman begged to be permitted to return his sincere thanks to the company for the very enthusiastic manner in which they had responded to the toast which had been proposed by his friend Mr. Anderson in such flattering terms (*cheers*). He felt that he had been placed in a position which he little deserved, and he only regretted that they had not selected a better chairman (*no, no*). With regard to the observations which had fallen from the various speakers this evening, he begged to say that they for the most part coincided with his views (*hear, hear*). He fully concurred with what had been said of the necessity of giving instruction to the landlord as well as the tenant ; for he had always found that the landlords who were acquainted with the practical as well as the scientific part of agriculture, were the most liberal to their tenantry, because they knew how to distinguish between the man who was anxious and willing to improve and make the most of his land, and the man who was not the sound, skilful, and practical farmer (*hear, hear)*. He had always found such landlords were more ready to meet their tenants in times of distress, while others would let to those who offered a little better terms, without distinguishing whether he had got a practical man, and a man with means to cultivate it, or not (*hear, and cheers)*. He also concurred in what had fallen from Mr. Smith, of Deanston, with respect to leases (*hear*) ; he quite agreed with him in wishing that the system more generally prevailed, but he attributed the indisposition to grant leases more to the uncertainty which existed respecting the corn laws than to any want of desire to do so on the part of those having a permanent interest in the soil (*hear*). He had known some among the most liberal of landlords who did not grant leases ; but, in the present day, he was sorry to say they were not meeting the tenantry in the liberal spirit in which they ought to meet them (*hear,*

hear). Within the last year or two, great improvements had doubtless taken place, but still many tenant farmers were paying their rents out of their capital, and not out of their profits *(hear, hear).* During long and severe winters, there were few landlords who came forward to employ the surplus poor in drainage, or in cutting down the superfluous timber; whereas, if the tenant did not happen to have his farm in quite so good a condition as the landlord desired, he became anxious to advance the rent, or get somebody else into his place. He trusted, however, that a better feeling would grow up between the landlord and tenant, otherwise it would be quite impossible that the tenant farmer could continue to pay labourers at a rate of wages which the price of corn in no degree justified *(hear, hear).* They were at present paying wages equal to those which they paid when wheat was at 56s. or 64s. per quarter. *(cries of "Oh, no!")* The present prices did not pay the producer, and they must either be relieved from some of their burdens, and be met in a fair spirit by their landlords, or the prices of labour must come down *(hear, hear).* The tenant farmers could not continue to pay their labourers the wages they now did, unless they were relieved from some of their burdens; that was his decided opinion. He thought the London Farmers' Club and the local farmers' clubs were the points on which they ought to assemble together to discuss the different questions of the repeal of the malt tax, an alteration in the tithe laws, and other matters relating to the burthens which pressed upon them *(hear).* Certain it was that there must, ere long, be great changes if they were to continue to produce corn at the present low prices (*cheers*). He trusted that the tenant farmers would rally round these clubs, and freely and openly discuss these subjects. He concluded by again sincerely thanking them for the kindness they had manifested towards him on this and all other occasions, and by declaring that, so long as he possessed health and strength, they would always find him the firm and unflinching friend to agriculture (*loud cheers*).

Mr. Anderson next proposed the health of the Committee of the Farmers' Club, and said that the company were the best judges of the manner in which they had discharged their duties *(cheers).* He had great pleasure in proposing the health of the Committee of the Farmers' Club, associating with the toast the name of Mr. Wm. Purser *(renewed cheers).*

The toast was drunk with three times three, and all the honours.

Mr. William Purser briefly returned thanks, and proposed the health of the Vice-President *(loud cheers).*

The toast having been duly honoured,

Mr. Paine said he was deeply indebted to them for the kind manner in which they had drunk his health as Vice-Chairman of that company; had he not counted on the indulgence of his brother farmers, knowing his own inabilities, he should not have allowed himself to take upon him the honours of that position *(hear).* He had not joined this society so early as many around him, and the reason of this was, that his opinion at first had been that no good would result from its establishment *(hear, hear).* But he had now no hesitation in saying that he believed the greatest good would result from British farmers uniting themselves together in a firm phalanx for the purpose of discussing and defending their own rights and interests (*cheers*). Politics were prohibited in their discussions, and very wisely so, or he would tell them a stronger reason why he had joined this society *(hear, and a laugh).* As it was, he would conclude by drinking all their good healths *(cheers).*

Mr. Shaw again rose, and said the Chairman had kindly permitted him to propose a toast. He recollected that when they met last year they were exhorted, each individual to enlist a new member, which would speedily secure such numbers as to render success certain. Now it so happened that he (Mr. Shaw) was favoured, by the consent of a gentleman well known and highly respected, more especially by his neighbours in that part of the country where he was best known, to propose him as a member of this club *(cheers)*; it was not the case of a pressed man, but of a volunteer, who had given him permission to propose his name at the next meeting of committee. He felt that he should be utterly unworthy of being a member of their Committee, if he allowed the opportunity to escape of congratulating them upon the circumstance of this gentleman's coming amongst them; the gentleman to whom he alluded was Mr. Colvile, one of the members for Derbyshire *(loud cheers),* whose health he begged to propose with three times three *(loud cheers).*

The toast having been drunk with enthusiasm,

Mr. Colvile, M.P., rose to return thanks. He said he was very much obliged to them for the honour done him. He had almost doubted whether he should not be looked upon as an intruder *(no, no),* but finding himself in the neighbourhood after leaving the House, and hearing that his friend Mr. Shaw was there, he had taken the liberty of coming up, and though an uninvited guest, the kind manner in which they had received his health convinced him that he was not an unwelcome one *(loud cheers).* He felt astonished that, having devoted all his life to the interests of agriculture, he should not before have found himself a member of this club, the more especially as he had been instrumental in introducing the first local club, which was established in the midland counties. *(Cheers.)* Nothing in this world gave him so much pleasure as finding himself connected with practical farmers, for the purpose of promoting the cause of agriculture, in which he felt a deep interest, not only as a landlord, but as an occupier. (*Hear, hear.*) He concluded by returning his most hearty thanks for the honour they had done him. (*Loud cheers.)*

Mr. Purser said he had been requested to propose the health of a gentleman who had rendered great services to this society. He had very great pleasure in complying with this request, and in giving them the health of Mr. Thorpe, the secretary, feeling assured that the manner in which he had discharged the duties of his office must be highly satisfactory to all. *(Loud cheers.)* The progress which the club had made since its formation was the best proof that these duties had been faithfully and efficiently performed. *(Cheers.)* Without further comment, therefore, he begged to propose the health of Mr. Thorpe, the secretary, with three times three.

The toast having been duly honoured,

Mr. Thorpe rose to return thanks. He said he felt much gratified at the kind expressions which had been used in the introduction of his name to the company, and begged to thank them most cordially for the manner in which they had responded to the toast. (*Cheers.*) So long as they should continue to value his services it would be his highest ambition and greatest pleasure to do all in his power to advance the interests of this institution. (*Loud cheers.*) He once more returned them his grateful thanks for the honour they had done him, and resumed his seat amid the hearty cheers of the meeting.

Mr. Purser, in rising to propose the next toast, dwelt upon the importance of a society such as this: its great object was to centralise the tenant farmers on one common point of union; and he hoped that they would, by bringing fresh members to each of their meetings, make its objects and its usefulness more extensively known. He begged to propose to them the "Health of the Visitors," connecting with the toast the name of Mr. Ambrose (*loud cheers*).

Mr. Ambrose returned thanks for the honour they had done himself and brother visitors by the warm and handsome manner in which they had drunk the toast just given. He had derived great pleasure from the observations which he had heard this evening; and as far as lay in his power he should endeavour to extend the knowledge and increase the numbers of the society; and he should feel infinite satisfaction in himself becoming a member (*cheers*). It was never too late to learn, and, perhaps, notwithstanding indolent habits and rather a stupid head, he might yet live to become a tolerably respectable farmer (*cheers and laughter*). He repeated his thanks, and concluded by expressing his gratification at witnessing this evening so much of that British spirit and true harmony which at all times constituted the best features of English society (*cheers*).

The last toast of the evening was the "Health of the Ladies;" which, having been drunk with enthusiasm, the company retired.

REPORT FROM THE SELECT COMMITTEE ON THE CHARGING OF ENTAILED ESTATES FOR DRAINAGE, &c.

By the Lords Committees appointed a Select Committee to inquire into the expediency of a legislative enactment being introduced to enable possessors of entailed estates to charge such estates with a sum, to be limited, for the purpose of draining and otherwise permanently improving the same; and to report thereon to the House.

Ordered to Report,—That the committee have met, and considered the subject matter referred to them, and have examined several witnesses in relation thereto.

The evidence of these witnesses leads the committee to express their opinion that the operation of draining, properly conducted, not only tends by its immediate effect to increase the produce of the soil and to facilitate its cultivation, but also permanently enhances the value of the inheritance to all future proprietors.

The committee are further of opinion, that in some cases (brought before them in the course of the evidence they have taken) the full advantage to be derived from thorough draining cannot be obtained without the erection of farm buildings suitable to the improved state of the land drained.

The committee also wish to add their conviction, that a more general extension of good drainage throughout the country is highly important, as calculated to prevent disease and improve the general health of the community. It is certain, however, that the attainment of these benefits is in many instances prevented, in England and Ireland, by the natural reluctance of proprietors to expend capital upon the permanent improvement of land in which they have only a limited or partial interest.

In Scotland a law (10 Geo. 3, cap. 51), intended to remove this difficulty, has for many years been in operation; and although the provisions of that act are in some respects defective and inconvenient, the importance of the principle is universally felt in that country.

An attempt was made to carry out the same principle, with respect to England and Ireland, by the statute 3 and 4 Vic., cap. 55. The legislature by that act have fully recognized the propriety and importance of enabling parties with limited estates to charge the inheritance, under certain regulations, with money expended upon permanent improvement by drainage, but the apprehension of great delay and expense consequent upon proceedings under that statute appear to have very generally deterred persons from seeking to take advantage of it. Not more than eleven applications appear to have been made under that statute, although the evidence fully satisfied the committee that cases are constantly occurring to which some measure of that nature might be most beneficially applied.

Recollecting how important it is for the security of property, that much caution should be exercised in the application of any powers which may be given for placing a charge upon the inheritance at the instance of persons having only a limited interest in the estate to be charged, the committee think that no measure would be satisfactory which should not secure the control of the Court of Chancery, or of some superior legal tribunal; but they are satisfied that the object may be attained with much less of delay and expense than attends a proceeding under the present law.

The committee have therefore come to the conclusion that they cannot execute the task confided to them more usefully than by pointing out the manner in which, in their opinion, the statute 3 and 4 Vict., cap. 55 may be altered and amended so as to become practically and generally useful.

They have had the advantage of good legal assistance in this respect; and a bill has been accordingly prepared under their direction, which they have requested their Chairman to lay upon the table of the House.

It is obvious that the question both of delay and expense must be materially affected by the forms of proceedings to be adopted on any application to the Court.

The committee feel that it would be inconvenient, if not improper, to encumber the act with minute regulations as to those forms which may be more effectively as well as more properly settled by Orders of the Court itself.

They think it right, however, to advert generally to some of the points to which it is necessary that attention should be directed in order to attain the desired object, of a cheap and expeditious proceeding, combined with the ultimate control and supervision of the Court.

The committee understand that the common practice is to refer all petitions under the statute, without discussion, to one of the Masters of the Court. It appears to them therefore that the attendance of counsel, and other expenses of putting a petition down for hearing, might safely be dispensed with, and some order made by which all such petitions should go at once before the Master, the judgment of the Court being exercised upon the matter when the Master shall have made his report. Difficulty is sometimes experienced relative to the surveyor upon whose evidence the Master is required to act. The person proposed by the applicant does not always command the confidence of the Master or of the other persons interested, and both expense and delay are occasioned by discussions in the Master's office upon this point.

It is suggested that the Master might name a competent person upon whose evidence, given orally or by affidavit, he might act, leaving him, however, a discretion to call for or permit the production of other evidence, if he shall think fit.

It is also thought that the mode of proceeding usually adopted with respect to the bringing in a paper called "a state of fact," being little more than an echo of the petition, and to the taking of copies from the office, and some other particulars of the practice, might be advantageously altered, so as to leave the applicant to prove the allegations of his petition by the production of such documents and such other evidence as he may be able to bring forward, care being always taken that all persons interested have proper notice of the proceedings.

The committee entertain no doubt, that, if the bill now suggested shall pass into a law, the judges will be able readily to make such orders as shall carry the object of the legislature into effect consistently with a due regard to the established rules of their respective courts.

In conclusion, the committee desire earnestly to press upon the consideration of the House the importance of legislating upon this subject without delay. The principle which it is now proposed to carry out has been fully recognized by repeated acts of the legislature, and there never was a moment at which the extensive application of that principle, both in England and in Ireland, would be more useful than the present.

The measure now recommended would tend greatly to benefit both countries, by extending the demand for remunerative labour, and increasing the amount of agricultural produce; and with respect to Ireland in particular, the committee desire to close this report by an extract from the report lately made by the commissioners upon the tenure of land in Ireland, which was founded upon very minute and extensive inquiries throughout that country; viz.—

"In accordance with the recommendation of the committee on public works, which sate in 1825, we are of opinion that for the permanent improvement of an estate, confining that expression to such operations as may properly be considered of an agricultural character, tenants for life and other persons should be empowered, subject to proper and efficient restrictions, to charge the inheritance to an amount not exceeding three years' income for such improvements, being bound to repay the principal by instalments, and to keep down the interest."

There are several other matters connected with the permanent improvement of estates for the benefit of all parties interested, to which, although not embraced in the reference to this committee, they are desirous of directing attention.

They refer particularly to powers of leasing and making exchanges; and they recommend that early in the next session a committee should be appointed, to consider and report whether it may not be proper, under certain restrictions, to confer by law general powers for the above purposes upon persons having limited interests in land.

REPORT OF THE TITHE COMMISSIONERS FOR ENGLAND AND WALES.

Tithe Commission Office, May 31, and June 18.

Sir,—It is our duty to report to you the progress of the commutation of tithes in England and Wales to the close of the year 1844.

We have received notices that voluntary proceedings have commenced in 9,594 tithe districts; of these notices 39 were received during the year 1844.

We have received 6,964 agreements, and confirmed 6,616: of these, 87 have been received and 121 confirmed during the year 1844.

4,545 notices for making awards have been issued, of which 674 were issued during the year 1844.

We have received 3,324 drafts of compulsory awards, and confirmed 2,821: of these, 643 have been received and 646 confirmed during the year 1844.

We have received 8,338 apportionments, and confirmed 7,919; and of these, 813 have been received and 1,034 confirmed during the year 1844.

In 9,437 tithe districts, as will be seen from the above statement, the rent-charges to be hereafter paid have been finally established by confirmed agreements or confirmed awards.

We have in our possession voluntary agreements and drafts of awards, as yet unconfirmed, which will include 851 additional tithe districts; and make a total, when completed, of 10,288 districts in which the tithes are commuted.

We have to repeat our regret that no decision has been given on the disputed points arising out of the statute of the 2d and 3d Will. IV., c. 100, commonly called Lord Tenterden's Act.

In the numerous cases which must be determined by the final interpretation of that Act, we are at present unable to proceed with any confidence in our own decisions, or any hope that such decisions will be acquiesced in by the parties, or confirmed by the courts.

This difficulty, of which we pointed out the existence and the consequence in our last report, becomes, of course, of more urgent importance as our labours, in other respects, draw nearer to their close.

The disputes which existed as to the recovery of rent-charges due from railroads have been removed by a clause of the 7th and 8th Victoria, c. 85.

On the other points recommended for legislation we have found no reason to alter our opinion.

We are glad to be able to state that the power we now possess of legalising exchanges of glebe lands and exchanges of rent-charges for a limited portion of land are found extensively useful.

We venture to recommend that, before the tithe commission expires, similar power, perhaps slightly modified, should be invested in some permanent public body. The superintendence of the operation is attended by very little labour or difficulty.

We have the honour to be, Sir,
Your faithful and obedient servants,
W. Blamire.
T. Wentworth Buller.
R. Jones.

To the Right Hon. Sir James R. G. Graham, Bart., &c. &c. &c.

AGRICULTURAL EDUCATION.

TO THE EDITOR OF THE WEST BRITON.

Sir,—Here follow some extracts from different portions of the *Agricultural Catechism*, to give your readers a general idea of its fitness for the purpose:—

Q. What is agriculture?

A. Agriculture is the art of cultivating the soil.

Q. What is the object of the farmer in cultivating the soil?

A. The object of the farmer in cultivating the soil is, to raise the largest crop, at the smallest cost, and with the least injury to the land.

Q. What ought the farmer especially to know, in order that he may attain this object?

A. The farmer ought especially to know the nature of the crops he raises, of the land on which they grow, and of the manures which he applies to the land.

I.—Of the Nature of the Crops he raises.

Q. Of what parts do all vegetable substances consist?

A. All vegetable substances consist of two parts, one which burns away in the fire, called the organic part, and one which does not burn away, called the inorganic part.

(Here the teacher will burn a bit of straw or wood in the candle, and show that part burns away, and that another *very small* part—the ash—does not burn away.)

Q. Which of these two parts is the greater in quantity ?

A. In all vegetable substances, the organic part is very much the greater. It forms from 90 to 99 out of every 100lbs. of their weight.

Q. Of what elementary bodies does the organic part of plants consist ?

A. The organic parts of plants consist of four elementary bodies, known by the names of carbon, hydrogen, oxygen, and nitrogen.

Q. What is carbon ?

A. Carbon is a solid substance, usually of a black colour, which has no taste or smell, and burns more or less readily in the fire. Wood-charcoal, lamp-black, coke, black-lead, and the diamond, are varieties of the carbon.

(The teacher will here exhibit a piece of charcoal, and show how it burns in the fire or in the flame of a candle. He may also draw their attention to the remarkable difference in appearance between it and the diamond, though essentially the same.)

Q. What is hydrogen ?

A. Hydrogen is a kind of air or gas which burns in the air as coal-gas does, but in which a candle will not burn, nor an animal live, and which, after being fixed with common air, explodes when it is brought near the flame of a candle. It is also the lightest of all known substances.

(Here the teacher will take a beer or champagne glass, will put into it some pieces of zinc or iron filings, and pour over them a small quantity of oil of vitriol (sulphuric acid) diluted with twice its bulk of water, and cover the glass for a few minutes. On putting in a lighted taper, an explosion will take place. He will then repeat the same experiment in a phial, into the cork of which he has introduced a common gas jet. After a short time, when the hydrogen gas produced has driven out all the common air from the bottle, a light may be applied to the jet, when the gas will take fire and burn. The cork and jet may now be taken out of the bottle, and a lighted taper introduced into it, when the taper will be extinguished, while the gas itself will take fire and burn at the mouth of the bottle.)

In like manner the properties of oxygen and nitrogen are explained and exemplified—all with illustrative figures.

Q. Do all vegetable substances contain these four elementary bodies ?

A. No, the greater number contain only three, viz., carbon, hydrogen, and oxygen.

Q. Name some of the more common substances which contain only these three.

A. Starch, gum, sugar, the fibre of wood, oils, and fats, contain only these three elements.

Q. Of what substances does the inorganic part of the plant consist ?

A. The inorganic part of plants contains from eight to ten different substances, namely, potash, soda, lime, magnesia, oxide of iron, oxide of manganese, silica, chlorine, sulphuric acid, or oil of vitriol, and phosphoric acid.

(Here the teacher may exhibit to his pupils—potash in the form of the common *pearl ash* of the shops; soda, in that of the *common soda* of the shops; lime and magnesia, in the forms of *quicklime* and *calcined magnesia;* oxide of iron, in the form of *rust* of iron; silica, in the form of a piece of *flint, rock crystal or quartz;* a bottle of *chlorine gas*, one of sulphuric acid (*oil of vitriol*), and one containing a little phosphoric acid, or burnt bones, in which phosphoric acid is present. By placing these substances before the eyes of the pupils occasionally, and allowing them to determine and taste them, they will soon become familiar with their names and with their several qualities.)

The properties of these are then explained, as the organic elements.

II.—Of the Organic Food of Plants.

Q. Do plants require food as animals do ?

A. Yes, all plants require constant supplies of food, in order that they may live and grow.

Q. Where do plants obtain their food ?

A. They obtain it partly from the air and partly from the soil.

Q. How do they take in their food ?

A. They take it in by their leaves from the air, and by their roots from the soil.

Q. Do plants require two distinct kinds of food ?

A. Yes, they require organic food to support their organic part, and inorganic food to support their inorganic part.

Q. Whence do they obtain their organic food ?

A. They obtain their organic food partly from the air and partly from the soil.

Q. Whence do they obtain their inorganic food ?

A. They obtain their inorganic food wholly from the soil in which they grow.

Q. In what form do plants take in organic food from the air ?

A. In the form chiefly of carbonic acid gas ?

Q. What is carbonic acid gas ?

A. It is a kind of air, which has no colour, but has a peculiar smell. Burning bodies are extinguished in it, animals die on respiring it, and it is heavier than common air. It causes the boiling up of soda water, and the frothing of beer, and forms nearly one half the weight of all limestone rocks.

(Here the teacher will prepare carbonic acid gas, by pouring dilute muriatic acid (spirit of salt) upon bits of limestone or of the common soda of the shops, in a tall covered beer glass. He will show that a burning taper is extinguished by this gas, but that it does not, like hydrogen, take fire by itself; that it is so heavy that it may be poured from one glass to another; and that, when poured from a large tumbler, a common candle may be put out by it.) Illustrated by figures.

Q. Does carbonic acid gas form a large part of the atmospheric air ?

A. No; the atmospheric air consists almost entirely of a mixture of oxygen and nitrogen gases. Five gallons of air contain about four of nitrogen and one of oxygen, but in 5,000 gallons there are only two gallons of carbonic acid gas.

Q. Do plants drink in much carbonic acid from the air ?

A. Yes, they drink in a very large quantity.

Q. How can plants drink in so large a quantity of this gas from the air, which contains so little?

A. They spread out their broad thin leaves in great numbers through the air, and thus are able to suck in the carbonic acid from a large quantity of air at the same time.

Q. How do they suck it in?

A. By means of a great number of very small openings or mouths which are spread every where, especially over the under surface of the leaf.

Q. Do the leaves suck in this carbonic acid at all times?

A. No, only during the day time. During the night they give off a quantity of carbonic acid.

Q. What does carbonic acid consist of?

A. Carbonic acid consists of carbon, or charcoal, and oxygen. 6lbs. of carbon, and 16lbs. of oxygen form 22lbs. of carbonic acid.

The teacher proceeds to explain how plants absorb and appropriate the carbon and nitrogen.

III.—Of the Substance of Plants.

Q. What does the substance of plants chiefly consist of?

A. The substance of plants chiefly consists of woody fibre, starch, and gluten.

(The nature of these substances, and their formation in the plant, are here explained.)

IV.—Of the Soil on which Plants grow.

Q. What does the soil consist of?

A. The soil consists of an organic or combustible, and of an inorganic or incombustible part.

Q. How do you show this?

A. By heating a portion of soil to redness on a bit of sheet iron, or on the end of a knife, either in the fire or over a lamp. The soil will first turn black, showing the presence of *carbonaceous* matter, and will afterwards assume a grey brown or reddish colour as this black organic matter burns away.

(The teacher will show this experiment, and will explain the meaning of the new word *carbonaceous*.)

Q. Whence is the organic part of the soil derived?

A. It is derived from the roots and stems of decayed plants, and from the dung and remains of animals and insects of various kinds.

Q. Does this organic part form a large proportion of the soil?

A. Of peaty soil it forms sometimes three-fourths of the whole weight, but of rich and fertile soils it does not usually form more than from a twentieth to a tenth of the whole weight.

Q. Can a soil bear good crops which does not contain a considerable portion of organic matter?

A. Not in our climate. A rich soil generally contains at least one-twentieth of its weight (five per cent.) of organic matter.

Q. Does the organic matter increase or diminish in the soil, according to the way in which it is cultivated?

A. Yes, it diminishes when the land is frequently ploughed and cropped, or badly manured; and it increases when the land is planted, when it is laid down to permanent pasture, or when large doses of farm-yard manure or of peat compost are given to it.

Q. What purpose does this organic matter serve in the soil?

A. It supplies the organic food which plants draw from the soil through their roots.

Q. Do plants draw much of their organic food from the soil?

A. The quantity they draw from the soil varies with the kind of plant, with the kind of soil, and with the season; but it is always considerable, and is necessary to the healthy growth of the plant.

Q. If plants always draw this organic matter from the soil, will the soil not become gradually poorer and less productive?

A. It will, if badly managed and constantly cropped.

Q. Then how can you keep up the supply?

A. By ploughing in green crops, by growing clovers and other plants which leave long roots in the soil, by restoring all the hay and straw to the land in the form of manure, or by laying down to pasture.

(The teacher may illustrate this answer beneficially, by referring to the practice in his own or the neighbouring parishes, and pointing out its advantage or defects.)

Q. Whence is the inorganic part of the soil derived?

A. The inorganic part of the soil is derived from the crumbling down of the solid rocks.

Further explain the formation and character of soils, and the effects of draining, &c.

V.—Of the Inorganic Food of Plants.

Q. What are the purposes served by the inorganic part of the soil?

A. The inorganic or earthy part of the soil serves two purposes: first, it serves as a medium, in which roots can fix themselves, so as to keep the plant in an upright position; and second, it supplies the plant with inorganic food.

Q. The inorganic part of the soil consists chiefly of sand, clay, and lime; does it contain no other substances?

A. Yes, it contains small quantities of eight or nine other substances.

Q. Name these substances?

A. Potash, soda, magnesia, oxide of iron, oxide of manganese, sulphuric acid, phosphoric acid, and chlorine.

Q. Are not these the the same substances which exist in the ash or inorganic part of plants?

A. Yes, the same substances exactly—only they form a much larger proportion of the soil than they generally do of plants.

Q. Do you understand, then, where plants obtain all the inorganic matter they contain?

A. Yes, they obtain them from the soil only.

Q. Why can they not obtain them from the air?

A. Because potash, soda, magnesia, &c., do not exist in the air.

(And so explain in some detail the character and contents of different soils, and the causes and means of fertility.)

The next extracts will relate to manure, crops, and their comparative value as food for animals.

Yours, &c.,

J. Prideaux.

A DETAILED ACCOUNT OF THE MAKING OF CHESHIRE CHEESE.

By Henry White,

Land Agent and Surveyor, Warrington.

(*From the Journal of the Royal Agricultural Society.*)

It has sometimes been a matter of dispute amongst Englishmen which particular county or district is the most famous for the making of cheese. I think, if quantity is to be taken into account as well as quality, the decision must be in favour of Cheshire, as there cannot be less, upon a moderate calculation, than 12,000 tons made in that county annually; a considerable portion of which is of excellent quality.

There is reason for believing that cheese has been made in Cheshire for at least 700 years;* and from allusions made to cheese and to curd in the Old Testament,† it is evident that an article of this nature must have been known and used at a very early period.

It is scarcely necessary to premise that milk, from which cheese is made, consists of three distinct parts—*cream, curd*, and *whey*—into which, by repose, it spontaneously separates; but the process of separating the whey from the other bodies may, as in cheese-making, be accelerated by infusing a small quantity of a simple acid extracted from cured and dried maw-skins,‡ which have been previously dissolved in warm water. This infusion is commonly called "steep," but more properly *rennet*.

The art of cheese-making consists in the complete extraction of the whey, and in the proper compacting and curing of the curd. The richness of the cheese depends upon the quality of the milk, or, in other words, on the proportion of cream which the milk contains. The cheese of Cheshire is professedly made from new milk, or milk from which no cream has been taken. It is, however, well known, that in many dairies, in the morning before cheese-making, a small quantity of cream is skimmed off the previous evening's milk; this cream is either churned by itself, or mixed with whey-cream, by which there is obtained a better quality and greater quantity of (so called) whey butter. It may appear singular to some, that any portion of cream should be found in whey; but such is the fact, and the means used in Cheshire for extracting it are very simple. (*See Appendix.*)

Before entering into a detailed description of the mode employed in Cheshire in the making of cheese, I would remark that this essay is founded upon my own observations, made during a fifteen years' residence in, and intimate connection with, that county; which latter is still existing. I have long felt an interest in the subject of cheese-making, with a desire to see it conducted upon more scientific principles, from a conviction that, were such the case, both the pocket of the producer and the stomach of the consumer would often be more agreeably filled; but I do not wish it to be supposed from this remark that I profess myself conversant with these principles, my information being more of a practical nature, and as such I offer it to the society.

Number of Cows kept, and Produce.—The number of cows kept for the purposes of a cheese *dairy* is seldom less than 8 or 10, or more than 70 or 80, and is of course regulated by the size of the farms—these average about 90 or 100 statute acres, upon each of which about 15 or 18 cows are kept. From 18 cows, a cheese of from 36 lbs. to 54 lbs. weight is made daily during four or five months of the summer.* The annual produce of cheese per cow depends both upon the quality of the animal (with the mode of keeping her) and of the land, or rather the herbage. I have known many farmers sustain great loss by not feeding their cattle sufficiently well in winter. With judicious management, about 3 cwt. of cheese (of 112lbs.) may be considered as the average amount made per annum upon land let for 30s. per statute acre: but in a few instances 5 cwt. per cow, and even more, is sometimes made. This can only be from a small and choice stock.

The Season.—It is the practice amongst farmers

---

* "The fame of the cheeses of Cheshire is of very ancient date; at least as old as the reign of Henry I. (A.D. 1100). The Countess Constance of Chester, though the wife of Hugh Lupus, the king's first cousin, kept a herd of kine, and made good cheeses, three of which she presented to the Archbishop of Canterbury. Giraldus Cambrensis bears honourable testimony to the excellence of the Cheshire cheeses of the day." (*Bell's Weekly Messenger, Feb.* 22, 1841.) "Poor men eat cheese for hunger, rich for digestion. It seems that the ancient British had no skill in the making thereof, till taught by the Romans, and now the Romans may even learn of us more exactness therein. The county of Chester doth afford the best for quantity and quality; and yet their cows are not (as in other shires) housed in the winter; so that it may seem strange, that the hardiest kine should yield the tenderest cheese. Some essayed in vain to make the like in other places, though hence they fetched both their kine and dairy-maids. It seems they should have fetched their ground too (wherein surely some occult excellency in this kind), or else so good cheese will not be made. I hear not the like commendation of the butter in this county; and perchance these two commodities are like stars of a different horizon, so that the elevation of one to eminency is the depression of the other." (*Fuller's Worthies.*)

† 1 Sam. xvii. 18; 2 Sam. xvii. 29; Job x. 10.

‡ The *stomachs of sucking calves.* See the method of curing these, in the Appendix.

* The Marquess of Cholmondeley and Mr. Tollemache, M.P., with a laudable desire to encourage the suspension of Sunday labour, have, for several years, offered through the South Cheshire Agricultural Society a prize of £20 to such farmer as shall have made the best cheese without infringing on the Sabbath rest. Although this prize has, I believe, been regularly claimed, yet, from a variety of causes, the practice of making cheese on the Sabbath, as on other days, is still very general.

in this county to arrange so as to have most of their cows calving in the months of March and April; and so soon as the calves are fed or disposed of, the cheese-making commences, and continues (excepting in small dairies) to nearly the end of the year. In January and February the quantity of milk obtained is often so small that the farmer prefers selling it in the neighbouring towns, or making it into butter. There are, however, instances in large dairies (of 70 or 80 cows), of cheese being made throughout the year.

Milking.—The operation commences about five o'clock in the morning, and five or six in the evening. In this county it is the practice for most of the servants, both men and maids, to assist, and for the cows to be milked in the cow-houses (called here "shippons") all the year round. When, as is usual, there is one milker for every six or seven cows, the milking seldom exceeds an hour and a quarter.

The milk of new-calved cows is not mixed with the other until about four or five days after calving.

Offices and Utensils.—As the evening's milk is seldom made into cheese until the following morning, and sometimes in small dairies (where four "meals" are used) not until the second morning, a cool "milk-house" is necessary; on which account it usually occupies that side of the farm-house least exposed to the sun. The utensils in which the milk is kept are usually portable, shallow, earthenware vessels called "pan-mugs," and in some dairies leaden or zinc coolers. Most of the milk-rooms have lattice or wire windows for the circulation of air, and the floors are laid in a sloping form for the free escape of the cold water with which they are daily swilled throughout the summer months. If precautions of this nature be not attended to, there is a risk of the evening's milk becoming *sour;* in which case, whatever quantity of new milk be added to it in the morning, the cheese will be *sour* also. I am led to believe that a temperature of as near 50 deg. Fahrenheit as could be maintained, would be best for a milkhouse throughout the year. The *dairy* is generally situate near the milkhouse, and fitted up with two *set-pans* or *boilers*—a large one for scalding the whey, and a smaller one for heating water. The "cheese-presses" and "screw" are kept within this room, and the operation of cheese-making is here carried on. Some farm-houses are not provided with a *dairy*, and the cheese is then made in the *kitchen*—this is commonly the case on small farms. The "salting and drying house" (often one and the same room), if conveniently situated, adjoins the dairy. The cheese is placed here on stone or wooden benches, salted *externally*, and is afterwards left so as to dry gradually before being removed to the cheese-room. By some dairy-maids, this external salting is dispensed with, and the room is then of course only used for *drying*. These offices are all on the ground-floor. In some cases the cheese-room is over the dairy, in others over the kitchen, or some other room wherein a fire is usually kept, and sometimes, though rarely, over the *cowhouses* or *stables*. Light and air are invariably excluded, either by a curtain or shutters.* The floor is either of plaster (gypsum) or boards, but more commonly the latter; some of the larger cheese-rooms are warmed by stoves, or hot air, and occasionally, though rarely, by fire places in the room itself. The small cheese-rooms are seldom supplied with artificial heat, except what is gained from the rooms below. Some cheese-rooms are occasionally found to be in the summer-time too warm, in which case the cheese has to be removed for a time to a cooler part of the house. This is more generally necessary where the building is slated, and exposed to the noon-day sun, but is seldom or never experienced where the roof is of thatch. The size of these offices is of course regulated by the extent of the farm; where 30 cows are kept I find them nearly as follows :—

	Yds.	Square yds.
Milk-house - - - -	6 by 3	or about 18
Dairy - - - - - -	6 by 5	„ 30
Salting and drying house	4 by 5	„ 20
Cheese-room over dairy and drying-house -	10 by 5 (or 8 by 6)	50

The utensils, excepting those I have described, will be noticed hereafter.

Process of Cheese-making.—As the first process—namely, that of extracting the whey and salting—occupies, according to circumstances, from five to seven hours, it is found most convenient to commence it in the morning. This being the case, the evening's milk has to be kept all night in the milk-house. In the morning, the cream having been skimmed off, a portion of this milk is warmed. This is done in a circular flat-bottomed brass or tin pan (see a. fig. 4), floated in the boiler, the water of which has been previously heated for that purpose: the size of this pan is about 20 inches in diameter and 8 inches deep. The quantity to be warmed depends upon the state of the weather; for the first two or three months of the season (say March, April, and May) it is not unusual to heat as much as half the evening's milk to a temperature of 100 deg. Fahrenheit, and this heat is rarely exceeded, excepting by those dairymaids who wish to save themselves trouble in the after process. The "cheese-tub," which is similar to a brewing-tub, having been placed in readiness in the dairy, the cold milk is now put in, and the warm added. Supposing the temperature of the cold milk to be about 50 deg., and the warm 100 deg., and they were in equal proportions, the heat after mixing would be 75 deg., or something less; but in warm weather it will be sufficient if it reaches 70 deg. I have known instances of good cheese being made in summer without warming any portion of the evening's milk; indeed, such is now becoming the general practice. In very warm weather some dairymaids think it necessary to reduce even the temperature of the morning's milk. The *cream*, which is diluted either in about double its quantity of warm or new milk, or by being exposed to the heat of the boiler in the same way as the milk, is next put in. I have before stated that it is cus-

* One reason, amongst others, assigned for this (universal practice), is its tendency to prevent the mischievous effects of the fly.

tomary to retain a small part of the cream for butter: when this is the case, it is considered best to skim off the whole surface of the cream before diluting, as by that means the froth and bubbles, which are supposed to be prejudicial to the cheese, will, for the most part, be taken off. This leads me to the conclusion that *fixed air*, if it gets mixed in the curd, has been found to be detrimental. Since warming of fluids has a tendency to dispel this fixed air, it is perhaps worthy of consideration whether it would not be better to warm the *whole* of the evening's milk to the required temperature, rather than heating a *part* of it so high as 100 deg. The process adopted with the evening's milk, as above described, is generally finished previous to the time of milking in the morning; but if not, the dairymaid stops and completes it before the *new* milk is brought in from the cows. This new or morning's milk is then added by passing it through a *sieve* placed upon the "cheese-ladder" over the cheese-tub. When the whole is thus collected, some few bubbles are invariably found floating on the surface; these are skimmed off and passed through the sieve to break them.

One of the most important points now to be attended to is the heat of the milk preparatory to coagulation, as the milk, if at a proper temperature, should now be ready to "set together," that is, to receive the rennet. This heat is rarely tested by any other thermometer than that of the dairymaid's hand; some may, and I have no doubt do, determine it pretty correctly, but cannot always.

In consequence of the changes in the weather, it is difficult even for an experienced dairymaid to know at all times what proportion of the evening's milk should be warmed, she is therefore cautious not to warm too much, until the morning's milk is added and the consequent heat ascertained. If it be deemed too cool, a little of the evening's milk which has been reserved is then warmed so as to produce the heat required; but when none has been reserved, the necessary quantity taken from the tub after admixture of the two milkings is warmed for that purpose. Little is known amongst the farmers or dairymaids as to the *precise heat* which is best. I have seldom heard the subject named, except by a vague comparison that such and such dairies were made *colder* or *warmer* than others. I am acquainted with some farmers whose wives are said to have a peculiar method of their own, and who, I believe, obtain a high price for their cheese in the Manchester market, chiefly from the tendency of the cheese to green mould. I know little of the system which these parties adopt, but I understand they make their cheese "cold"—that is, set the milk together at a low temperature; and I am also inclined to think they use less salt than others. I have not solicited the *privilege* of prying into the *mysteries* pursued in these dairies, nor could I expect to have been so indulged if I had, especially if they had supposed it was for publication. It is said these parties get a greater price for their cheese than many of their neighbours, which I have no reason to doubt; and I think, from what I have seen, they make quite as great a quantity per cow. But the *real* price obtained, and the *precise* quantity made in any particular dairy, is seldom known beyond the farmer's own family and the factor.

I ought, perhaps, to state that I have tasted some of these cheeses, and find them generally very good, fair toasters, and without colouring; but in some I have detected a slight sourness: from this cause, or, what is more probable, from too little salt being used, the cheese will not keep long before decomposition takes place. To the farmer this would only be of consequence in the event of his not being able to sell the article at the time he wished. In the dairies where I have been permitted to take observations, the lowest heat of setting the milk together was 77 degs. I am disposed to think those who make a so-called *cold cheese* do not adopt much lower temperatures, even in summer, than 74 deg. or 75 deg.; since a much longer time would be occupied in gathering and compacting the curd, and considerable risk incurred of having what is termed a *sour cheese*.

The evening's milk in the tub being at or about 75 deg., as before stated, and the milk which is brought from the cows 90 deg. or 95 deg., the temperature of the whole is then found to be somewhere between 80 deg. and 85 deg.; and I am of opinion that the heat at which milk ought to be and is commonly coagulated ranges between those two temperatures.*

When *colouring* is used, which is not so extensively the case as formerly, it is put into the milk immediately before the rennet. The nature of the article used for this purpose I propose to investigate under a distinct head in the Appendix. The *quantity* of colouring is in some degree regulated by the quality of the milk: if a considerable portion of the cream of the evening's milk has been taken out for making butter, a greater quantity of this colouring matter will be required to give the cheese that appearance which is found necessary to please the *eye* of the consumer, and particularly of those residing in London or at a distance. *Annatto* (or rather a colouring matter which *goes by that name*) is the article used; 1 lb. of it for each ton of cheese is a moderate calculation; this would be after the rate of half an ounce to 75 lbs. The present retail price of the "best *real* Spanish annatto" is 4s. per lb. The colouring is prepared and applied in different ways, but the most common is to take a piece of the requisite size, to fold it in a small bit of linen, and put it in half or a quarter of a pint of warm water the previous night. By this means it gets sufficiently dissolved. When the infusion is poured into the milk, the linen bag containing it is dipped in, and rubbed betwixt the fingers until the

---

* Since writing the above, I have met with a farmer in Eddisbury Hundred, who says he used the thermometer during the year 1841 for the first time, and that the heat he uniformely adopted was 84 deg. I also found a thermometer at another dairy near to this, but it was not in use. I was allowed to test the heat of the milk with it, and found it 78 deg.: this was in June. The precise heat at which milk ought to be coagulated is a matter of vital importance in cheese making, and can only be ascertained by a series of careful and judicious experiments made by scientific and practical parties.

colouring is all discharged. The dregs, if any, remain in the bag.

The *rennet*—or *steep*, as it is commonly called—is next added. I have already stated in the introduction that this is an infusion made from the preserved stomach or maw of sucking calves, thence called *maw-skins* or *bag-skins*. A recipe for preserving the skins will be found in the Appendix. To define the quantity of rennet sufficient for coagulating a given quantity of milk is a very difficult matter, as the maw-skins vary so much in quality. When the farmer is laying in a stock for the year, he generally calculates upon a dozen of skins to a ton of cheese, but the skins vary in size. The price, when cured, is from 6s. to 9s. per dozen. In using them, it is the practice often to cut two skins at once. Three square inches taken from the *bottom* (or strongest part) of one, and one or two inches from the top (or weakest part) of the other, are generally found sufficient for sixty gallons of milk. These two pieces of skin are put into a cup containing about half a pint of lukewarm water, with the addition of a tea-spoonful of salt, some part of the day previous to being used. The water thus impregnated with the maw-skin is passed through the sieve into the milk, but the skin itself is generally, though not always, kept out. The rennet cup is well *scalded* before being used again. I have been told that some farmers make a sufficiently large quantity of rennet to last for several weeks, and find it to answer better than making a small quantity daily. The question is, will it keep *sweet?*

The colouring and rennet having been put in, the milk is well stirred and left to coagulate. It is usual to invert the skimming-dish on the surface of the milk—a practice of doubtful propriety, for this reason, that the curd immediately under it does not attain the same adhesiveness as the other, and is one of the causes of what is commonly called *slip curd*. The tub is now covered up, either with a wooden lid or with cloths supported by the "cheese-ladder:" these assist in preserving the heat of the milk, and protect it from dust and dirt.

The coagulation (or "coming") is generally effected in an hour or an hour and a half. As far as my own observations extend, I am led to think that an average of these two is sufficiently long, if the proper means are used in effecting the formation of the curd; for it is well known that, *cæteris paribus*, the warmer the milk is at the time of setting together, or the stronger the rennet, the sooner will the coagulation take place, but the curd will, in consequence, be tougher and less in quantity; on the contrary, the cooler the milk, or the weaker the rennet, the longer will the curd be in forming, and the more tender its quality, but its quantity will be greater. By attention to these results the cheesemaker may soon decide when too much or too little rennet has been put in the milk, and correct the quantity the next time. It may be proper here to state that too much rennet has a tendency to impart an unpleasant flavour, or bitterness, to the cheese.

It may generally be expected that the heat of the curd when formed will be four or five degrees less than the milk was when set together; and it is desirable, particularly in cool weather, that this difference should not be greater, otherwise the subsequent labour will be more difficult. To determine exactly when the *curd* is in a fit state for what is called "breaking," requires some practical knowledge: with attention, this is soon acquired. The point is generally determined by gently pressing the surface of the milk with the back of the hand, or by lifting up the skimming-dish, beneath which the curd and whey will distinctly appear if the coagulation is complete. Another criterion is the colour of the whey, which should be of a pale green.

The "breaking" and "gathering" of the curd is the next process. This used formerly to be done by means of the hands and skimming-dish (a practice still continued in some dairies); but the *curd-breaker* is now generally made use of for this purpose (see Fig. 1). It is made of wire-work, in an oval form, and has a tin rim round it about an inch and a half broad. This wire-work cuts the curd, by being passed through it perpendicularly *very, very* gently at first, and in different directions, so that the whole mass is separated into very small portions. The length of time required for the operation depends upon the quantity of curd: for a 60lb. cheese the operation often takes 20 or 25 minutes. After this the curd is left for a quarter of an hour to separate from the whey, and, if the weather be cool, the tub is covered to retain the heat. The curd having separated, which it does by sinking, a portion of the whey at the top is then taken out by the portable brass or tin pan before alluded to, being *pressed* into it, and emptied into the *set-pan*. The curd is then gently broken by the dairy-maid and her assistant passing their hands down to the bottom of the tub, and buoying up a portion of the curd at each time to the surface, or by again using the curd-breaker. The curd, having been brought to the top, is easily seized and separated into smaller portions, and the whey thereby released. This operation takes about half an hour. After the expiration of another half hour (or so soon as the curd is considered sufficiently settled, for there is no saying to five or ten minutes how long each particular interval of rest should be), more whey is taken out, and the curd afterwards drawn as much into one-half of the bottom of the tub as its loose texture will admit of.* Upon the curd is then placed a semicircular board adapted to the size of the tub, with a weight of about 30 lb. placed upon it. This board is perforated with holes, about half an inch in diameter, to allow the whey

* At this stage, it is the practice with some dairy-maids, when they suppose the curd is colder or more tender than it ought to be, to return a few gallons of whey, after it has been heated over the boiler in the brass pan, into the tub again, to assist the discharge of the remaining whey. If, on the contrary, the curd is found warmer than is intended or desirable, which is sometimes the case in hot weather or during thunder, a few gallons of cold water are applied to prevent the curd becoming tough. These inconveniences would, in my opinion, seldom if ever happen if a thermometer was used at first, and the proper heat at that time adhered to.

to escape through. The tub is now set three or four inches atilt, to drain the whey more readily from the curd, and to admit of its being collected and carried off. The skimming-dish is again required, to lade out the whey. The whey, on its way to the set-pan, is passed through a sieve, to collect any curd which may happen to be floating in it. This curd is what is called *slip curd*, which by some is not returned to the tub, for the reason I have before stated. The weight and board are shortly taken off, and such part of the curd as has been squeezed from under them is again collected on one side, and a heavier weight (say 50 lb. or 60 lb.) applied as before. As the whey escapes from the curd it is laded out. In the course of a quarter of an hour the board is again removed, the curd cut in intersections of six or eight inches apart, to assist the discharge of the whey; and the board, with additional weights (about double the last), again applied. Some dairy-maids now add the slip curd. The weights are again increased if it be thought necessary; observing always to *let the pressure which is applied be gradual, and regulated by the degree of compactness of the curd;* for if this is not attended to now, as well as afterwards, a considerable portion of butyraceous matter will be forced out, and the cheese of course deteriorated.

The curd is again cut into square pieces, taken out of the cheese-tub, and broken a little by the hands as it is passed into the "thrusting-tub" (*a*, Figs. 2 and 3). (In some dairies a large-sized cheese-vat, in others a willow-basket is substituted for the thrusting-tub). In this the extraction of the whey is afterwards continued by the application of "the screw," of which there are two or three kinds, but all on the same principle (see Figs. 2 and 3). The old plan of *thrusting*—and from which the *term* is no doubt derived—was by means of a pole four or five yards long, fixed at one end into an upright post, whilst at the other was seated a lusty lad or a man, who kept regularly pressing down the pole upon the curd, the pole acting as a lever. Both poles and men are now almost entirely expelled from the Cheshire dairies; and the *screw* is also likely to be superseded by the "lever press" (Fig. 5). The advantages of this over the screw are, *that it sinks by its own action with the curd: any degree of pressure required can be applied and gradually increased, and less attention is necessary;* whereas the pressure from the screw is sudden and uncertain, and, having no self-action, requires the dairy-maid's assistance every five or ten minutes to render it effectual.

The "thrusting-tub," in which the curd has now to be pressed, is round, and is perforated with holes at the sides and bottom for the whey to escape through (see *a*, Figs. 2 and 3). Before the curd is put in, a "cheese-cloth" of the coarsest kind, about one and a half yard long and a yard wide (or of dimensions sufficient to contain the curd), is placed in it.* In this the curd, after being broken, as before stated, is enveloped, and a "sinker," or strong circular board, which fits the inside of the tub, placed on it (*b*, Figs. 2 and 3). Upon this the screw (or lever press, if used) is let down, and the power gradually applied.

To assist still further the discharge of the whey, long iron skewers are introduced through the perforations in the tub, with their points directed upwards, so that when the skewers are withdrawn there is a drain made for the whey to follow. These skewers do not remain in more than five or ten minutes; the pressure is continued a little longer. The curd is now cut *through*, in intersections of two or three inches apart, with a large *dull* knife, so as not to injure the cheese-cloth, and the edge or corner of the curd is cut off all round, and placed in the centre. After this the pressure is again applied, and gradually increased, and the skewers introduced and withdrawn as before, after the lapse of about fifteen or twenty minutes. The curd is then taken completely out of the tub, cut into four or five pieces, and each piece broken separately with the hands to about the size of two or three inches square. A clean dry cloth is made use of, the curd folded in it, and again pressed and skewered. These operations are repeated until the whey is sufficiently extracted to admit of the curd being *salted*, which is the next part of the process.

If the milk is set together at six o'clock, and the coagulation takes place in an hour and a quarter, the breaking, gathering, and preparation for salting is generally accomplished by eleven or twelve o'clock.

This is merely mentioned as some guide to the *new beginner*, who may not be able to judge from the state of the curd when it is fit for salting. I may here observe that it is the practice in some dairies to salt the curd, whilst, in my opinion, there is *too much whey in it.*

The *quantity of salt* used is regulated by some old custom, or by the fancy or taste of the dairy-maid, and with about as good a chance of correctness as that with which she regulates the temperature of the milk by the touch. That clever and experienced persons may determine the proper quantity of salt in this way tolerably well, I admit; but there are many others who *fall into error*, and all *for want of some fixed rule.* If there be a certain proportion of salt which would answer the purpose best, which there doubtless is, why not ascertain and adopt it?

"In all dairies," (says Mr. Wedge, the author of the original 'Report of the Agriculture of Cheshire,' written many years ago, but still equally true) "the same points are admitted to be essential; but although the means of obtaining those are, upon farms similarly circumstanced, so far alike as to differ materially in the minutiæ only, yet upon these minutiæ much of the art of cheese-making depends.

"That an exact uniformity does not prevail in every part of the process is no wonder; for there is not any of the business which is conducted in a dairy which tends to chemical exactness. Where there is no precision, there can be no just comparison; and where no comparison can be made, there exists no foundation for an attempt at uniformity. *The degree of heat at setting the milk together is never measured; the quantity of steep is*

* *Cheese-cloths* are *linen*, of a rather closer texture than canvas, and made for the purpose. The coarse kind are sometimes termed *screw-cloths.*

guessed at, and its quality not exactly known; *the quantity of salt necessary is undefined; and the sweating or fermenting of the cheese, when made, is accidental.*"

As an antiseptic, a certain quantity of salt is necessary: it is the same in this respect with cheese as it is with butter or bacon. There may be, and no doubt are, differences of opinion, both amongst makers and consumers of cheese, as to the degree of saltness which is best; and it may be necessary, in order to suit the palates of the *many*, that there should be a *variety*. I am willing to admit the force of the argument, so far, that there might be these shades of difference in different dairies, but think that they ought not to exist in one and the same dairy. Each maker strives at uniformity, as regards the *thickness and colour* of his cheese, and would like also to attain uniformity in flavour if he could. Why not, therefore, measure or weigh the salt before using; regulating the same by the quantity of milk or the weight or quantity of curd?* The former would easily be ascertained by means of a *gauge*, or graduated rod, which any farmer might make for himself, to suit his own cheese-tub. The way to make it would be to pour into the tub a gallon of water, or any liquid, and then to note its height, and mark it on the rod. This being done, put in another gallon and again mark the height, and so on until the tub is full; taking care afterwards to introduce the rod into the *same part of the tub*, as the bottoms are not often level.

It has generally been considered that a gallon of milk (supposing little or no cream has been taken from it) will produce upon an average of the season 1lb. of saleable cheese; that is, when the cheese is four or five months old. In autumn there is always more curd from the same quantity of milk than at any other part of the season.

During wet weather there will sometimes be more milk than usual, though not a proportionately greater quantity of curd. An experienced dairymaid soon detects these different results, and makes allowances accordingly. I have met with no dairy-made who regularly weighs the salt; but a highly-respectable farmer, whose wife makes a first-rate cheese, has given me the weight used in his dairy, as near as the same can be *computed*. It is as follows:—

	lbs.		lbs.	oz.	
In March and April their cheeses average about	30	and about	0	10	of salt is used.
In May, June, and July	70	,,	2	0	,,
In August	60	,,	1	12	,,
In September	50	,,	1	4	,,
In October and November	30	,,	0	10	,,

In the above instance it will be seen that more in proportion was used in summer than at other times, and that the average is 1lb. of salt for 40lbs. of dried cheese (or say forty gallons of milk).

I was favoured with an account from another dairy in which, to oblige me, the salt *for once* was weighed. For a cheese which weighed 46lbs. a few days after making (say 42lbs. at four months old) 1lb. 1oz. was used. This is also after the rate of 1lb. of salt for 40lbs. of dried cheese, and was said to be the quantity uniformly used throughout the year in this dairy, which consisted of about forty cows.

A third account is from a dairy of sixteen cows: the quantity of salt used was generally about 1lb. for 45lbs. of cheese; but the dairy-maid made a trial last year with one cheese, using only three quarters of a pound. The cheese was made at the beginning of June, and when weighed in the middle of September was 42lbs. This cheese was admitted to be better than the others in the same dairy.*

The salt termed the "middle grained" is the kind generally used; but some use "fine." Before applying it the curd is cut into three or four equal sized pieces, and each of these is broken into smaller pieces by hand, or is passed *once* through the curd-mill† (Fig. 4). The salt is then scattered over it, and the "breaking" continued either by the hands, the curd-mill, or both, until the salt is well intermixed and the curd perfectly crumbled. Each portion as it is broken is put into the cheese-vat, in which has first been placed a clean and rather finer cloth than was used for the previous process, and the curd is compacted as much with the hands as possible. To admit of the curd being properly pressed, it is necessary to put it into such a vat as it will *overfill* by at least two inches. It is also rounded up a little in the middle. The cloth is then brought over it, and tucked in at the edges of the vat with a small wooden knife or other dull-edged instrument. In order to support the outside of that part of the curd which is above the vat, and to keep it in proper form when the press is applied, a tin or zinc hoop or "fillet," the edges of which are rounded off so as not to cut the cloth, and the ends lapping over and unattached, so that the same fillet will do for different sizes of cheese, is introduced round the inside of the top of the vat. The "fillet" thus placed sinks with the curd, and having small perforations in it, the emission of the whey is effected through it as through the perforations of the vat. Since it has become the fashion to make Cheshire cheeses *thicker* than they used to be, it is no unusual thing to see fillets six or eight inches broad.

The vat is now again placed under the screw or

---

* Since writing the above, I have learnt that a farmer in South Cheshire, well known for his introduction of improvements in agriculture, has commenced the system of weighing his curd previous to salting it, and he says he uses salt in the proportion of 1lb. to 42lbs. of curd. He also informs me he sets his milk together by a thermometer, and at a temperature of 76° to 77°.—May, 1845.

* It may not be out of place here to state that at Northwich, which is about the centre of the county, and where the principal salt-works are found, salt is at present bought for 8d. per bushel of 56lbs. In large quantities the price is considerably lower.

† The *curd-mill* is of recent introduction, and it is only in a few dairies that it is met with; some dairy-maids highly approving, others objecting to it. I think it will soon be more generally adopted, as it effects a saving in time, and breaks the curd more regularly than it can be done by hand.

lever press, and the skewering is also continued. The pressure is increased at intervals, and the skewers inserted in fresh places to accelerate as much as possible the discharge of the remaining whey or "*thrustings*," as it is now termed.

In the course of an hour from the time of salting, the curd is taken from under the screw or lever press and out of the vat, for the purpose of being turned upside down, which is done on a table. In the first place, the angles of that side which was topmost in the vat are cut off; a circular piece, two or three inches deep, is often also scooped out of the centre, and both are broken small with the hands and rounded up in the middle. The cloth being drawn over the curd, the vat is then turned down upon it, and re-turning the vat with the curd in it, the other angles and centre part of the curd are broken in a similar manner: after which the tin fillet is put on, and the screwing and pressing are continued as before for about half-an-hour or an hour. It will, probably, be two or three o'clock in the afternoon before the curd (or cheese, as it may now be termed) *is got under the press*, that is, when it is removed from the screw to the stone press; but where the lever press is used instead of the screw, which, I think, might always be advantageously done, all the change that will now be required is a little more weight at the end of the lever.

Before turning the cheese for the purpose of placing it under the press, it is usual to prick it perpendicularly down with a skewer in several places, for the purpose of making drains for the whey, after having been so turned. A clean cloth is applied, and where the lever press is not used the cheese is put under one of the lightest of the other kind. A pressure of six, eight, or ten cwt., according to the size of the cheese, will be sufficient. This is generally accomplished by about two or three o'clock in the afternoon. Smaller skewers are now used, and remain (by removing them occasionally into fresh places) until about four o'clock: they are then withdrawn, but the cheese remains half-an-hour longer undisturbed, to allow the whey to drain from it. It is then, or some time in the evening, turned, a clean cloth is put over it, and the pressing continued. If the lever press be used, the weight may be a little increased.

On the *second day* the cheese is generally turned twice or three times; it is also skewered, and clean cloths are used each time of turning. I would observe here, that if any of the cloths are used again before they have been washed and dried in the open air, great care should be taken that they be well *scalded*. The presses used for at least the two first days, and, if possible, during the whole process, should be situate in the dairy, kitchen, or some other moderately *warm place*, otherwise the whey will be longer in discharging, and more liable on that account, from the acidity which it soon acquires, to injure the flavour of the cheese. Another advantage of the lever press is that in cold weather it may be easily moved to a sufficiently warm place, which cannot be the case with the common presses. These common presses are chiefly made of one square block of stone fixed in a wooden frame, but are also made of wooden boxes filled with slag or other heavy material. They are generally fixed by the walls of the dairy, for the purpose of being stayed to them, and being there most out of the way; when there is not room in the dairy or kitchen, they are placed in the salting room or pantry, which latter places are often much too cold for the purpose, as the whey seldom gets thoroughly extracted when the presses are in cold situations.

On the third day, the cheese is again turned once or twice, but ought not to require any skewering. The heaviest press is now had recourse to, and for a cheese of 60lbs. or 70lbs. weight about 30 cwt. will be pressure sufficient; but some dairy maids apply as much as two tons, their heaviest press being that weight. A cheese-press of this weight, made of a block of red freestone, would be 3ft. 2in. long, 2ft. 8in. wide, and 3ft. 2in. high.

On the *fourth day*, it is usual in most dairies to discontinue the pressing, but in others it is continued for a day or two longer.

The cheese is then removed to what is called

The Salting and Drying Room.—Sometimes these are distinct apartments, but more generally one room suffices for both purposes. The salt can now, of course, be only applied *externally*: and the good, *if any*, effected is to harden the coat of the cheese. The cheese I have before alluded to, as having been made with three-quarters of a pound of salt, and which *was much above an average in quality*, was removed, as an experiment, *direct from the press to the cheese-room*. I am inclined to think this is the better system, or at least that a great deal of the present labour of the salting-house might be dispensed with.

It is, however, only right to state that in most of the dairies of this county the practice of *external salting* still obtains. I will therefore describe the process usually adopted.

The cheese is taken out of the vat, and a strong bandage called a "fillet," about two inches broad, and long enough to go three times round the cheese, is used. As this bandage is put on, salt is applied underneath it, to the coat of the cheese. The bandage is fastened with strong pins, the cheese placed on stone or wooden shelves or benches, and salt spread on the top to within an inch or two of the edges. The cheese is turned daily, and fresh salt and a clean bandage applied. In some few dairies it is the practice, before the salting above described, to half immerse the cheese for two or three days in strong brine kept in a shallow tub for that purpose. The salting process above described is continued for various periods: by some for five or six days, by others as long as three weeks. I will give the rule followed by the farmer who furnished me with the particulars of his salting of the curd (p. 113). It is as follows:—

From the beginning of the season (about March) to the time of the cows being turned out to grass (12th May), the cheese remains in salt four days; from thence to the end of July, ten days; in August, eight days; September, six days; and the rest of the season, four days.

It is obvious, from the practice in this dairy, that it is considered necessary for the cheese to remain in salt longer in the middle of summer than at other seasons.

After this salting, the cheese is well wiped or washed, has a clean bandage put round it, and continues in the same room, or an adjoining one, on wooden shelves, for the purpose of being *dried.* It is turned once a day, and remains until it is considered sufficiently dry for being removed to the *cheese-room.* The length of time for keeping cheese in the "drying-house" varies from seven to twenty days, and is regulated by the temperature of the weather, or the *cheese-room* to which it has to be next removed. In hot weather, and especially if the cheese-room is exposed to the heat of the noon-day sun, the change from a *too cold drying house* (as many often are, except, perhaps, in the middle of summer) to a too hot cheese-room, is calculated to cause *cracks* in the cheese, which said cracks have from time to time to be filled up by the application of bacon fat, or whey butter, otherwise mites would soon be generated, and the appearance of the cheese detracted from. To prevent this cracking as much as possible, the salting and drying houses have rarely if ever the windows opened, and drafts or currents of air are thereby prevented. This precaution is also adopted in the cheese-room; and, in addition, the light is excluded either by a shutter or *blind,* as I have before stated.

The cheese I have before alluded to as having been made without any *external salting,* as an experiment, and which *was taken direct from the cheese-press to the cheese-room,* was made in the beginning of June, and at the end of September was ready for the *market.* The quality of the cheese was better than that made in the ordinary way, and all the labour of the salting and drying house was saved. My own impression is, as I have already hinted, that the drying-rooms are often *too cold;* and that if it is found to be desirable, as perhaps it may be in some dairies, to continue the use of such drying-rooms, the heat should be kept as near as possible at from 50 deg. to 55 deg. In concluding my remarks on this room, I must not omit to observe that it is necessary the cheeses should remain *bandaged,* in order to prevent their bulging, and also that they should be turned over once a day. If one cheese be made daily, one will consequently—in the course of a certain time after the season of cheese-making commences—have to be removed every day to the *cheese-room.* When taken to this room, the situation of which I have before described, it is usual to scrape and clean the coat of the cheese, and to place it, in the first instance, in the coolest part of the room, often for a few weeks upon shelves or benches, which are cooler than the floor, subsequently upon the coolest part of the floor, and ultimately upon the warmest part. It is usual to continue the bandage or "fillet" for several weeks after the cheese gets into this room, and indeed in some dairies until it is sold. It is also usual to turn the cheeses, and wipe them with a cloth daily, for at least three or four months, and every alternate day afterwards; and when there are any symptoms of cracking, bacon-fat, hogs'-lard, or some other fatty substance, is applied. The floor of the cheese-room is generally covered with dried rushes, or a coarse grass resembling rushes, called "sniddle," or wheat-straw. The floor should be *level,* otherwise the cheeses will not be kept easily in shape; and should be well washed with hot water and soft soap about twice a-year. The temperature of the cheese-room should, when attainable, range between 60° and 65°. When this is the case, the "first make" will generally be ready for the factor by September or October, and the "latter make" by December or January; but in consequence of many rooms being badly situated and imperfectly heated, the farmer very often does not get his cheese into the market until two or three months after these respective periods. The object gained in having the cheese-room about the temperature I have named, is threefold: the perfect fermentation and ripening of the cheese; the reduction of labour; and the quicker return of *profit.*

It is usual in this county to sell the cheese by what is sometimes called the *long hundred* (120 lbs. to the cwt.); but the factors often require 121 lbs. The price varies with the quality of the article, the state of the market, and the size of the cheese; for large cheeses always sell for more per lb. than smaller ones. There is, perhaps, nothing more difficult to ascertain than the average price of cheese, inasmuch as both farmer and factor make the price a secret. The highest I heard of last season (1843) was 72s. per cwt. of 120 lbs., or a little more than 7d. per lb.; the lowest would probably be about 40s. or 45s.*

Conclusion.—I am aware that a great deal might still be said bearing on this subject: the various defects of cheese, the great difference of the flavour, the effects of different pasturage and food, and various other matters, might be discussed; but it is considered this essay is already too long and tedious. I shall, therefore, content myself by giving the following tabular statement, and the information promised in the Appendix. I cannot, however, close my remarks without expressing my admiration of the industry, cleanliness, and frugality of the Cheshire dairymaids. Their labours are great indeed; their cleanliness not to be surpassed; and to their good management it is that the landlord may often consider himself indebted for the *whole of his rent.*

---

*There is a general wish on the part of the farmers to adopt the standard weight of 112 lbs.: but the factors have hitherto, in a great measure, succeeded in purchasing according to the old custom of 120 lbs. The law for regulating weights and measures has little or no effect in this county, as the numerous customs at variance with that at law, and still in operation, bear testimony.

Tabular Statement of Observations taken at Four Farms in Cheshire:—viz., Nos. 1 and 2 in Bucklow Hundred; No. 3 in Nantwich Hundred; and No. 4 in Eddesbury Hundred. *Note.*—At Farm No. 1 there are Two Observations.

	Day of Observation.	Number of Cows.	Quantity of Milk at Two Milkings (except No 2).	Heat of Milk when the Rennet was put in.	Quantity of Rennet.	Time occupied in Coagulation.	Heat of Curd and Whey after Coagulation.	Heat of Dairy or Room in which the Cheese was made.	Time occupied in gathering the Curd, and completing the Formation of the Cheese.	Quantity of Salt used internally.	Weight of Cheese a Day or two after Making.	Weight at some subsequent Period.	Quantity of Cream taken from Night's Milk.	Quantity of Whey.	Quantity of whey cream.	Quantity of "Fleetings."	Size of Cheese.
			Galls.			h. m.			h. m.	lb. oz.	lbs.	lbs.	Qts.	Gall.	Qts.	Qts.	Inch.
No. 1.	Nov. 21.	42	43	83°	About 3 sq. in. of skin, 1 pint of water.	0 50	73° but raised with hot whey to 79°	..	5 0	1 1	55	47 Aug. 17 following.	..	37$\frac{1}{2}$	5$\frac{3}{4}$	4	15$\frac{3}{4}$ diam. 6$\frac{11}{12}$ deep. Aug. 17.
	Aug. 17 following.	48	Two made cheeses in two tubs. 59 / 53	88° / 86°	3 square in. skin, half pint of water to each cheese.	1 0 / 1 0	.. / 85°	68° at 7 o'clock.	..	2 4	58$\frac{1}{4}$ / 53	..	1$\frac{1}{2}$	102	13$\frac{1}{2}$	..	..
No. 2.	Oct. 13.	10	24 4 milkings.	78°	3 sq. in. skin, $\frac{3}{4}$ pint of water.	0 45	74°	..	4 0	0 4	..	..	..	22	3	3	..
No. 3.	Aug. 10.	26	56	..	..	1 0	..	78° at 11 o'clock.	5 15	1 0	60	..	1	47$\frac{1}{2}$	..	..	16 diam. 7$\frac{1}{4}$ thick. Aug. 30.
No. 4.	Aug. 19.	53	107	77°	12 or 16 sq. in. of skin, 1 pint of water.	1 45	72°	Morn. 64° Noon 67°	..	4 4 besides 1 handful in milk.	2 cheeses made; weight not ascertained.	57 / 53 Sep. 16	4	98	..	..	15 diam. 8$\frac{1}{4}$ thick. 15 diam. 8 thick. Sept. 16.

These Observations are not so complete as might be wished, not having been taken at the time in a *tabular form*, and with a view to publication.

Note.—Cheese loses about 15 per cent. in weight the first year.

APPENDIX.

The Scalding of the Whey, and the Making of Whey-Butter.

This process is carried on simultaneously with the making of the cheese. The whey which comes from the curd, previous to its being salted, is called the *green whey,* and that which is extracted afterwards, the *thrustings*, or white whey. The latter are more or less impregnated with salt. As soon as the principal part of the green whey is collected in the *set-pan*, a fire is lighted under it of cannel coal, crop-wood, and other quick-burning fuel. The remainder of the green whey is added after the fire is lighted. It is usual to skim off any small particles of curd which float on the whey, and give them to the poultry. Whilst the whey is heating, it is necessary that it should be frequently stirred, or it will be liable to burn to the bottom of the pan. When it has attained a heat of about 160° or 170°, if any whey is wanted for the family, it is then taken out. When the whey has reached the heat of 180°, it is in a fit state for *breaking*. This may be effected by any simple acid; but it is customary here to use sour buttermilk, and with it the *thrustings* of the previous day. The quantity of buttermilk necessary may be easily ascertained. I have only noted what was used in one instance, which was 1 pint of buttermilk and 2 quarts of thrustings (which had been mixed the day previous to being used, and kept in a tolerably warm place to increase the acidity) to 22 gallons of whey. The *breaking* by this method, which is almost instantaneous, has the effect of causing all the creamy matter to rise to the surface, from which it is regularly skimmed off, and put into a cream-jug. The last skimmings are termed *fleetings,* and are generally reserved for the use of the servants. It is necessary, after the *breakings* are put in, to check or withdraw the fire, to prevent the whey from boiling. The refuse whey, after the cream is skimmed off, is laded out of the pan for the use of the pigs: and it is generally conveyed by a spout fixed above the pan, which leads to a cistern or tub in which the pig-meat is kept.

The making of butter from *whey-cream* varies very little from the process of making butter from the cream of milk. The cream is kept for three or four days, or until it has become clotted (provincially termed *calved*). Those who make the best whey-butter have a spigot and faucet to each of their cream-mugs, to let off the whey, which, in the course of a few hours, settles at the bottom, and which, if allowed to remain, imparts a rank flavour to the cream, and consequently to the butter. The temperature of the cream, when put into the churn, is generally ascertained by the hand; but, if a thermometer be used, the heat which I would recommend is 60°, having found that the best. If it be much *higher* than this, the butter may be expected not only to be soft, but inferior both in quantity and quality; and if much *lower*, the operation of churning will be prolonged, and indeed tedious. At this heat, the time in churning will probably be about an hour and a half. It will perhaps be necessary in cold weather to put hot water into the churn, and in warm weather to put in cold water, in order to attain this desirable object as to heat.

From 100 gallons of milk there will not be less than 90 gallons of whey, which should yield from 10 to 12 gallons of cream, or 3½ to 4 lbs. of butter. The quantity of whey-butter per cow is about half a pound per week, taking the season through; but with that small portion of cream of the evening's cream (to which I have alluded at p. 106) added, the farmer often churns as much as three-quarters of a pound of butter per cow per week, or from 20 to 25lbs. per annum: 1 lb. of salt is sufficient for curing 37 lbs. of butter, if for present use.

Cheese-Colouring.

This ingredient is, or should be, *annatto* (or *annotto*), the produce of the *Bixa orellana* of Linnæus. It is, I believe, chiefly imported from the West India Islands, and used for dyeing. The colouring chiefly used in cheese-making is *prepared* by manufacturers in this country for the purpose. It gives the cheese that amber or cream-like appearance which is unfortunately required in order to *please* or *deceive* the eye of the London consumer. For the Manchester and Liverpool markets, and for *home* consumption, the Cheshire farmer rarely uses it in his cheese-making, as it is well-known it does not improve; but if an inferior article is bought, and especially if much be used, it may deteriorate the flavour very much. Those who wish to be enlightened on this subject would do well to read the "Essay on Cheese-Colouring," written by Mr. Whitly of Stretton, published by Ridgway, in which it is clearly proved that the greatest bulk of the cheese-colouring used in this country, is only an *imitation of annatto*, but sold by that name, and consisting of such ingredients as turmeric powder, potash, and soft-soap or train-oil, well mixed, to form a mass along with a *little* "real Spanish annato." I cannot, for two reasons, here resist inserting a verbatim copy of a paper which was printed and published several years ago by a cheese-factor in Cheshire: *first,* because it is an acknowledgment, on his part, that much bad colouring did then exist; and, *secondly*, because it contains "A Word of Advice to the Dairy-maid," which shows what were considered some of the defects of the dairy system at that time, and what, in his opinion, the remedies. Many dairy-maids, even *now*, would do well to attend to this latter advice.

"LOOK YOU HERE, AND BUY ——'S COLOURING."

"To all that may be concerned in making coloured dairies of cheese, —— begs to inform the users of annatto for the purposes of colouring, that he has, for the last ten years, felt sorry to his heart for great numbers of dairy-owners, to see such bad-coloured dairies as he in general has done; and the very great loss the owners thereof have annually met with on this account.

"—— having therefore been determined, for the farmers' interest, to use every influence possible with the manufacturers of this article to have the same genuine, which till lately has been to little purpose, as one-half they have in general sent out has proved to be far short of the colour which the market requires, he has at last gained considerable information from sundry manufacturers; and as he has now engaged a person that has been in the habit of making and seeing this *article made for the period of twenty years* and upwards, and as —— is now in the habit of seeing and hearing what other manufacturers have been and are doing, convinces him that farmers will still find themselves but little better off by following their old mode, he has determined to make the article of annatto in its genuine and original purity, and is now giving the public a favourable opportunity of having some of this very superior colouring, which, from its brilliant colour, will recommend to the farmer a great variety of customers for their choicest dairies."

"A WORD OF ADVICE TO THE DAIRY MAID.

"Let your rennet or steep be put into your milk of a temperate heat or warmness. After the curd is formed, do not let any part of it be starved, or get any colder than your own hand.

"All dairy maids that would have real fine-flavoured cheese would do well to thrust it with their hands, that there are no cold draughts from doors upon their curd, but keep it gradually warm, but not to scald it, neither with water, whey, nor burning vats. Have your first press not too heavy, and in as moderate a warm place as you can possibly place it; study a warm salting room; use neither flags nor slates for your cheese to lie on, but good planks; your drying room to be moderately warm, and also your cheese-room; cold damp rooms, flags, or slates, will spoil the handiwork of the best dairy maids; you should never suffer your cheese to be starved, or get into a cold damp state, as it very materially hurts the flavour.

"Good calf skins, or calves' bags, as are invariably made use of, are of serious consequence to the flavour and the coming of the cheese."

A Recipe for Curing the Maw Skins.

Procure the skins fresh from the butcher the year previous to their being wanted; clean out the chyly matter, and every other apparent impurity; the inside is then turned outward on a table, and salted; the skins are then laid one upon another, with a layer of salt between each, in a deep earthenware vessel similar to a cream mug; they are then covered over with salt, and have a lid of slate or flag placed on the top. They are taken out as wanted, about a month previous to being used, and the brine drained from them. They are then spread on a table, and fine salt is powdered on each side. In this state they are rolled with a paste roller, distended with a splint of wood, and hung up to dry.

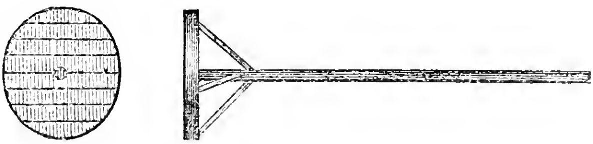


Fig. 1.

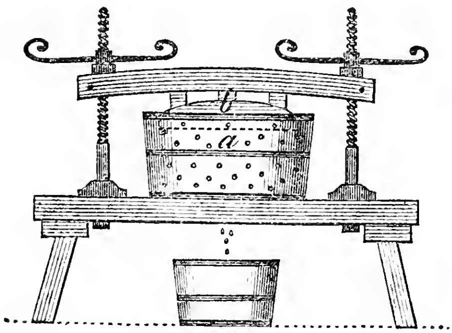


Fig. 2.

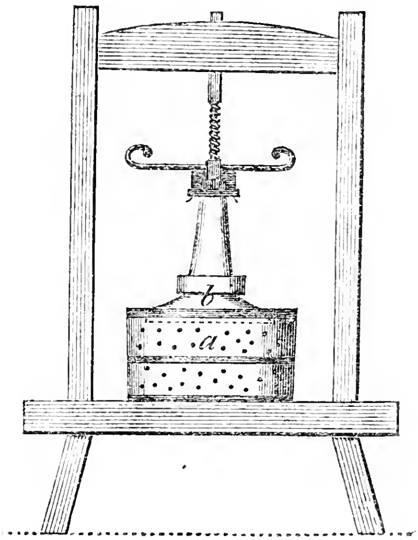


Fig. 3.

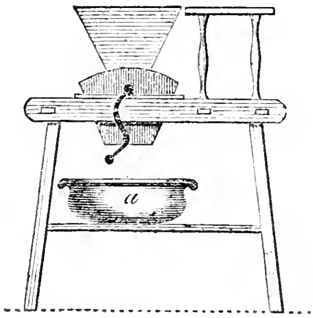
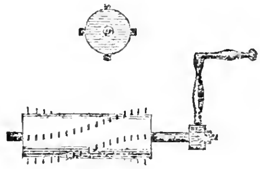


Fig. 4.



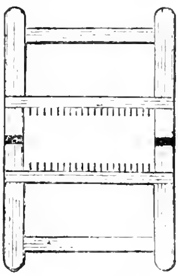


Fig. 4.

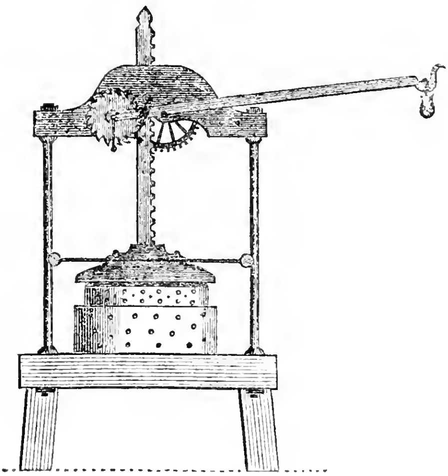


Fig. 5.

Scale, 2 feet to an Inch.

ON RENT.

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

THE TENANTS' IMPROVEMENTS.

It is fortunate for the prosperity of England's agriculture, that the property of the outgoing tenant in the unexhausted improvements, he has effected on his farm, is a right rapidly becoming better understood. In this very desirable progress of sound knowledge, the interest of both the landlord, and the tenant are equally served; for when once it becomes generally settled and acknowledged that the departing tenant is entitled to all the unexhausted improvements he has made on his farm, so soon shall we see the tenant farmers of England, to a still greater degree than ever, encouraged to increase the fertility of their land by every means in the power of skill, prudence, and capital to accomplish. The right of the outgoing tenant to be paid either by his successor or by his landlord, for the improvements, such as those, to which I have alluded, rests upon either the custom of the country, or is derived from a written agreement. In most instances, perhaps (while the improved good custom is not yet generally and perfectly understood), it may be the most prudent for both the incoming tenant and his landlord to have a written agreement, describing as minutely as possible the unexhausted improvements which are intended to be regarded at the expiration of the tenancy: this will prevent mistakes and erroneous conclusions. When the best customs are generally and fully admitted, of course the necessity for the written memorandum ceases. The custom of the country, the farmer is generally aware, in the absence of a written agreement, is the rule by which such claims are determined; but in those disputes where there is a written agreement the courts of law will not inquire into the custom of the country (see *Libenrood* v. *Viner*, 1 *Mer.* 16), and if an express stipulation is made, of course the custom of the country is altogether excluded (see *Roberts* v. *Parker*, 1 *C. & M.* 808).

The courts of law have in too many instances been employed in settling these conflicting claims between farmers and their landlords—decisions which it would be well for every incoming tenant to remember. I will here insert, to aid him to a better understanding of his own position, a few of the leading cases on this head, and these I will take from p. 355 of the valuable work of Mr. M. Mathews, entitled "A Manual of the Law of Landlord and Tenant." He there very correctly observes, when treating of "the partial occupation of land," that it is very generally the case that outgoing farming tenants leave, and the incoming tenants enter upon the premises, at different periods of the year, as the house and buildings at one time; the arable land at another, and the pasture and meadow at a third. Sometimes, however, the general quitting of the farm takes place at one time, and there exists the privilege for the outgoing tenant to retain possession of the land upon which his away-going crops are growing, and the use of barns and stables for the purpose of thrashing and conveying it to market (*Bevan* v. *De la Hey*, 1 *H.*

Bl. 5). This privilege is occasionally given on condition of his paying the rent and taxes applicable to the land which he retains, but perhaps more commonly without any such stipulation. The incoming tenant has also the privilege of entering before the expiration of the existing tenancy, for the purpose of ploughing and preparing for his crops, particularly when there is a Lady Day holding. These privileges of partial occupation are sometimes expressly given by the terms of the contract of demise; and when this is not the case, frequently may be supported by the custom or usage of the country (*Har. Woodf. Lan. & Ten.* 474). The effect of thus allowing the outgoing tenant to take an away-going crop is to give him a prolongation of the term as to the land on which it grows, and he continues in possession until the crop is taken (*Borasdon* v. *Green*, 16 *East*, 71).

RIGHT OF THE FARMER TO OUTGOING CROPS.

The right which an outgoing tenant has to take an away-going crop, which may be explained to be the crop sown during the last year of his tenancy, but not ripe until after the expiration of it, is sometimes given to him by the express terms of the contract; and where that is not the case, he is generally entitled to do so by the custom of the country; and such a custom, observes Lord *Mansfield*, is good and just for the benefit and encouragement of agriculture; for it is but reasonable that he who sows should reap the profit (*Wigglesworth* v. *Dallison*, 1 *Doug.* 201). And it should be again remarked that a common usage of the neighbourhood is quite sufficient to confer the right, in the absence of any specific agreement between the parties (*Senior* v. *Armytage* (*Bart.*) *Holt.*, 197). This custom, however, cannot be pleaded where the offgoing tenant holds under a lease expressly making a different provision in respect of the away-going crop (*Webb* v. *Plummer*, 2 *Barn. & Ald.* 746), or where he continues to hold over after the expiration of such a lease without entering into a new agreement with his landlord, by which he may be considered as holding under the same terms (*Boraston* v. *Green*. 16 *East*, 71); but where the lease contains no stipulations as to the mode of *quitting*, the off-going tenant is entitled to his away-going crop, according to the custom, even though the terms of *holding* may be inconsistent with such a custom (*Holding* v. *Piggott*, 7 *Bing.* 465; *S. C.* 5 *Moore and Payne*, 427; *and see Webb* v. *Plummer*, 2 *Barn. & Ald.* 746).

Where the defendant, a tenant from year to year, had received notice to quit, and a motion was made for an injunction to restrain him from taking away the crops, manure, &c., contrary to the usual course of husbandry, the Lord Chancellor said, the case applies equally to the case of a tenancy from year to year as to a lease for a longer term, with respect to the right to take an away-going crop (*Oxlow* v. ——, 16 *Ves. Jr.* 173).

An agreement between the outgoing and incoming tenants with respect to crops, does not, however, at all affect any existing rights the landlord may have; thus, when a tenant of a farm, entitled to the away-going crop of the harvest, 1801, after his term expired, and paying rent up to Lady Day preceding, agreed previous to that day, viz., in June, 1800, to let in the new tenant, and sold the standing crops, and took a receipt for the value thereof, and also for 20*l.* "for the right of cropping the lands from June 18th," it was held that by this sale of the right of cropping, the tenancy was not to be considered as changed; and, therefore, that the outgoing tenant must pay for the time from Lady Day, 1800, to Lady Day, 1801, he having paid tithes and poor rate for that time (*Petrie* v. *Daniel*, 1 *Smith*, 199). A parol contract for the sale of growing crops between an outgoing and incoming tenant is not within the Statute of Frauds, and therefore good, because the sale of the interest in land proceeds from the landlord (*Per Littledale in Mayfield* v. *Wadsley*, 5 *Dowl. & Ryl.* 233; *S. C.* 3, *Barn. and Cress.* 357.)

REMUNERATION FOR TILLAGE TO OFFGOING TENANT.

It is also extremely desirable that the regular rotation of fallowing upon arable farms should be kept up, notwithstanding a change of tenants; but it is not to be expected that a tenant will lay out his capital in this process where he cannot derive a complete benefit from it before the expiration of his tenancy. From these circumstances has arisen the right which an outgoing tenant has to remuneration for tillage which is not exhausted at the time of his quitting; and this right is either given to him by the express stipulations of the demise, or, in the absence of any such agreement, by the custom of the country; and this custom has always been recognised by our courts (*Dalby* v. *Hirst*, 3 *Moore*, 536; *S. C. Brod. & Bing.* 224) even though the farm be held under a written agreement, if it do not in express terms exclude the custom (*Senior* v. *Armitage* (*Bart.*), *Holt*, 197). In delivering judgment in the first case cited, *Dallas*, C. J., said —"There can be no ground for contending that such a custom, or, rather usage, is unreasonable; it affords the strongest encouragement to the cultivation of farms with good husbandry; it is beneficial to both landlords and tenants; the land of the former receiving a lasting benefit from the labour and expense bestowed by the latter, on payment of a reasonable compensation to him; and the tenant being thereby encouraged to pursue a good course of husbandry, by the assurance he has that if his continuance on the farm should not enable him to reap the full benefit of what he has done, he will have a right to call for proportionate compensation." Where there is any agreement between the parties, the extent of compensation is regulated by it; where there is not, the usage of the country prevails. In a late case, where a farm was taken for fourteen years, and the tenant agreed to pay a given sum for tillage and improvement done previous to his entering, on receiving in return the value of such as he should leave, and in the first year gave notice to quit, to which the landlord acceded, but no new bargain was made as to the tillages and improvements, it was held that he was not entitled to the value of such as he left on so quitting (*Whittaker* v. *Barker*, 1 *Cromp & Mees.* 113). As the system of allowing to an outgoing tenant a remuneration for those expenses of husbandry to which he has been put without deriving any benefit arises from the necessity which exists of allowing the land to lie fallow, and therefore for the time unproductive, the amount of remuneration thus allowed must, of course, depend upon the length of time which has elapsed and the number of crops which have been taken since the last fallow. When land has been laid in fallow one year, and made perfectly clean, and is valued before producing a crop, it is denominated a full tillage; and in taking the valuation, the rent, taxes, dressings, manure, seed, if any sown, and labour are calculated. When turnips, rape, or other green crops have been consumed on the ground by sheep, land is also said to be in full tillage, but one-half the value of the crop is deducted. When land has sustained one white crop after a fallow or turnips, it is said only to be a half tillage, and only one-half of the rent, taxes, dressings, and manure expended in the year of fallowing are allowed to the outgoing tenant; and if the turnips be drawn and consumed off the land, half the dressing and one-fourth of the manure only are allowed, and nothing is charged for the rent and taxes. Where the tenant is bound to a regular rotation of crops, either by express stipulation or the custom of the country, he is not entitled to any remuneration for tillages out of the regular course (*Har. Woodf.* 480).

The progress of knowledge within these last few years, with regard to the rights of the outgoing tenant to unexhausted improvements, has in some districts of England been much more rapid than in others, and perhaps in no county more so than in the great agricultural county of Lincoln. This happy advance has been mainly accelerated by altered modes of modern tillage, and by the introduction of better and more permanent systems of drainage and of manures, and by more commodious and useful fixed machinery and agricultural buildings. It is not yet twenty years since Kennedy and Grainger, in their work on the landlord and tenant customs of different counties, described those of Lincolnshire as being, at that time, in general, for the outgoing tenant to hold his land by a lease of only seven or fourteen years; that, as regarded his improvements, a very common way was for the outgoer to be paid for all his crops, the value of seed and labour, and also for the manure. Of course, by the word "manure" those of the farm-yard would be, at that period, chiefly regarded; and as regarded the crops, these were valued at harvest-time, and the price set according to the average of three market-days, taken once a month between harvest-time and the ensuing Lady-day.

In the *Journal of the Royal Agricultural Society of England* (v. 6, p. 44), Mr. Williams has given an account of the system now usually adopted in north Lincolnshire in the allowances made to outgoing tenants for unexhausted improvements. From this description we find that, in the estimate for manures, bone-dust is considered to last for three years; and thus a tenant quitting in the spring of 1845 receives two-thirds of the cost of what he put in in 1844, since one-third only of this fertilizer is supposed to be exhausted by the turnip crop. If the bones were applied in 1843, then he receives only one-third of their cost, because he has had the benefit of the other two-thirds in the crops of that year and 1844.

In addition to these allowances for manures, a fresh one has been established on the great and highly-cultivated estate of Lord Yarborough, such an allowance having become desirable from the increasing importance of its subject. It is an allowance for oil-cake given to stock, which has, it is well known, a most important effect in improving the quality of the manure, though there is seldom much profit to be made from it on the stock itself. The allowance is based on the assumption that the manure is improved to the extent of half the value of the oil-cake consumed, and, to get a fair average as to quantity and price, it is made to extend over the last two years; and the allowance is *two-sixths* (one-third) of the cake used in the last year, and *one-sixth* of that used in the previous one, making together the half of a year's consumption. Oil-cake given to horses is excluded from this allowance, as it is considered that the benefit to their manure is comparatively trifling, and an allowance for it might tend to make oil-cake supersede the legitimate food of the horses in the last year of a tenancy. Cake given to sheep in the field is also excluded. This decision has been come to after careful consideration, partly on the ground that the benefit to the sheep is sufficient to make it worth while to give cake, without regard to the manure, and partly from the greater difficulties attending the getting a correct account, and the increased liability to fraud.

This allowance for oil-cake is at present, in Lincolnshire, made only on Lord Yarborough's estate, and on one or two other smaller ones. It is, therefore, one of those to which I have before referred, that can only be derived from a special agreement, and cannot, until the practice become general, be claimed by any custom, although there is little doubt but that it will become eventually a very usual allowance.

With regard to fertilizers of a more permanent character, precisely the same principle is adopted; the only difference being the number of years during which the benefit of the application is assumed to extend. These periods are as follow:—Marl or chalk, seven years; lime, five years; clay applied to sandy land, four years, and in some instances seven years, which is, most probably, a fairer allowance.

As to tile draining or with stone, when the tenant pays the whole cost, seven years are allowed. This, however, adds Mr. Williams, is now a rare case, the usual practice being for the landlord to find the tiles. In this case, the tenant, provided he has had a crop off the land, is not entitled to any allowance; although he certainly ought to have a proportion of the cost, as it must often happen that the first crop will not pay for the labour of draining. It would probably be right to put this on the same footing as bones. For draining with sods or thorns, four years are often, though not always, allowed. It is a mode of draining, in fact, fast falling into disuse in Lincolnshire.

The tenant is paid the cost price of the seeds sown the spring previous to his quitting, and for the labour of sowing, &c., provided they are not stocked after the first of November, and have not been unfairly stocked before. When seeds are ploughed up for wheat the autumn previous to quitting, he is allowed for herbage until the end of the term; but it is not usual to allow anything upon ploughing up clover stubble for wheat, that being considered the crop which ought, as a matter of course, to follow the clover.

For a naked fallow on strong land, he is allowed for ploughing and all the labour performed; but not for rent or taxes, unless he paid for them on his entry. The cost of seed and labour on corn sown for the incoming tenant, is of course always paid by the incomer.

The tenant has a right to remove, continues Mr. Williams, or can claim to be paid for any buildings put up by himself on "bay stones," where the buildings do not enter *into* the ground; but he cannot remove a building attached to the freehold, nor even claim an allowance for it except by special agreement. On some estates buildings are allowed for like other improvements, on a term of twenty years.

A tenant cannot break up grass land without permission, nor sell any straw, hay, or manure. He is bound to keep the buildings, fences, gates, and ditches in good repair, and to leave them so.

All these claims and matters are left to be settled by two arbitrators, one to be named by the out-going tenant, and the other by the landlord or incoming tenant; and if they cannot agree, then by a third party, to be named by the arbitrators before they begin to act.

In districts, such as in some parts of Leicestershire, where the farms are small and leases but rarely required, the claims to allowances for unexhausted improvements by the outgoing tenants are much too generally ill-regarded. It was from being convinced of this that the Loughborough Agricultural Society, in a recent meeting, unanimously adopted a series of suggestions for the improvement of agreements between landlords and tenants; many of which may be very advantageously adopted in other agricultural districts besides the county of Leicester. They are seventeen in number, and are thus given by Mr. Charles Stokes.—(*Jour. Roy. Ag. Soc.*, v. 6, p. 47) :—

1. Old turf land not to be broken up without the consent in writing of the landlord or his agent.

2. Timber not to be lopped or cut down, without the consent of the landlord or his agent.

3. A tenant ought not to be repaid for any buildings erected by him, unless the same shall have been done with the consent, in writing, of the landlord or his agent.

4. All draining, where it can be, to be done by the landlord, and five per cent. per annum charged to the tenant; but if the tenant drains the land himself, with the consent and under the superintendence of the landlord or his agent, an allowance for fourteen years shall be made to the tenant, for seven years only for carriage and workmanship.

5. Manures. The allowance ought to be made for lime and carriage for five years.

6. An allowance ought to be made for four years for the cost and carriage of all bought dung and night-soil, which may be spread upon the land.

7. An allowance ought to be made for bones for four years.

8. For rape dust one-third of the cost after a crop of corn, hay, or clover.

9. For marling or claying land, an allowance ought to be made for carriage and labour for seven years.

10. For linseed oil-cakes and corn used for feeding cattle or sheep, one-third of the cost ought to be paid for the first year, and one-sixth for the second, where the manure belongs to the landlord.

11. Where the manure so made from oil cake and corn belongs to a tenant, an extra allowance ought to be made on the value of the manure, in the same proportion as in the foregoing rule.

12. An allowance ought to be made for turnip fallows; namely, the working, rent, and taxes to be calculated, and the crop of turnips to be valued, and one-half of the value of the turnips to be given to the out-going tenant. Two-thirds of the value of the turnips to be consumed upon light soils.

13. The above allowances are made on the presumption, that all the produce, except corn, meat, wool, and the produce of the dairy, is consumed on the farm; and all allowances are to be made in equal proportions in each year, for the period over which they extend, except in the 10th and 11th rule.

14. Such system of cultivation ought to be adopted as may be most suitable for the quality of the land, and an allowance ought to be made to the landlord if such system be not adopted, and for any dilapidations in the buildings, fences, gates, and drains.

15. At the termination of each year the tenant shall give an account to his landlord, or his agent, of all money expended by him during the previous year, for which he is entitled to claim any allowance on quitting his land.

16. If the out going tenant refuses or neglects to enter into an agreement with his landlord, or his agent, on or before the 17th day of October next preceding the termination of his tenency, then the landlord ought to have the power of entering to sow wheat where the crops do not belong to the tenant, the tenant receiving compensation for herbage and stubbles.

17. The landlord ought to have the power of entering to plough for, and to sow spring corn, on the second day of February previous to the tenant quitting the farm.

FIXTURES.

As regards the law of fixtures, between landlord and tenant, remarks Mr. Mathews, in the work I have already quoted, it may be observed generally that the tenant cannot remove those which he has erected, if attached to the freehold, unless the same shall have been erected for the purposes of trade, such as a baker's oven, a dyer's or soap boiler's vat, a varnish house, cider mills, furnaces, brewhouse coppers, fire or steam engines used in trade, salt pans, green-houses, and hot-houses in gardeners' grounds, and trees in a nursery ground for sale; and these must be removed before the expiration of the tenancy, for if suffered to remain after the term the law considers them as given to the landlord (*Year Book*, 20 *Hen.* 7. 13. *b. Pool's case*, 1

Salk. 361; *Penton* v. *Robart,* 2 *East* 88; *Dudley* v. *Ward, Amb.* 113, 3. *Atk.* 14). But though the doctrine here laid down may serve as a general guide to parties, yet there are doubtless many cases and niceties in which it would be overruled, and which would call for the decision of a jury; to show which, it is only necessary to observe, that in the case of *Elwes v. Maw* (3 *East*, 54), my lord Ellenborough decided against the right of an agricultural tenant to remove a beast house, which was of brick and mortar, and let into the ground, and which had been erected at his own expence; and it having been done for the purpose of carrying on his agricultural business, it would seem to have come under the principle of trade, and to have belonged to the tenant; but the Court held otherwise. The safest course therefore is, to have on the part of the tenant a specific agreement that what he erects shall be his own, and that he shall have the power of removing it, or that it shall be allowed to him at a fair valuation.

LOUGHBOROUGH AGRICULTURAL ASSOCIATION.

The Quarterly Meeting of this Association was held in the Wellington Room, at the Plough Inn, on Thursday, the 19th June. There was a good attendance of members; S. B. Wild, Esq., presided, and Mr. J. N. H. Burrows occupied the vice-chair.

After the cloth was drawn, the usual loyal toasts were given in the usual loyal manner. "C. W. Packe, Esq., president," was also warmly received.

The CHAIRMAN then read the circular calling the meeting, and announcing that the discussion would be "on the best and cheapest method of harvesting hay and corn." He would call upon Mr. T. C. Angrave to introduce the subject.

Mr. ANGRAVE rose and said:—In preparing the remarks for that occasion, he could not but think that they would be uninteresting, as most of those who heard him would be as well acquainted as himself with the subject on which those remarks were made. After briefly observing on the duty of agriculturists to endeavour to improve their practice, he expressed his thanks for the assistance and information he had received from friends on the subject for discussion, and read the following paper:—

The state of growth or maturity which it is desirable that clover and other sown grasses should attain, previous to being cut, is when they are in full flower, and before the seeds are ripe, or even before the flowers of the clovers have in any degree begun to fade. Loudon says, "all the herbage tribe ought to be mown before the seed is formed, and indeed before the plants have fully blossomed, that the full juice and nourishment of the herb may be retained in the hay. By the adoption of this system the hay is cut in a better season—it can be more easily secured—and it is much more valuable. Nor is the strength of the plant lodged in the seed, which is often lost. The great advantage of converting under-ripe herbage and grass into hay is now beginning to be known; there is much more saccharine matter in it, and it is, consequently, greatly more nutritious. A crop of clover, when cut in the early part of the season, may be 10 per cent. lighter than when it is fully ripe, but the loss is amply counterbalanced by obtaining an earlier, a more valuable, and more nutritious article".. "When the stems of clover become hard and sapless, by being allowed to bring their seeds towards maturity, they are of little more value as provender, than an equal quantity of the finer sort of straw of corn."

The same principle should be adopted in reference to the natural or meadow grasses; they should be cut down when the greater number of them have come into flower. It appears, from a table of the grasses experimented on at Woburn, by Sinclair, gardener to the Duke of Bedford, that there is a considerable gain in nutritive matter by cutting the majority of grasses for hay when they are in flower, as compared with the result of cutting when they have ripened their seeds; and of those grasses which show an increase of nutritive matter by being allowed to ripen their seeds, many are such as come to maturity very early, and are, therefore, generally ripe by the time that the others are forward enough to cut.

The making of clover into hay is a different process from that of making hay from the natural grasses. The swath should lie until it is thoroughly dry at the top, and then should be carefully turned over, so as to break it as little as possible; and, in fine weather, one more turning will be all the labour required until the crop is put into cocks, ready to be carried to the stack. In wet weather, the less it is stirred or exposed the better, and it may remain a considerable time in the swath without material injury; but when it becomes yellow underneath it should be turned over.

In the making of meadow hay, as soon as the ground is dry after it is mown, it is desirable that it should be shaken out of the swath, and separated as much as possible, spreading it evenly all over the gronnd. This operation is called tedding, and is performed much more effectually and expeditiously by a hay-making machine than it can be by hand. It is computed that a boy and a horse with the machine will ted as much in an hour as twelve or fifteen women; thus effecting an important saving of manual labour. It may afterwards be turned over by the machine; but the succeeding operations of turning it into windrows, and making it into cocks, must be performed by hand. The hay-making machine is not used when the hay is becoming dry, as it would then cause a loss by shaking out the seeds.

It will be at once perceived that there can be no regular plan for making hay laid down, which will not require to be varied considerably, according to the weather, and the quality and bulk of the crop. Much depends upon the judgment and activity of the farmer, in adopting the best methods of preparing and securing his crop, according to the circumstances in which he is placed. As general rules, I should say that in fine settled weather there should be a sufficient number of hands, and the grass should be well shaken out and turned over as often as possible, so that every part may be thoroughly dried. It is also a good practice to rake it into rows, and set it up in grass cocks at night. The next day it may be opened into windrows, and turned, and made up into larger cocks in the evening, and this process repeated, making it into still larger cocks in the evening, as it becomes drier, until it is ready to stack. When the hay has to be carried a considerable distance to be stacked, the following plan is sometimes adopted, which I have known to answer very well:—When it is sufficiently made, a few forksfull are thrown together in a heap, round the bottom of which a rope is passed, and the ends being brought together, it is drawn along by one or two horses, a man stands upon it to build it, and the hay from the windrows on each side is pitched up as if they were loading a waggon, and the ground is raked. As much as a waggon load may, by this means, be drawn together; and if it be neatly raked down and nicely topped, it may be considered safe until the whole field is ready to carry. The whole may then be stacked at once, with much less risk of the loss and damage which is often sustained by having a stack in halves for several days.

In wet weather, the grass may remain several days in swath, and, if necessary, be turned over; it may then, in the intervals of fair weather, be shaken up and made into grass cocks without tedding. Advantage should be taken of every hour of favourable weather, and, by shaking it well up and making the cocks larger as the hay becomes drier and lighter, it may be made nearly fit for the stack without being tedded or thrown abroad at all, so that in a few hours of fine weather it may be secured.

I am not aware that any rule can be laid down as to the state of dryness requisite, or the time which should elapse between the mowing and carrying of fodder; this requires much judgment, and a knowledge of the land, and the quality of the herbage. The grass grown upon rich land requires more time, and must be in a much drier state than that grown upon weaker and poorer soils, before it can be safely stacked. In all cases, hay should, if possible, be thoroughly dried from any wetness produced by rain or dew, but it is very possible upon poor land to have the sap and juices of the plants so much dried up as to prevent that degree of heat taking place in the stack which is desirable, and which very much improves the quality of the hay. When there is danger of too great a degree of heat, it is useful to have one or two openings or chimneys near the centre of the stack, which facilitate the escape of the heat and prevent damage; they may be formed by having sacks filled with straw or chaff, set upright, and drawing them up as the stack rises in the process of building it. It is considered a good plan, when hay has been injured by continued wet weather, to add to it a portion of common salt; this is done by sprinkling it over each successive layer of hay as the stack is built: the quantity recommended is about one peck of salt to a waggon load of hay, and it renders such fodder more wholesome for stock as well as more palateable. There is a difference of opinion as to whether salt can be beneficially applied to good and well got hay. My opinion is, that if hay be of good quality and well harvested, the addition of salt is of very little service.

The expense of mowing grass varies from 2s. 6d. to 4s. 6d. per acre, according to the crop; and the whole expense of mowing, making, carrying, and stacking, may average from 12s. to 17s. or 18s. per acre. I am informed that in some parts of Leicestershire, in ordinary seasons, persons are accustomed to bargain to do the whole at from 14s. to 16s. per acre.

We are now to consider the harvesting of Corn. With regard to wheat, it seems to be the general opinion that it should be cut before it is fully ripe, and that by that method a better quality is obtained, the skin being thinner, and that it makes finer and whiter flour. Johnson, in his Farmer's Encyclopædia, gives an account of experiments and details made by Mr. John Hannam, of North Deighton, near Wetherby, in 1840, showing the advantages of cutting wheat before it is quite ripe. The article is too long to be repeated here. The result, however, was, that the quantity cut a fortnight before it was ripe, had the advantage over that which stood to be ripe, in every point. Mr. Hannam cut three parcels of wheat in the same field. No. 1 was cut a month before it was ripe; it was quite green, and though the grain appeared perfectly formed, it was so soft and milky, that the slightest pressure reduced it to a pulp. A fortnight afterwards he cut No. 2; the straw, at this time, appeared at a distance green; but, when examined, was found to be fast changing to yellow, while for about a foot upwards from the ground it was quite yellow; the grain was still soft and pulpy. In another fortnight the whole field was ripe, that is, not dead ripe, but in that condition when it is customary to commence cutting. No. 3 was then cut. The three parcels were carefully kept until November, when they were thrashed; it then appeared, that, according to the judgment of two competent men, the sample No. 1, which was cut when very green, was worth 61s. per qr.; that of No. 2, cut a fortnight later, but still unripe, was worth 63s. 6d. per qr.; and that of No. 3, cut when ripe, 61s. 6d. per qr. The value of the produce of the straw and corn of each parcel was then estimated, and it was found that there was a loss upon No. 1, cut very green, as compared with that cut ripe, of about 10 per cent.; and that there was a gain upon No. 2, as compared with that cut ripe, of about 4 per cent. Mr. Hannam's statement is that in addition to this 4 per cent. gain, by reaping wheat a fortnight before it is ripe, we have 1st. Straw of better quality, containing more nutritive matter; 2nd. A better chance of securing the crop by beginning harvest earlier; and 3rd. A saving in securing it by the diminished risk of shedding in the field, and in the process of carrying and stacking.

In this part of the country the general practice is, to cut wheat with the sickle, and set it up in shocks of 10 sheaves—four on each side being placed with their butt-ends upon the ground, and their tops leaning inwards so as to support each other, and two riders, or hooders, one of which is placed upon each end of the shock, with the ears downwards, and drawn round so as to thatch it completely, and when it is well done it has a very neat appearance, and in bad weather will stand a considerable time in the field without material injury. Great care should be taken that it is not cut and tied up wet, as it is difficult to get dry, and is apt to mould and spoil in the middle of the sheaf. The best size for sheaves to be made, is from 2 ft. and a half to 3 feet in circumference at the band.

The practice of mowing and tying-up wheat has not been generally adopted in this neighbourhood; while in some districts it is the usual plan; the advantages of this mode, as stated by its advocates, are, the increased quantity of straw obtained, as compared with reaping; that after rain it dries more quickly, and is therefore less liable to sprout, in consequence of the straw not being so straight and even in the bands, and its not being tied so tightly, and that it is sooner in condition for carrying, than if reaped. There is also the advantage of clearing the ground at once, leaving it ready for the plough or scarifier, without the expense of mowing the stubble. I have been favoured with a letter from a farmer, in Lincolnshire, upon the subject, and he says, that they prefer, and practise, mowing; that a crop which would cost 12s. an acre to reap, they can have mown and tied up for 7s. an acre. The difference would not be so great here, I should say, not more than 2s. or 3s. per acre in favour of mowing. Many good farmers hold opposite opinions respecting this practice. It is objected, that the quality of mown wheat is not equal to that of wheat which has been reaped; and that the saving in the expense of cutting is more than counterbalanced by the extra cost of carrying, stacking, thatching, and thrashing. I have not had much experience in the system of mowing wheat, and what I have mown, has been done by the day, and not by the acre, which is probably the reason that it has cost me nearly, if not quite, as much as reaping would have done. On the other hand, I have not perceived the quality to be inferior to that of reaped wheat: and it is certainly sooner in condition for stacking, after rain, than a reaped crop. I am inclined to think its chief advantage is, that of drying more quickly, and especially if there be grass or weeds in the crop, as they are very liable to cause damage if reaped and bound up tightly.

There is also another method of cutting wheat, which, I believe, is seldom practised in this neighbourhood; it is that of bagging; it is performed with a hook without teeth, and is, I am told, if well done, a very clean method; there is no necessity for the use of the rake if the crop is bagged. This plan is generally adopted in some parts of Scotland, as I learn by a very business-like letter from an intelligent Scotch farmer, which, by the kindness of a friend, I have had the privilege of perusing; according to his statement, the cost of cutting and shocking a fair crop of wheat, say of four quarters per English acre, is 10s., which is about the price which would be paid for reaping such a crop in this country. In the south of England, I understand, the same mode of cutting wheat obtains; it is there called fagging, and costs, upon an average, 10s. per acre.

"The usual mode of cutting barley here is with the scythe, and it is allowed to remain in the swath (being turned over as often as required) until it is carried. The method of mowing, tying up, and raking barley, and setting it in small shocks, has long been practised in some districts. It is all but universal in some parts of Lincolnshire, as I learn by the letter I have before referred to; and that it is done at a cost of about seven shillings per acre for a good fair crop. It is thought by some that this plan is so great an improvement upon the old method of carrying the crop loose, that it will before long be very generally acted upon. Its advantages are—that there is a considerable saving, by preventing the shedding of the barley upon the ground; the saving of time in carrying; and more than all, in a wet season the quality and colour of the grain is so much better. I have the best authority for stating, that it makes from three to five shillings per quarter difference in the market price, as compared with the same barley mown and allowed to lie in the swath in the usual manner. The cost of mowing, tying, and raking an acre is from six to seven shillings. The sheaves should not be large, and not tied too tightly; and the shocks are better with four, six, or eight sheaves, than a larger number, and without hooders. A gentleman, who farms extensively in Leicestershire, has informed me that he ties up his barley as near to the ears as possible, and sets the sheaves upon the ground singly; and that by spreading out the butt ends properly, they stand very well, and get dry sooner than they would in a shock. Where barley grows long soft straw, and is much twisted, it would be almost impossible to gather it into sheaves; in such cases there seems no alternative but to dry and carry it in the usual manner.

"Oats are sometimes reaped, but in this neighbourhood they are oftener mown and carried loose. The loss by shedding is much greater in the oat crop than in barley, and on this account the reasons for reaping, or mowing, and tying up this crop, are stronger, and the advantages greater. Both barley and oats should, if possible, be tied up when dry, and the rakings should be tied up and placed at the end of the shocks. The expense of mowing and tying an acre of oats is from seven to eight shillings.

"Peas are cut with hooks, and should be gathered with the left hand as the reaper proceeds along the row, and put down in small heaps, or cocks—the smaller the better; if they are made large, and rain should come, both the straw and the corn are damaged in the middle of the cock. The expense of cutting an acre of peas is from three to four shillings.

"Beans should be cut with a hook, and tied up; (it is called bagging, and is the same process as is described with respect to wheat,) they should be set up in shocks of six or eight sheaves. The plan of mowing beans, gathering with a fork, and carrying loose, is fast losing ground; the former method is so manifestly superior. They are cut and tied up at about the same expense as wheat, viz., from eight to twelve shillings per acre.

"With respect to the stacking of corn crops; in wet seasons it is advisable to make very small stacks. Barley and oats should be stacked very narrow. If the grain cannot be perfectly dried in the field they should not be more than two and a half or three yards wide. I have known a wonderful difference in the condition of barley during the winter, between that put into stack four or five yards wide, and that made into very narrow ones. It is at all times desirable, if possible, to have a sufficient number of wheat straw battens ready to cover the stacks immediately, especially the wheat, until the hurry of harvest is over, and there is time to thatch them."

Mr. ANGRAVE sat down amidst great applause.

The CHAIRMAN said, it it had been his regret that Mr. A. had not been induced before this time to take a leading part in the proceedings of the Association, and hoped this was the beginning of better days. He would propose the health of Mr. Angrave *(cheers)*.

Mr. A. briefly returned thanks.

Mr. KILBY rose and said, this appeared to be an age of improvement; and although theirs was an humble calling, they were called upon to discuss everything which might be for their benefit. He never rose after the introduction of a subject with less disposition to raise an objection to anything which had been advanced, than on the present occasion. He agreed with nearly all that Mr. Angrave had advanced; he was of opinion that grasses should be got before they seeded. If they produced crops of good quality, and lost the benefit of them by the mode of getting, it was a serious matter. Hay was different to clover: it should be distributed as much as possible. The use of the tedding machine had been referred to by Mr. A. as the best method of spreading the grass. In this opinion he coincided; but was of a different one as to the remaining part of haymaking being done by hand labour. He (Mr. K.) thought that the horse-rake, invented by Mr. Grant, should be used next to the tedding machine; it was very useful, in case of a thunder storm-coming on, after the tedding machine had been used; he had experienced the want of it time back. The two machines, he considered, did these parts of haymaking to perfection. He was of opinion, it should not be allowed to become too dry: the cattle were not so much benefitted by it, as when there was some heat in it. The stacks he liked as large as possible, as he considered it was better together than in small quantities. The medium of corn getting was, in his opinion, the best. If they cut wheat too green, or too ripe, they lost £2 or £3 per acre by it. He thought the grain should be so as they could just crush it with the finger and thumb; if a milky matter came out of it, it was too green. The three methods of cutting wheat were by the hook, the sickle, and the scythe. Of the hook he knew but little; but believed, that where it was used the wheat was generally cut the greenest, as, if it was dry, it would shell more than by cutting it otherwise. Reaping was a very neat mode when well done; but if it was badly done it looked slovenly. With respect to mowing, it was the most modern plan in this neighbourhood; and they had a difficulty in getting men to act in improved ways, because they were not used to them. He had a dozen times commenced mowing wheat, and gave it up, thinking it could not be done; but he had persevered until he was now satisfied it was the best method. Wheat, is tied up tight, should be perfectly dry first: if wet once gets into the sheaves, they should be untied, or they were not fit for stack or barn. There was an objection to mowing wheat by some, because they thought the sheaves could not be made to look neat. His plan of mowing was to have the ears got as even as possible. Two men mow, two others follow to tie up; and one to set up; and two women to rake and tie up what remains. None of the roots should be left amongst the straw, or injury might be done by them; if the wheat was well set up, where one shock was blown down ten of the nicely set-up reaped ones would be; because the but-ends of the hivers are top-heavy, and are therefore most liable to fall. He could assure them, he had experienced it. When the corn was taken out of the field he used the horse-rake, and kept apart from the other what was collected by it, as there was a difference in the quality. With respect to the expense of reaping and mowing, he paid 12s. per acre for the former, and 8s. for the latter. Besides effecting a saving of 4s. per acre in the cutting, he found it beneficial to have the land cleared at once. He generally found stubble a great nuisance, and could employ his horses and men better, than in removing it when he wanted the land. He considered the saving in this respect was half-a-crown per acre. He last year grew forty acres of wheat; if he had reaped that, he should have had one-third less straw than he had by mowing it; and they were all aware how valuable straw had been this year. This system (mowing) was destructive to the sportsman, for there was no stubble for the game to shelter in. Were he situated as some men, he would ask his landlord to allow him to mow his wheat on that account *(cheers)*. It kept off many things he would rather not see on *(continued cheering)*. The sickle need not be altogether discarded; there might be cases in which it would be useful. Barley should be mown and tied up; it was more expensive, but of much better quality—it was 3s. or 4s. per qr. better. Grain should be kept from the earth, or it would be injured in some way or other. He hoped these meetings would promote discussion. Instead of spending the afternoon in smoking and drinking, they were endeavouring to improve themselves, and whether successful or not, they ought to try. Other classes were endeavouring to expand their minds—to improve their occupations, and it behoves them to do likewise. In doing that, they should be doing great service to our country, and they ought to try. (The remainder of the sentence was lost in much cheering, amidst which Mr. K. sat down.)

The CHAIRMAN then proposed the health of Mr. Kilby.

Mr. KILBY returned thanks.

Mr. C. STOKES proposed the health of Dr. Pigott.

Dr. PIGOTT, in reply, said, he was much astonished to be thus brought before that meeting; and spoke in high terms of such meetings, for discussion, as the present: he then remarked, that it was much better to spend the time thus, than in the smoke of tobacco, until they went home, almost unconscious of what they had been about. He then highly eulogised the Chairman, and concluded by proposing his health.

The CHAIRMAN rose, and in thanking them for the honour, said he certainly did anxiously desire to promote the improvement of cultivation; and his experience showed that a liberal outlay, which might at first appear extravagant, was the best means of securing a good return. With respect to the subject of discussion, cutting the grass when in flower, was supported by excellent names, but he considered scientific practice should be regarded. Davy said there were different grasses which should be cut at different periods. Mr. Sinclair, gardener to the Duke of Bedford, who carried on a number of experiments under the eye of Davy, said some grasses afforded most nutriment in seed, others in flower. He then quoted the result of Mr. Sinclair's experiments, showing the *bulk* and *amount of nutriment*, per acre, produced by the different kinds of grass cut when in flower and when in seed, which he described as important observations, and should be particularly noticed by farmers. There was a system of making clover into hay, recommended by Thaer, called the Silesian system. When the clover was mown on the following evening, about four o'clock, several cart loads were put together to ferment until the next morning, when it would become very hot; they then drew it about, and with the influence of the sun or air it would in a very short time be ready to be put the stack. Hillyard tried it for two years; it succeeded very well, but he suggests that, if the weather be fine, the old and accustomed method need not be changed; and if rain comes on when the heated clover has to be spread abroad, you are in a sad predicament. The practice of mowing was what he approved of, although it spoils a little sport; but he sincerely thought no sport should interfere with the interests of the country, and he would throw aside his gun and the game rather than let it. Oats and barley should be sheaved. When they saw a field of oats, soon after being mown, look as if it was fresh sown, it was strong evidence that there was great extravagance in the mode of getting it. Barley, which is shocked, requires no more trouble, but is fit for carrying home in ten or twelve days. Mr. Angrave had made a remark respecting the time for preparing remarks for these discussions. He would just observe, that as soon as possible after one, the next meeting, with the subject of discussion should be decided upon, that the introducer should have as much time as possible to consult authorities on the subject.

Mr. WALKER, of Bradmore, thought he appeared to disadvantage after so many able speakers. With regard to cutting grass, as soon as the flower begins to fall he thought it was safest to cut it; for by that means the best quality was retained, instead of allowing it to fall off in seed. Mr. Kilby had said that he liked a large rick better than a small one; he would advise that they be of a middling size. After a few remarks on the necessity for a tenant to have security for the investment of his capital in improvements, Mr. W. sat down.

The CHAIRMAN proposed the health of Mr. Walker.

Mr. WALKER returned thanks.

Mr. C. STOKES thought it was better to cut grass in full flower than at a later period. His opinion was, that land was materially injured by allowing it to stand longer. He recommended that when clover was about half-made it should be put in large cocks, on the middle of the land, for three or four days. It may require turning the day before carrying. The best time to cut wheat was when they could see the straw white about six inches below the ear. The advantages of sheaving barley were not so well known here as in the north. The extra expense of sheaving was more than saved afterwards, as there was not so much loss occasioned by stacking as if it was mown. The corn should be sheaved dry, set up well, and patience should be exercised to have it fit to be carried. He had great pleasure in hearing Mr. Angrave read his paper, and should like to hear the young members of the association come out and take part in the discussion of matters. He should be very happy to render all the assistance he could towards making this association useful.

The CHAIRMAN proposed the health of Mr. Stokes.

Mr. STOKES replied; and proposed the health of Mr. Wright.

Mr. WRIGHT replied; and expressed his gratification with the discussion.

Mr. KILBY proposed the health of Mr. Burrows and the rest of the stewards.

Mr. BURROWS returned thanks.

Mr. ANGRAVE proposed the health of Mr. William Wild.

Mr. WILD returned thanks; and proposed "Success to the Loughborough Agricultural Association."

The CHAIRMAN said he was willing to give the most liberal scope to the proceedings of the association; and proposed the health of Mr. Smith, which was drunk and replied to at some length.

Mr. HENSON, of Walton, proposed the health of the Gentlemen of the Press, to whom he considered the association was much indebted for their attendance, to render their proceedings of service by giving publicity to them.

Mr. HARRISON returned thanks for himself, and on behalf of his colleagues.

Mr. T. C. ANGRAVE proposed—"That, as a general principle, clover and artificial grasses should be cut when in full flower, and only moved so as to insure a sufficient evaporation of the sap. That, the meadow-grasses being so various, it depends upon the flowering of the majority as to the proper time for cutting them; and none ought to be left in such a state as to shed their seeds. That the tedding machine and horse-rake ought to be used conjointly; and the hay should be put together perfectly free from all extraneous wet or damp, and to induce a proper degree of fermentation. That all white crops and beans ought to be sheaved."

Mr. C. STOKES seconded the resolution.

Mr. KILBY would rather have had it gone forth stating that mowing was superior to reaping.

Mr. SMITH was of opinion mowing was far superior to reaping. Either the hook or the scythe was superior to the sickle. He was quite convinced that by the housing of wheat, by the scythe, more money and more straw was received in return, and a greater bulk of grain per acre than by reaping.

The resolution was carried with but one dissentient. He dissented because he considered farmers ought to cut their crops as they pleased.

The health of Mr. Allen was drunk, and a vote of thanks given to the Chairman, and the meeting separated.

COMPARATIVE VALUE OF DIFFERENT KINDS OF FODDER.—The following table is the result of experiments made by the principal agriculturists of the continent, and published by M. Antoine, at Nancy. The best upland meadow hay is taken as the standard, at 100 lbs.; and the specified weight of the other kinds of fodder enumerated are required to produce the same results:—

	lbs.		lbs.
Good hay	100	Dried stalks of Jerusalem artichokes	170
Aftermath hay	102	Dried stalks of Indian corn	400
Clover, hay made when the blossom is completely developed	90	Millet straw	250
Ditto, before the blossom expands	88	Raw potatoes	201
Clover, second crop	98	Boiled ditto	175
Lucerne hay	98	White Silesian beat	220
Sainfoin hay	89	Mangold-wurzel	339
Tare hay	91	Turnips	504
Spergula arvensis, dried	90	Carrots	276
Clover hay, after the seed	146	Swedish turnips	308
Green Indian corn	275	Ditto, with leaves on	350
Green clover	110	Grain—Rye	54
Vetches or tares, green	457	Barley	54
Green spergula	425	Wheat	42
Stems and leaves of Jerusalem artichokes	325	Oats	59
Cow-cabbage leaves	541	Vetches	50
Beet-root leaves	600	Peas	45
Potato haulm	300	Beans	45
Rye straw	442	Buckwheat	61
Oat straw	196	Indian corn	57
Peas haulm	153	Linseed cake	69
Vetch haulm	159	Wheat bran	105
Bean haulm	140	Rye bran	109
Buckwheat straw	195	Wheat, peas, and oat chaff	167
		Rye and barley chaff	179

DEVONSHIRE FARMING.

TO THE EDITOR OF THE FARMERS' MAGAZINE.

SIR,—In perusing your last journal for July I was astonished at seeing a description of Devonshire farming by "James Barnes, Becton Gardens, Sidmouth, Devon," and is denounced by all I have heard speak of it as a despicable, infamous, and undeserved slander; and such a complete libel, mixed with such barefaced falsehoods and misstatements, on the Devonshire farmers, I never heard or read of before, and which is not worthy of insertion in your valuable magazine. Though I have been north, south, east, and west of the county, and living nearly in the centre, I never witnessed such as he describes.

Last summer I took a tour in the north of the county, of between two and three hundred miles; I was pleased to see thorough draining, liquid-manure tanks, and general improvement of the land, together with implements of husbandry by modern makers; no cudgelling of horses and worthless teams, as he says, but such as all good farmers delight to look upon. Preposterous absurdity, that all the forty horses he employs would not average thirty shillings each, and this a specimen in his neighbourhood! Again he says, "Ploughing, it is true, is done by a pair of horses; but I can tell him that farmers of this county often put in three horses worth more than all he employed (at his valuation), and plough the land to such a depth that is required." Again, he says "a man is required to hold the plough, a boy holding and beating the horses with a cudgel, &c." That a man is required to hold the plough I admit is generally done, and have never had the pleasure of seeing one working by itself without the guidance of a man. I should have imagined that he was situated worse than the back settlements of America, or at least to have represented mole hills as mountains. Among all the farmers of this improving county turnip husbandry is universally adopted. I have taken up turnips myself weighing between 20 and 30 lbs. each, without top or root. Such an effusion of inconsistencies I never read of, and more especially in his description of the poor farmer of his neighbourhood and locality; he says "he neglects that he ought to do, is always behind, sows his crops late, nothing kept in its place and in repair, does nothing in stormy weather, loses his hogsheads of beer and cider, waggons and carts out of repair, and so forth, all through his indolence and carelessness; slack in all his payments, and buys altogether on credit;" and I ask him how long have they been farming on this system? It is a rude mixture of trash not worthy or belonging to the industrious, respectable body of farmers of Devon. Tell me where do all the fat and superior breed of cattle come from that are seen in the fairs and markets, particularly in his neighbourhood. Tell me if Devon does not carry away her share of prizes offered by the Royal Agricultural Society of England; and tell me if this characterises and resembles the indolent, lazy, improvident, and ignorant farmer of Devonshire.

I am, sir, yours truly,

July 25, 1845. AGRICOLA.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

MEETING AT SHREWSBURY.

The Meeting of the Royal Agricultural Society at Shrewsbury is the event which has most occupied attention in the agricultural world during the past month. As we had anticipated, the attendance of visitors was very considerably less than at the previous country meetings of the society; the deficiency, however, appears to have arisen from the lack of visitors from a distance, as the number of persons who eagerly sought tickets for the council and pavilion dinners testified. It is said that the object of the society is to exhibit animals of the best form and quality, and implements of the best construction and of the greatest utility in those agricultural districts in which improvement in either department may be needed, without reference to the returns likely to be produced from visitors to the show-yard. This, in the abstract, may be true; but it must be borne in mind that the society cannot carry on its operations without the "sinews of war," and also that, *primâ facie*, where there are the greatest number of visitors there will the greatest diffusion of information take place. Had the meeting been held at Chester, the funds of the society would have been increased many hundred pounds; and although we are not acquainted with the farming in the county of Cheshire beyond the account given in Mr. Palin's excellent report published in the Society's journal, if we can judge from what we saw in the neighbourhood of Shrewsbury, we entertain strong doubts whether the object of the society would not have been more effectually promoted by having gone to Chester. The town of Shrewsbury is beautifully situated, the land around it of prime quality, the crops good, and the character of the farming much above the average of the kingdom. Adjoining a county celebrated for its breed of cattle, we were however much surprised to see such numbers of mongrel-bred cattle on those estates where there could be no excuse for not having better, and where we should have expected that a better example would be set. In numbers the stock exhibited was less; but we have the authority of Earl Spencer for stating that the quality was good. We shall not attempt to join issue with his lordship upon this point, on which he is so pre-excellent an authority; but we must hazard the opinion, that, although the show may be said to have been held in the Hereford district, we think we know where to find animals of that breed, of better *quality* than any exhibited at Shrewsbury. Viscount Hill, and J. Banks Stanhope, Esq., were conspicuous as winners amongst the exhibiters of short-horns. In the one case, Mr. Parkinson, of Leyfields, holds his usual place as a breeder; in the other, Mr. Jaques, of Easby Abbey, stands conspicuous. In the Herefords, it will be remarked that the exhibiters were in every case the breeders—a circumstance reflecting the greater credit on them. In Devons, Messrs. Quartly and Turner maintain their accustomed position, the former winning two prizes, the latter three. In cattle of any breed, the once celebrated longhorns still show their superiority over the *ordinary* breeds of miscellaneous character, the Honourable M. W. B. Nugent having carried off four prizes out of six. In cart-horses the first prize was awarded to a Suffolk stallion, exhibited by Mr. Crosse, of Beyton Hall, Suffolk. We are informed that there were 103 foals produced by mares covered by this horse in the last season. His stock is much esteemed in the county of Suffolk. This horse was sold at the sale, and purchased by Mr. W. Fisher Hobbs, of Mark's Hall, Essex. In Leicester sheep the names of some well-known breeders will be recognised. But it is in the class of Southdowns that the competition was most severe, Mr. Jonas Webb winning the first prize for the shearling ram, Mr. Grantham one prize, and his Grace the Duke of Richmond carrying off three prizes from such champions as Webb and Grantham. Mr. David Barclay seems determined not to be driven from his position, having again, as last year, won the prize for shearling ewes. In the class of long-woolled sheep, not Leicesters, the main competition, as last year, was between the improved Cotswold and the new Oxfordshire. Messrs. Handly, Lange, and Smith last year carried off all the prizes in this class except one, and this year they have monopolized the whole. In mountain sheep, a class adapted for the encouragement of any breed which might be especially adapted to the district, all the prizes were awarded to the Cheviots, thus giving them a decided superiority over the district breeds. The prizes for pigs are divided into two classes, namely, the large breed and the small breed. Mr. Fisher Hobbs was as usual successful, having won two prizes in the small class; and what is still more remarkable, the sire and dam of Mr. Randall's boar, which obtained the prize for the large breed were both bred by Mr. Hobbs.

Upon the whole the exhibition of stock must be considered as highly satisfactory, and fully answering the purposes intended by the society.

The exhibition of implements was far short of what was seen at the previous meetings of the society. The want of that varied and excellent display which the Messrs. Ransome have heretofore made must necessarily create a blank which could not be filled up. It is here, however, that the stimulus given to improvement by the society, and for which we are bound to say the society is greatly indebted to the Messrs. Ransome, may be plainly perceived. Had those gentlemen not rendered their powerful aid at the early exhibitions of the society, not only would the shows have been meagre, but the character and make of the implements now exhibited would not have been such as they now are. Other implement makers have availed themselves of the opportunity afforded of learning to improve their own manufacture. It cannot fail to be observed that there is a continuous improvement in the manufacture of agricultural implements, and which must be attended with improved construction.

Annexed will be found a list of those agricultural implements which obtained prizes. It would be impossible to give an account of all those which were exhibited, as we could not find space;

but we beg to call attention to some which were especially the objects of general admiration. The Earl of Ducie's Uley cultivator, which has again received the 10*l.* prize, attracted the notice of the leading farmers of Shropshire, and was universally approved of. This instrument obtained a 15*l.* prize in Liverpool in 1841, and 10*l.* and the silver medal last year at Southampton. He also received 2*l.* for his corn-crusher; this implement also was awarded a medal at Derby in 1843. For his Richmond cart for general purposes the 5*l.* prize; this also received the medal at the meeting in Southampton last year. And for his thrashing and dressing machine a prize of 10*l.* This machine has had great improvements since last year, one of which is a shaker which completely separates the corn from the straw, consequently it has this year secured the prize. Mr. Cornes, of Barbridge, Cheshire, exhibited his chaff-cutter (prize 10*l.*); it has three knives, and for its power of work and simplicity is remarkable. Saunders, Williams, and Taylor, of Bedford, deservedly received the prize (5*l.*) for the best set of harrows. Mr. Hornsby, of Spittlegate, Grantham, received prizes for his two-row-drill presser (10*l.*) and his double oilcake breaker (3*l.*) The former obtained the silver medal and 10*l.* at Southampton, and at this meeting his drilling machines for turnips and general purposes were selected by the judges for further trial. Mr. James Richmond, of Salford, obtained prizes: for a churn invented and manufactured by himself 5*l.*; for his portable steaming apparatus for roots, 5*l.*; and the silver medal for his machine for washing vegetables:—the implements exhibited by this manufacturer were particularly attractive. Mr. G. James, of Fish-street Hill, London, obtained a prize of 10*l.* for a weighing machine manufactured by himself. Mr. Crosskill, of Beverley, Yorkshire, 10*l.*, for his well-known valuable clod-crusher. We have so often adverted to this instrument, that repetition of the praise it merits would not enhance its acknowledged utility. He also was awarded a prize of 2*l.* for his improved one-horse cart. Mr. James W. Newberry, of Hook Norton, Oxon, for his five-rowed horse dibbling machine, the prize of 15*l.* The general arrangement of this machine is as ingenious as it is practically useful. By a series of wheels, each dibbling a separate row, and spokes divided into two halves, the whole acting in conjunction, the seed from the spokes is placed in the hole just formed, by its raising an inch andopening; and a feeding arrangement is attached for placing two or three seeds in each spoke before it acts as a dibble. Alexander Dean, of Birmingham, was awarded two prizes of 10*l.* each, one for his portable steam engine, the other for his machine for crushing linseed, rape, &c., &c. There were also portable corn mills, patent fire-engines, and some very capital chaff-cutters exhibited at this stand, which attracted great attention. Edward Hill, of Brierly Hill, Dudley, received, with the prize of 10*l.* for a wrought iron sheep fold, the silver medal for his general exhibition of gates, hurdles, &c., and 2*l.* for an iron granary, &c. His wrought iron, two-wheel, pulverizing plough, with skim coulter, which received the extra prize at the Bristol meeting in 1842, was also exhibited at this stand; the judges then gave their opinion that "the soil operated upon was as well pulverized by this single process, and to as great a depth, as if first ploughed and then harrowed." Mr. George Frere, of Edinburgh, exhibited two Norwegian harrows: for the one with a roller attached he was awarded 10*l.* It is mounted on a system of wheels similar to Mr. Finlayson's grubber, by which the depth of working the soil may be regulated, and its removal from field to field easily effected. Mr. Wm. E. Vingo, of Penzance, was awarded 10*l.* for his patent seed dropping or planting machine. It deposits the seed at any required depth at any distances, in any number of grains, and also covers the seed at the same time. Mrs. Mary Cartmell 2*l.* for her weighing machine; she also, amongst other valuable implements, exhibited her grain bruiser, which obtained the 3*l.* prize at the Liverpool meeting in 1841. Messrs. Wedlake and Thompson, of Hornchurch, near Romford. 3*l.* for their hay-making or tedding machine. This machine received a prize at Derby. They likewise exhibited several much admired chaff-cutters, rollers, scarifiers, &c., &c. Mr. E. H. Bentall, of Heybridge, near Maldon, was awarded the silver medal, for his hand seed-depositor, which deservedly attracted great attention; it weighs only 1½ lbs., and will save at least a bushel of corn on every acre dibbled with it, and will tend to give increased employment to labourers and children; the price of this patent instrument is only 7s. 6d., which must tend greatly to render its universal adoption in those counties where manual labour is employed in this department of agriculture. Lieut. Vipart, of Chilleswood House, near Taunton, 5*l.* for his compound lever power. This implement, though not in the exhibition-yard at Southampton last year, attracted our attention outside, and we noticed it then; we are glad to perceive that we were right in our view of its use, which is proved this year by its obtaining a prize. John Read, of Regent's Circus, London, obtained a prize of 10*l.* for his subsoil pulverizer, and 5*l.* for a double action fire engine. The former is of remarkably neat appearance, though of great stiffness and strength; it is quite as light as wood, and better adapted for exposure to the weather. The stand occupied with the various implements manufactured by Messrs. Garrett and Son, of Leiston Works, Saxmundham, Suffolk, was very attractive. The thrashing machine, which has within the last two years been brought into such general use near London, for thrashing any grain without the least bending or injuring the straw (rendering it more valuable than when thrashed with the flail), appeared to excite the admiration of the neighbouring farmers, who seemed anxious to adopt the use of this implement. Messrs. Garrett and Sons' drilling machines were, as usual, various, and adapted to all the purposes of the farm; the chief improvement since last year is a novel arrangement of the manure machinery, by means of which well-rotted farm-yard manure, whether wet or dry, mixed or unmixed with mould, may be drilled and well covered with the soil before the seed is deposited upon it, in quantities as much as 16 to 20 carts per acre. This was declared to be of much value to the farmers, it being stated that half the quantity thus drilled in rows directly below the seed would have as much effect on the growing crop as the whole quantity would spread and ploughed in the ordinary way; two of these drills were selected by the judges, in accordance with the new regulation of the society, for subsequent trial, and should the prize be awarded to R. G. and Son, it will be the sixth confirmation of their value by this society. Messrs. Garrett and Sons' patent horse hoe, suited to all the prevailing methods of drill husbandry, and adapted for hoeing corn or roots of all sorts, still maintains its pre-eminence, and, we understand, is making its way into general use. The patent wrought-iron corn rick stand, by the same makers, must be enumerated among the articles of great utility, and may be recommended to agriculturists, being a sure and never-failing protection against the ravages of rats and mice. Our limited space will not admit of further description; suffice it, therefore, to enumerate the different implements upon which we have notalready commented. Chaffcutting machines, winnowing machines, rape and linseed-cake crushers, clod-crushers, iron field rollers, subsoil and pulverizer ploughs, scarifiers, &c. We must not, however, close our remarks without referring to the drain tile and pipe machine, manufactured by them, for the patentee, Mr. Richard Weller, of Capel, near Dorking, Surrey; it is made entirely of iron, occupies, when at work, a space of only 8 feet by 2 feet, is very simple, and easily drawn on its wheels between the hakes; it is worked by a man and boy, with a lever purchase, and will make an immense quantity of every description of pipes and tiles for draining or building purposes.

The Council exhibited in a booth of their own various specimens of farming implements presented to the Society, which were much admired: among these we noticed some hames (received too late to compete for a prize this year) invented by Mr. Bencraft, of Barnstaple; the principle of them transfers the draft from the point of the shoulder to the withers, or front of the spine; thereby imparting an additional power to the horse, giving him the free use of his fore legs, and protecting him effectually from the suffering hitherto so common from galled shoulders.

In stand No. 13 was exhibited the patent asphalted felt for roofing, manufactured by F. Mc Neill and Co., of Lamb's-buildings, Bunhill-row, London. Judging from the numbers that continually surrounded the stand, the article must have attracted a very large share of attention, and very numerous were the visits of gentlemen, who have been extensive consumers of the felt for some years past, to bear testimony to its merits as a very durable, effective, and cheap article for all descriptions of farm buildings. A book giving a great deal of information as to its uses, with samples, were given gratis. The model of a farm for 500 acres was also exhibited, whose miniature roofs well illustrated, when covered with felt, the great saving of timber in every form of construction, whether for large barns, shedding, hay, or corn-ricks, &c.

Among the most attractive exhibitions at this show was that of the seedsmen of the society (Messrs. Thomas Gibbs and Co., of the corner of Half-moon-street, Piccadilly), and it certainly surpassed any we have ever witnessed, not only in extent, but also in the scientific and appropriate manner in which the different specimens of seeds were arranged. The stand was of considerable length, and on it were displayed samples of several hundred varieties of seeds, chiefly agricultural, comprising grasses for laying down land, turnips, carrots, mangold wurtzels, &c.; also a splendid collection of wheats. Much trouble and care must have been taken in growing and preserving the different specimens; the collection of wheats alone extended upwards of 50 feet in length, each specimen being a separate variety, and bearing its name. The dried specimens of grasses were still more numerous, and reflect great credit upon this firm, whose attention to the grasses has for so many years been well known. The general appearance of the stand was pleasing even to the casual observer, and highly interesting and useful to those engaged in agricultural pursuits. From the number of persons we observed thoughtout the day examining this collection, we feel sure its interest was fully appreciated.

The Agricultural Society of England was founded in 1838, after many attempts had been made, and many suggestions thrown out, by some of the leading farmers of England, as to the probable value of such a society to the advancement of practical agriculture. The first person, however, who systematically addressed himself to the question was William Shaw, Esq., now editor of the *Mark Lane Express*. From the year 1834 to the period of the first public meeting of the society, Mr. Shaw, on every proper occasion, not only suggested the public advantage likely to be derived from such a society; but he excited Lord Spencer, the Duke of Richmond, Mr. Handley, and other great leading agriculturists, to propose its immediate formation.

The first public expression by these great friends to agriculture of their willingness to co-operate in the promotion of a National Agricultural Society, similar in its objects to the great and prosperous Highland Society of Scotland, was made at the dinner of the members of the Smithfield Club, on the 11th of December, 1837, when Earl Spencer was the first to allude to the subject in a speech, in which he dwelt not only upon the advantages which would arise to agriculture from the exertions of a national society, but alluded to the great principles to which such an institution must adhere, such as the careful avoidance of political discussions, and of all interference with themes which might be likely to become the subject of legislative enactments—principles which have been since engrafted into the charter, rules, and bye-laws of the society. The feeling thus publicly expressed was immediately and warmly responded to by the Duke of Richmond, Mr. Handley, Mr. E. W. Wilmot, and others; and so clearly expressed was the feeling of all the members of the Smithfield Club then assembled in favour of the proposition, when Lord Spencer thus first briefly alluded to the subject, that immediate steps were taken to effect the formation of such a society. In the month of March, 1838, therefore, an advertisement appeared in the public papers, an address which will ever be peculiarly interesting, as furnishing in its list of subscribers the names of those who must, in conjunction with Mr. Shaw, be regarded as the founders of this great society. The following are the names alluded to:—

Duke of Richmond	H. Blanchard, Esq.
Duke of Wellington	W. T. Copeland, Esq., M.P.
Earl Fitzwilliam	J. W. Childers, Esq., M.P.
Earl Spencer	Ralph Etwall, Esq., M.P.
Earl of Chichester	H. Handley, Esq., M.P.
Earl of Ripon	C. S. Lefevre, Esq., M.P.
Earl Stradbroke	Walter Long, Esq., M.P.
Lord Portman	Wm. Miles, Esq., M.P.
Hon. Robert Clive, M.P.	Jos. Neeld, Esq., M.P.
Hon. B. Baring, M.P.	E. W. W. Pendarves, Esq., M.P.
Sir James Graham, Bart., M.P.	Philip Pusey, Esq., M.P.
Sir Francis Lawley, Bart., M.P.	E. A. Sanford, Esq., M.P.
	R. A. Slaney, Esq., M.P.
John Bowes, Esq., M.P.	J. A. Smith, Esq., M.P.
Edward Buller, Esq., M.P.	R. G. Townley, Esq., M.P.
R. A. Christopher, Esq., M.P.	W. Whitbread, Esq.
	Henry Wilson, Esq.

In consequence of this invitation, on the appointed day, a very numerous and influential meeting took place, at which the establishment of the society was determined upon, when Earl Spencer presided, and Sir Robert Peel, the Duke of Richmond, Mr. Handley, Mr. C. Shaw Lefevre, Sir James Graham, Alderman Copeland, Earl Fitzwilliam, Mr. Pusey, and others, assisted.

Earl Spencer was soon after elected the society's first president, and Mr. Shaw its secretary, an office which he resigned in 1839, when the present able secretary, James Hudson, Esq., was elected.

One of the chief features of the society being an annual country meeting in the month of July, six of these have already been held, each exceeding the preceding one in importance, and in its imposing effect. The first at Oxford, 1839; the second, at Cambridge, 1840; the third, at Liverpool, 1841; the fourth, at Bristol, 1842; the fifth, at Derby, 1843; the sixth, at Southampton, 1844; and the seventh, in Salop, 1845.

At the conclusion of the annual country meeting the president's year of office terminates. After the Oxford meeting (July, 1839) Earl Spencer was succeeded by the Duke of Richmond, whose period of office was concluded after the meeting at Cambridge, in July, 1840. It was during his presidency that the society, by a charter from her present Most Gracious Majesty, became "The Royal Agricultural Society of England." The third president of the society was Philip Pusey, Esq., who concluded his presidency at the Liverpool meeting, held on July 22nd, 1841, and was then succeeded by the Earl of Hardwicke, who, after the Derby meeting, was succeeded by president Earl Spencer.

It was most gratifying to notice the rapid and continued prosperity of this powerful society. At the termination of its first year, in 1838, the members of the society were 690 in number, its income 1,128*l*. At the expiration, however, of its second year (1839) the committee reported (December 12th) that its members had increased to 2,007, its income to 2,666*l*. On December 11, 1841, it was found to number on its list 5,382 members of all kinds; its income had increased to 4,794*l*. At the close of the year (1842) the committee reported that its members were about 6,500, and that its income for the past *half* year (January to June of 1842) had amounted to 4,540*l*. Its present list of members is nearly 9,000, and its funded property above 9,000*l*.

In whichever way, therefore, the society's progress is examined, the results are most cheering, and we cannot but feel much satisfaction that it has arrived at its present state of prosperity.

COUNCIL DINNER.—Wednesday, July 16.

The chief feature of this day was the council dinner, at which the award of prizes for stock was read. The judges had been occupied during the day in inspecting the cattle, and their decision was made known in time for the dinner in the evening.

Upwards of 300 gentlemen sat down to dinner, which was provided in the concert-room by Messrs. Bathe and Breach, of the London Tavern. All the arrangements for the dinner, as well as the dinner itself, and the wines, were excellent. The extensive gallery in the concert room was filled with ladies.

The chair was taken by the Duke of Richmond. On his left was the Marquis del Arco, *attaché* of the Spanish embassy. The vice-chair was filled by Earl Spencer.

Among the principal guests were—the Duke of Cleveland, Lord Talbot, Lord Morley, Lord Berwick, Earl Powys, Lord Aylesford, Lord Kenyon, Lord Hill, Lord Hatherton, Lord Ingestre, Lord Clive, Lord Wynford, Mr. O. Gore, M.P., Mr. Dugdale, M.P., Mr. Slaney, the Hon Mr. Kenyon, the Hon. W. Bagot, Mr. Digby, Mr. Cotes, the Mayor of Shrewsbury, and the late Mayor, the High Sheriff of Shropshire, Captain S. Carr, Sir A. Corbet, Sir J. Edwards, Colonel Powell, M.P., Colonel Wingfield, Mr. A. V. Corbet, Mr. E. Buller, M.P., Mr. Barclay, M.P., James Hudson, Sec. to the Royal Agricultural Society of England, Wm. Fisher Hobbs, Geo. Turner, Jonas Webb, S. Grantham, W. Shaw, John Hudson, J. A. Ransome, Chas. May, &c.

The cloth having been withdrawn,

The President proposed "the health of Her Majesty," which was drunk with enthusiasm.

The President then gave "the Royal Family of England."

The toast having been duly honoured,

The President rose to read the award of prizes to the exhibitors of stock. Before he read the list, he said he would wish to impress upon the attention of the company that the principle of the society was so to select the gentlemen who were to decide on the merits of the stocks, as to prevent the possibility of any undue personal influence being used. Exhibitors were excluded from the committee of selection. The object of the society was so to conduct their arrangements, that not only should the society do justice, but also see that justice was done. The noble duke then read the list of the prizes for cattle.

The President then said he had the pleasure of proposing to them the health of the successful competitors for the cattle prizes. The name of the hon. Mr. Nugent appeared conspicuous in the list of those who had gained prizes, and he would therefore, with their permission, couple his name with the toast. He was in the hope that he would have had to couple the name of Lord Hill with the toast, but as the noble lord disliked speaking (*a laugh*) he would, no doubt, be glad to find that the task was in other hands. The noble duke then proposed the toast, which was received with applause.

The Hon. Mr. Nugent rose to return thanks. Often as he had attended these meetings, he had never had the presumption to suppose that he would be called on to return thanks. In obedience, however, to the commands of the chairman, he rose to express his thanks; but at the same time he could not refrain from expressing his regret also that he stood in the way of Lord Hill, a nobleman so celebrated as a breeder of cattle, but still more dear to the inhabitants of Shrewsbury from their respect for the memory of his late father. For himself, he could not but feel proud that through any means of his the breed of long-horns should have been able to attract the attention of the society, after having for so long a time been comparatively neglected. The hon. gentleman concluded by expressing his warm anxiety for the continued success of the society.

The PRESIDENT then read the award of prizes to exhibiters in sheep.

The Duke of RICHMOND rose, and was about to propose as usual "The health of the successful competitors," when

Earl SPENCER, the vice-president, interrupted him, and obtained permission to address the company. The noble earl said he was quite sure they would feel that he would not have discharged his duty as their vice-president, if he allowed the Duke of Richmond to propose the health of the successful competitors for the prizes for sheep, because he could not very well propose his own health, and he believed that they would see by the list the noble duke had read that his name certainly ought to be coupled with the toast of "the successful competitors." As having been steward of the yard, he could himself declare, that to have won the prize on this occasion for the Southdowns, was no mean honour. The exhibition of the present year was equal to any they had ever had, and indeed he might say the same thing of the whole show (*hear, hear*). The exhibitlon was not so numerous certainly as it had been on former occasions, but it had been most excellent, in no respect less worthy of the attention of the agriculturists of England than any which had gone before. The noble earl concluded by proposing "The health of the Duke of Richmond and the successful candidates."

The toast having been received with very enthusiastic cheering,

The PRESIDENT said he was most gratified at his noble friend having proposed his health on this occasion. He had himself been about to propose the health of Mr. Hanby, who had gained more prizes than he (the duke) had; but as the meeting had responded to the toast in so gratifying a manner, he felt that they would permit him to say how proud he was on every occasion to send stock to the shows of the Royal Agricultural Society. He believed that, by bringing specimens of stock from distant parts of the country to any particular locality, they afforded those means of comparison by which persons were led at last to see that their own breeds were not so perfect as they supposed them to be. It was only on that morning that he had gone over an estate of Earl Powis, one of whose tenants had offered to exhibit his wethers against his (the duke's). His answer was to recommend him to wait till he had seen the show, before he made any engagement on the subject. The fact was, that, as long as men saw their stock in their own farm-yard, they believed it the best in the world. It was only by comparison that they were led to see its defects; and to promote this habit of comparison was one of the chief objects of this society, and one in which they produced the most advantageous effects (*cheers*). The noble duke concluded by thanking the meeting for their reception of him (*cheers.*)

The PRESIDENT next read the list of prizes for pigs, and said that the class which he had just read to them showed a "dead heat;" and therefore he proposed "The health of Lord Hill" first, and "The health of Mr. Hobbs" afterwards. The toast having been drunk,

Lord HILL rose and said, he felt extremely obliged to his Grace the President for having a second time coupled his name with a toast. He was highly gratified at having obtained so many prizes from the association, to the influence of which he ascribed the improved state of his stock; for if the society had been in Shrewsbury seven or eight years ago, that stock would have been found wanting in every respect (*cheers*).

The PRESIDENT then introduced Mr. F. Hobbs to the company, stating that he would say no more of him in his presence than that he was a good, honest, straightforward tenant farmer, and that he was sure no one then present would decline to drink the toast after hearing that he was so.

The toast having been drunk,

Mr. F. HOBBS returned thanks, and said that he was proud to run a "dead heat" with Lord Hill, that the breed of pigs was a most valuable one, and that he was glad to see their usefulness appreciated in the country. As long as he had animals worthy of the society's exhibition he would continue to send them, and to compete for the prizes.

The PRESIDENT then read the list of prizes for extra stock.

The DUKE having then called upon Mr. Ormsby Gore to propose the health of those who had gained prizes for implements generally,

Mr. O. GORE pleaded his inability to do justice to the toast, from his want of mechanical knowledge, but admitted that in giving it he had some relative advantages. He was perfectly aware that an impression existed that agricultural mechanical inventions interfered with the demand for labour. But he had no hesitation in saying that the greater the number of improvements made, the greater in proportion was the hold which the labourer had upon the soil. It was not, however, simply the fact that they might look for increased demand for labour. Those implements which had passed through the ordeal of the society's approbation were sent in great numbers to the various continental countries and to the colonies, and in consequence hundreds of thousands of acres were brought into cultivation which would otherwise have lain fallow. All around him had heard of the jealousy which was felt on the continent with respect to the superiority of this country in manufacturing inventions. Now there was no reason why improvements should not take place to the same extent in agricultural as in manufacturing implements, and in this respect he had reason to congratulate the society on the exhibition in their implement-yard. By the concurrent testimony of all competent judges it was acknowledged that though the implements at the other shows were more numerous, those of the present exhibition, in point of quality, of value, and of staple and ascertained superiority, proved beyond a doubt the great yearly improvement which had taken place in that department (*cheers*). The hon. gentleman concluded by proposing the healths of those who had gained prizes for agricultural implements generally.

The name of Mr. Hornsby having been mentioned as the person whose success in the implement department entitled him to return thanks,

Mr. RANSOME, in his absence, spoke to the toast. In doing so he mentioned that at a large meeting of the exhibitors of implements on the present occasion they expressed their unanimous desire to acknowledge their sense of the increased facilities afforded to them by the society, and of the courteous manner in which their various wants had been met by the stewards of the yard, whose healths he concluded by proposing.

Mr. Shelley, on behalf of the stewards, returned thanks.

The President then stated, that Lord Kenyon, with great liberality, had offered a prize of 20*l*. for the best essay on the application of gorse to the feeding of cattle, sheep, and horses, derived from practical experiment. He had now to announce that the prize had been awarded to that written by Mr. O. O. Roberts, of Bangor. He (the Duke of Richmond) was sure that those around him would agree in the opinion that it was a noble and worthy sight to see Lord Kenyon thus coming forward, and from his own private resources encouraging the spread of agricultural knowledge. Gorse was an article of food particularly applicable to stock in hilly districts, such as that of North Wales; and he himself remembered that in the Peninsular war they were often obliged, in the absence of corn, to give their horses what they could alone procure for them, viz., bruised gorse. He had not read the essay, but he believed that on perusal it would be found worthy of attention, and he understood that it was to be published in the journal of the society. As a proper tribute to the liberality of the noble lord who had given this prize, he would conclude by proposing the health of Lord Kenyon.

Lord Kenyon returned thanks. He felt that praise coming from their noble chairman was more valuable than praise coming from any other quarter, for he knew well, though none could know fully, how much agriculture was indebted to his grace (*loud applause*). The motive that induced him to give the prize was, that it was important to the interests of the small farmers of Wales, being adapted to the soil and requiring nothing but labour. Though neglected in this country, it was not so abroad, for in the Peninsula, which the noble chairman had alluded to as having there fought side by side with the great man who had preserved the liberties of Europe—(*loud applause*)—in that country they had a saying, that an acre of gorse was better than an acre of oats (*Hear, hear*).

The Hon. Mr. Clive said he had a pleasant task assigned him to perform, and he was sure that when he named the subject of his toast, all present would join with him in his opinion. The toast which he had to propose was "the health of Earl Spencer" (*loud applause*). Whether as vice-president or as president, or as steward of the yard, or, in short, in any situation in which this society was concerned, there they would find the noble lord identified with its welfare. It was unnecessary, after the manner in which they had already received this toast, to offer a single remark upon it; but he trusted they would allow him to make one or two remarks upon the objects of this society. If he understood it right, the improvement of agriculture was one of their first objects—to raise more corn, and to produce food more abundantly. He apprehended also that the better application of science to agriculture was another of their objects. They had seen, in reference to manufactures, how much talent and how much ingenuity was displayed, and the success which had attended the manufactures of this country over the whole world. They, the agriculturists of the country, had formed this society, that they might obtain the same advantages in their circumstances, and enable them in some degree to benefit by the application of machinery to agricultural purposes. He would remind them, however, that the tenant farmer would not be expected to undertake experiments unless there was a prospect of his being remunerated (*applause*). It could not be supposed that the farmer would expend his own means for the country without any regard to his own interests (*applause*). Let the landlord, then, endeavour to promote their welfare and comfort by an improved understanding between them. There should be a fair understanding in the way of agreement, which would enable landlord and tenant to be united in carrying out these advantages (*applause*). Let them endeavour to follow the example which the noble lord had set before their eyes, by extending their sphere of usefulness through the district in which they might reside, by creating a spirit of emulation from one end of it to the other. He begged to propose the "health of Earl Spencer" (*great applause*).

Earl Spencer said he felt much gratified by this mark of their approbation. If credit was to be given to him for endeavouring to promote the success of this society, he could only say that he would continue to deserve that credit by every means in his power. He felt how important it was to the agriculture of the country, that there should be a reunion of the intellect of the country for the improvement of agriculture, for the cultivation of the soil, and so for bettering the condition of the people (*applause*). He felt especially gratified with the present condition of the country. It was now most flourishing. Mr. Clive alluded to the mechanical skill of the country which had been brought to bear upon agriculture. He might say that almost every means might be brought to bear upon agriculture; but he agreed with him in thinking, that of all the means, mechanical science would accomplish the greatest good. There was one point which he wished to impress upon the society, and that was, that in giving prizes to implements, the price of the machine ought to be considered; because, if their object was to improve the condition of the country, they must not encourage a set of implements which the farmers could not afford to buy—implements which were not within their reach, and which they could not test with any prospect of a remuneration (*applause*). He begged again to return thanks, and to assure them that he should ever be ready to assist the county to the utmost of his power (*loud applause*).

The Chairman then rose to propose "The health of the Judges" (*applause*), whom he highly complimented.

John Grey, Esq., of Dilston, Northumberland, agent for the Greenwich Hospital estates, rose, in obedience to a loud call from all parts of the room, to return thanks. He said it might be known to most of them that the office of a judge was attended with circumstances of difficulty, and often with dissatisfaction. The noble duke in the chair had shown how natural it was for farmers to approve of those animals which they looked upon daily in their own farm-yards; but when they came to compete with others, then it was often found that they became shorn of those extraordinary qualities which they were before supposed to possess. This, of course, created a feeling of dissatisfaction; and when that arose, it was not unlikely to be directed against the judges who had been the source of it. But he was certain that the judges on this occasion, as on every other, had gone through their duty conscientiously and honestly, and as far as their judgment went they had endeavoured to discharge it impartially. The difference was great between a premium and no premium, while in many cases the difference was small between the two animals (*applause*). In such a case, the judges had done what they could by signifying their approbation of the merits of the second animal; but they could not but feel that that would go but a little way towards liquidating the expense of bringing the animal to the exhibition. He threw out this hint to the council, and he hoped they would excuse him for doing so, because really the judges felt that in many cases it would be better to divide the prizes than to let them remain single (*Hear, hear.*) After saying a few words in praise of the society, he begged again to thank them, in the name of the judges, for the kindness shown them.

Lord KENYON then, in a few words, proposed "The health of the Duke of Richmond, president of the society" (*great applause*).

The Duke of RICHMOND then rose and said, that he could not plead that he was unaccustomed to rise and thank a body of the agricultural interests in this country for the manner in which they had received him (*cheers*). Yet he was sure they would agree with him in this, that having already returned thanks as one of those who had gained prizes as competitors, it was difficult for him to hear without exultation the expressions of approbation and praise which had just been paid to him. He had always felt proud to be accounted one of their former presidents, but he felt it to be a great additional honour that he had been reelected to that elevated office, for he felt that the members of the society had shewn thereby not that he was more worthy than any other individual, but that they considered he had steadily and conscientiously discharged his duty. He believed that he and his noble friend Earl Spencer were the first to suggest the formation of the Royal Agricultural Society. It now numbered among its members 7,000 owners and occupiers of land in this country. It was, however, his opinion then, and it continues so still, that the society would not flourish until it received the support of the practical farmer (*cheers*). If he and his noble friend received the slightest acknowledgment of merit in suggesting the formation of such a body, he said that there was a similar acknowledgment of merit due to the tenant-farmers in giving it their support. Such was his declaration to his noble friend Lord Powis that very day when conducted by him over his estate—an estate in the survey of which he felt that there was good farming in Shropshire, though not better than in his own locality. In all that he saw, his only objection was not with respect to the tenantry, but with regard to his noble friend. In his survey he observed good fields, good cultivation, and good stock, according to what the farmers believed good stock to be (*laughter*). He was bound, however, to say that he hoped if the society ever came again to Shropshire they would either see more pure South Downs, or not hear them called South Downs (*cheers and laughter*). He must also add, that he found too many ash trees in the fields (*laughter*). He would recommend his noble friend and the landowners who now heard him, if they would have trees in their hedge-rows, to consider them merely as hedge-rows, and as promoting the interest neither of the landowner nor his tenant (*cheers*). They would find that these annual meetings of the society would remove much prejudice, and that they would diffuse much useful agricultural knowledge, even although in an assembly composed like this of such large numbers, or like the larger one over which he hoped to preside to-morrow, it could not be expected that they could go into any minute, scientific, or practical inquiries. If, however, they would permit him to offer the owners and occupiers of land then present a few words of advice, he would say to them, "Support your farmers' clubs." In various parts of the country men of energy and talent, who were strangers to each other, had been brought together by these clubs, and it had been found that much benefit would arise from them to the whole agricultural interests of the empire. Little had been said on the present occasion as to the advantage of bringing chemistry to the aid of agriculture. He was proud, however, to see on the estate which he had visited to-day an experiment tried which he believed had now been made in many parts of the country, and that successfully too. He alluded to the combined use of sulphuric-acid with bone-dust, which he believed presented one of the greatest advantages which had yet been derived from the operation of chemical influences upon the soil. He believed, however, that this was only the forerunner of future experiments, which he hoped would prove successful. He must be permitted, however, to say that he did not allow the propriety of the tenants experimenting on any large scale in this respect, for the landowner was the proper person to do so, requiring only of the farmer in return to look over his neighbour's hedge (*cheers*). He concluded by thanking the company for the honour which they had done him, and by assuring them that, however inefficient he might be as the president of the society, they would find him always most anxious and desirous to promote, by every means in his power, the improvement of the agricultural system of his native land (*cheers*).

The last toast of the evening was "the Ladies." They appeared in considerable numbers on the occasion, and witnessed from the gallery the proceedings of the evening.

The company separated before nine o'clock.

THE PAVILION DINNER.—THURSDAY, JULY 17.

The following is a correct list of the stewards of the several tables :—

High Table.—The Duke of Richmond, President.
Vice President's Table.—Lord Portman, President Elect.

A.
Edward Buller, M.P.
Stephen Grantham.
William Fisher Hobbs.
John Kinder.
Philip Pusey, M.P.

B.
Thomas Wm. Bramston, M.P.
W. R. Browne.
Sir Hungerford Hoskyns, Bart.
Francis Pym.

C.
Sir John V. B. Johnstone, Bart., M.P.
Sir Francis Lawley, Bart.
James Allen Ransome.
Henry Stephen Thompson.

D.
Colonel Austen, M.P.
Colonel Challenor.
John Hud on.
Samuel Jonas.

E.
Thomas Raymond Barker.
William Henry Hyett.
Charles Stokes.
Henry Wilson.

F.
C. Hillyard.
E. W. W. Pendarves, M.P.
William Shaw.
George Wilbraham, M.P.

G.
Samuel Bennett.
Hon. Robert Henry Clive, M.P.
Sir Robert Price, Bart.
Robert Aglionby Slaney.

In the evening the great dinner of the society took place in the pavilion erected at the head of the show-ground, a large and commodious building, fitted up to seat twelve hundred persons. There was little or no attempt at ornament in its construction, the comfort and convenience of the guests being the only points aimed at, and these were fully attained.

Soon after four o'clock, the Duke of Richmond, president of the society, took the chair, supported on his right by R. Burton, Esq., mayor of Shrewsbury ; Lord Hill, St. John Charlton, Esq., high-sheriff of the county ; Lord Clive, Hon. Thomas Kenyon, Earl of Chicester, Earl of Sheffield, Lord Berwick, Lord Mostyn, Edward Haycock, Esq., Ormsby Gore, M.P., Sir A. Corbet, Lord Ingestre, Lord Vivian, the Earl of Mansfield, Mr. Christopher, M P., Sir John Tyrell, M.P., and Sir John Walsh, M.P. On his left his Grace was supported by the Duke of Cleveland, Earl of Powis, J. T. P. Edwards, late mayor of the town ; Lord Kenyon, Lord Hatherton, Earl of Aylesford, Lord Southampton, Lord Forester, Viscount Newport, the Marquis del Ango, Major Gravenitz, Herr Pogge, Captain Carr, and the deputation from Mecklenburgh, Count Potocki, &c.

The Vice-president's chair was occupied by Lord Portman, president elect, who was supported on the right by Mr. Tyron, Mr. Hore, Col. Egerton, Professor Selby, Colonel M'Donell and N. M. Lochart, Esq.; the two latter a deputation from the directors of the Highland Society; on the left by Mr. Dugdale, M.P., Mr. Archbold, M.P., Mr. Tomline, M.P., C. H. Turner, Esq., &c., &c.

Among the company we observed Earl Spencer, Earl Talbot, Mr. D. Barclay, M.P., Mr. Bellew, M.P., Mr. E. Buller, M.P., James Hudson, Sec. to the Royal Agricultural Society of England, Wm. Fisher Hobbs, George Turner, Jonas Webb, S. Grantham, W. Shaw, John Hudson, James Allen Ransome, Charles May, &c.

After the cloth had been removed,

The CHAIRMAN said the first toast he had to propose was one which ever had been, and he trusted would ever continue to be, received at the meetings of the farmers of England with that enthusiasm which it so well deserved—the health of her Majesty (*great cheering*). Since her accession to the throne up to the present moment she had evinced the greatest desire to ameliorate the condition of all classes of her people; she had shown herself worthy indeed to reign over a great, a free, an enlighted, a moral, and a religious people (*great applause*), while, if they looked to her Majesty's conduct in the domestic circle, all those who knew the great advantage which was derived from a good example being set by those in a high and exalted station must duly appreciate it (*applause*). With three times three he gave "The health of the Queen, and may it please Almighty Providence long to protect and guard the days of one who was so dear to them all."

The toast was then drunk with great enthusiasm.

The CHAIRMAN then proposed "The health of the Queen Dowager, Prince Albert, the Prince of Wales, and the rest of the Royal Family," adding a short eulogistic comment to the name of each. This toast was also received with great enthusiasm.

Earl POWIS then rose and said, if the toast which had been allotted to him to submit to their consideration had required much eloquence to recommend it to their notice he would have wished the duty entrusted to other hands. But the toast with which he was charged was one which required no recommendation to introduce to the notice of a meeting of British farmers. It was "Success to the Royal Agricultural Society of England" (*great applause*). It was to promote its objects and celebrate its success that this goodly company were here assembled, and it was therefore unnecessary for him to state what was known to all who had given their thoughts and attention to the subject—that at all times, from the earliest period of the history of the world down to the present day, happiness, amusement, and intelligence were equally connected with the prosecution of the pursuits of agriculture (*great applause*). The earliest and some of the best poetry on record have relation to it; some of our best treatises in prose equally descant on its merits—on the happiness of the people employed by it, and on the strength and power it gave to the nations who patronized it (*cheers*). It was therefore not to be expected that practical and scientific England would omit to give a due attention to that which our ancestors had given so much of their attention to. The necessity of doing so must be obvious to every one who looked for a moment at our great and fast increasing population. What would it have availed this country to have had the great men who appeared during the last century—what would have signified the scientific abilities of Watt or of Bolten—what would have signified the scientific ability of another gentleman whose descendant he was happy to see in the room, who was a practical farmer, in a neighbouring country, and who was disposed to give all that education could confer upon agricultural labourers on his estate, and who reared as good Hereford stock as was to be found in the county—he could not name him without thinking of his attached friend of forty years, the descendant of the illustrious Arkwright (*applause*)— what would have signified the labour and the skill of these men if the agriculturists had not been at hand to feed the vast population to which their ingenuity gave employment (*cheers*)? But they were not to limit themselves to the home and domestic maintenance of the people: they must extend their means further, and recall to their minds the times when the produce of British agriculture was essential, not only to the support of the population at home, but to the maintenance of the power and glory of our arms abroad. He was happy to avail himself of the evidence on this subject of his noble friend at the head of the table (the Duke of Richmond), who had told him that when the British army was in the Peninsula, it must have been withdrawn at one time from the advanced position it occupied if it had not been for the ability of this country to supply them on the mountains of the Pyrenees with British Beef and British bread (*Hear*). Nor must they limit their views to the military service alone; it was his good fortune within the last few days to see the fleet which had been collected at Spithead—not numerous, indeed, but such as no sovereign but the Queen of England could hold at her disposal. (*Applause.*) In contemplating these triumphs of British skill lying quiet, as it were, asleep on the waters which they were made to command, he could not help thinking that the time may come—God send it might be far distant—when that force would be called into active service. And how was that to be done if British produce could not be found to maintain the gallant men who would then be required to maintain the honour and glory of the country? These, then, were the duties in which British agriculturists were called upon to engage. Allow him to add, that it was impossible they could be so employed without their becoming by means of that labour better men and better members of society. (*Applause.*) He ought here, perhaps, to conclude; but with their permission he would take the liberty of paying a debt to his noble friend in the chair, for he was sure all the Shropshire men were desirous of paying their debts. At the council dinner last night the noble duke had alluded to a farm of his which he had done him the honour to inspect, and while giving credit to the cultivation of the farm generally, he said there were too many ash trees in the hedges. (General cries of "*hear.*") But his grace added to that at the time, which he was sure he forgot to state to the meeting last night, that they were upon the whole better than the broad and inconvenient hedges in Sussex. (*Laughter.*) Now, let it be recollected that his grace had made that admission, and then they would stand upon equal terms. He begged pardon for detaining them so long upon this matter, and he would now conclude with giving the toast, which he was sure they would all drink with great enthusiasm, recollecting that agriculture was the science which gave consistency to power, energy to the decisions of councils, and splendour to their prowess both by sea and land—which added to the morality of the people and the happiness of the whole population. (*Loud cheering.*)

The Duke of CLEVELAND, in giving the healths of the deputation from Mecklenburgh who were present, said that all previous meetings of the society had had the good fortune to be attended by foreigners of the first rank and distinction. In illustration of that assertion he might mention the names of Mr. Everett, the American Ambassador, and Chevalier Bunsen. With the former of these he had had the good fortune to have been for a long time intimately acquainted, and he knew there was no man who took a deeper or more lively interest in the institutions of the country than he did. As to the Chevalier Bunsen, he believed that the last meeting at Southampton was the first meeting he had attended, and yet he addressed the meeting in English with an elegance and a fluency which he believed perfectly astounded the whole of the audience. He regretted to say that neither of these distinguished individuals were present on this occasion; but there was another party of strangers—a deputation from the neighbouring state of Mecklenburgh—who had attended their meeting to learn if there was anything which would be of use in their own country. If they had no other claim upon their hospitality, it was enough to state that they had shown the greatest kindness and attention to Mr. Handley, one of the oldest members of the council, when he went over there. But, at the same time, he felt that Englishmen did not need a motive like that to induce them to show their hospitality: they were always willing to take the initiative in such duties *(applause)*. He would not detain them further, but propose as a toast, "The deputation from Mecklenburgh" *(loud applause)*.

Captain Carr, in a few sentences which were sadly marred by the bells, which at that instant began to sound a merry peal in honour of the occasion, returned thanks on behalf of the deputation *(great applause)*.

Earl Spencer was called on for the next toast; and, as he sat in the body of the room, at the request of the Chairman he mounted the table, that he might be better heard. The noble Earl good-humouredly complied with the request, and was greeted, in consequence, with a hearty burst of cheering from all parts of the hall. He said—The committee have selected me to give the toast, "Agriculture, Manufactures, and Commerce"—

Here the bells burst out again, totally drowning the noble Lord's voice, and it was some time before a message could be sent to stop them; while his lordship, with the utmost good humour, kept his place upon the table, appearing heartily to enjoy the ludicrous nature of his position, while shouts of laughter and bursts of applause alternately occupied the time. The "dreadful bell" having been at length silenced,

His lordship resumed: The reception you have given me, gentlemen, is undoubtedly far more agreeable to me than the reception I have received from the bells *(laughter)*. I have been selected to propose the next toast, which is one that I propose with the greatest cordiality. I feel that "Agriculture, Manufactures, and Commerce," it must be the fullest wish of every one of you to receive with the greatest satisfaction. My only difficulty is, in proposing such a toast where I know I have the cordial concurrence of all those whom I have the honour to address—the greatest difficulty with me is to select the topics on which I shall address you, or in which you will not be beforehand with me in feeling everything that I may say. This country depends—the greatness of the country, the prosperity of the country, the happiness of every class in the country depends—upon the prosperity of agriculture, manufactures, and commerce; and if I could conceive that there was any Englishman who was an enemy to either of these classes, I should say that he was an enemy to his country (*cheers*). I shall take them in a different order from that in which I myself feel their importance, or in which I feel attached to them. I shall begin with manufactures. The manufactures of the country are the sources of employment to great masses of our fellow-countrymen. On their prosperity depends the actual existence, in anything like comfort, of the greatest masses of the labouring classes (*"No, no," from Lord Kenyon, accompanied by cheers*). What, does any gentleman say to you that, looking to the population of the manufacturing districts — looking to the number of such enormous masses of the population—does any one say that it is not for their advantage that manufactures should prosper? *(loud applause)*. I really, when I began, could not believe it possible that any person, whatever his means might be, would say "no" to such a proposition as that *(applause)*. If we look to the millions of our fellow countrymen—of our poorer fellow countrymen—of our honest, industrious labourers, whose existence, whether in comfort or starvation, depends upon the prosperity of manufactures—I must profess that at a meeting of farmers a doubt should arise, a question should be started, whether it was for the advantage of the country that prosperity in manufactures should exist, is to me one of the most astonishing things I ever heard. Who are your consumers—who buys your produce—who is it that encourages the improvement of the agriculture of this country? *(hear)*. We all know when there is a prosperity in the manufacturing interest; we all feel when there is a failure in that prosperity; we feel it in our prices; we feel it, above all, in the encouragement which is given to agriculture. What country, I should like to know, ever existed where it was possible to bring agriculture to its highest and most complete state of perfection, if it depended on agriculture alone? This is a great country, rich in every line, great in every line, skilful and industrious in every line to which it applies its energies; and this energy of the country has been given to us to improve—to improve, I say—for I do not say that we have yet arrived at anything like perfection—but to improve agriculture, in which I have no doubt we at present occupy a position superior to that of any other nation in the world. So that while, in addressing Englishmen of every description, if I were to speak to them of the prosperity of manufactures, I should expect they would be ready to applaud; but, in addressing an assembly of farmers, I feel still more confident that they will applaud me (*loud cheers*). The commerce of the country is another point to which I wish to call your attention. The commerce of the country is one of the great elements of our prosperity. Commerce has given us our naval superiority; it is on the commerce of the country that the maintenance of our naval superiority must depend; and in asking you to drink prosperity to the commerce of the country, I ask a toast which I am sure you will all concur in. I now come to agriculture, and I address you with perfect confidence on that subject. Without agriculture our manufactures could not go on *(great applause)*. Without agriculture our commerce would languish—without agriculture our people would be miserable (*cheers*). I have alway been—I am ready to assert distinctly that I have always been desirous to the utmost degree to promote the improvement of the agriculture of the country. I concurred with my noble friend in the chair and with Mr. Handley in establishing this society. I think the society has done a great deal of good, and I think it will yet do a great deal more good than it has ever yet done in promoting the improvement of agriculture. The agriculture of the country is of the greatest possible importance. I have already stated what I feel with regard to manufactures. I have stated what I feel with regard to commerce, but then I feel that these apply only to parts of the country. Agriculture applies to the whole (*great applause*), and therefore it is of the highest importance to every interest in the country—it is of the highest importance to every person who is engaged in trade or occupation in the country that the agriculture of the country should prosper. Our prosperity, gentlemen, depends upon our own exertions. We must exert ourselves to improve it in every way we can, with a view to render the greatest amount of produce out of the smallest amount of outlay (*cheers*). It is impossible to describe the effect of agriculture upon the happiness of the country. I feel, as you all know, I feel that it is a most agreeable occupation. I feel that I can pursue its various interests through all parts of the year. There is no part of the seasons in which an agriculturist may not find full and entire occupation. I won't say that it is, at least quite lately, a profitable occupation (*laughter, and "Hear"*). I am too much of a practical farmer to tell you that; but though it has not been so profitable as I would wish latterly, yet I don't think, so far as I am concerned, that it has diminished in its interest at all (*cheers*). It is a most agreeable occupation, and suits every man, whatever his disposition may be. If a man likes to look at the dark side of things, then there is scarcely any kind of weather which is not bad for some part of his crop. I cannot say that I am fond of looking at the dark side of things. But, on the other hand, if a man likes to take a comfortable and agreeable view of matters, then the same weather which is injurious to some part of his farm will be good for another (*great applause*), and therefore I say, that farming suits every body's taste. Those who like grumbling can find in it plenty of opportunities for grumbling; and those who like to be pleased, can always find something in it to please them. I will not now detain you further, but I beg to propose the toast, "Success to the Agriculture, Manufactures, and Commerce of the Country" (*loud applause*).

The CHAIRMAN, in calling upon the Earl of Chichester for the next toast, alluded to the interruption caused by the bells, and said that never having had any opinion of *Falstaff's* courage, he never could understand how he fought an hour by the clock; but he had at last found it out, for it appeared that the clocks in Shrewsbury tolled every five minutes (*great laughter*).

The Earl of CHICHESTER then, after some complimentary allusions to the antiquities of the town, and to the high character which the inhabitants had ever shown for loyalty and piety, proposed "The Mayor and Corporation of Shrewsbury, with thanks for the hospitality the Society had experienced" (*applause*).

Mr. BURTON, Mayor of Shrewsbury, returned thanks.

Earl TALBOT proposed the health of the Noble President—(*loud cheers*)—after a few complimentary allusions to the interest the noble duke had ever shown in the promotion of agriculture. The toast was drunk with the utmost enthusiasm.

The CHAIRMAN said—Gentlemen, I never in my life asked a man to do that which I would not do myself, and therefore I shall myself get upon the table, as I asked my noble friend Earl Spencer to do it. (Having suited the action to the word, amidst the cheers of the audience, the noble duke proceeded)—I can truly say that I deeply value this expression of the compliment which you have paid me this day as the president of the Royal Agricultural Society of England. When I look round, and see such a large, numerous, and respectable meeting of the tenant farmers of the country, I feel that it is not necessary for me to ask whether you approve of the objects of this society. Your presence here this day proves to me that you do feel that we are pursuing the right course. Much has already been done; and I agree with my noble friend (Lord Spencer) that much remains still to be done. Draining has been greatly advanced throughout the country, and it should be extended still further, as it is the foundation of all agricultural improvement (*loud cheers*). My noble friend (Earl Powis) told you that I made some observations yesterday with regard to his estate, which he took me over to see, and he stated to you that I was a witness last night who, though I spoke the truth, yet did not speak the whole truth. With that challenge I now stand before you, and I must tell you what I told him when he sat down, that he was a little injudicious in saying so, for I should have the last word (*loud applause and laughter*). To remove all cause of complaint from the mind of my noble friend, I will now state what my views are, but I do not ask you to agree with them; but of this I am sure, that if I were to ask the tenant farmers of Shropshire whether, if their landlords were to say to them to-morrow, You are at liberty to grub up every ash tree in your hedge-rows—(*enthusiastic cheering*)—I do not believe that if such a permission were given, that a single tree would be left in the county, except, perhaps, in some lady's garden (*continued cheering*). My noble friend stated that I admitted the wide and inconvenient hedges of Sussex. Gentlemen, I do admit that, and I regret it; and I believe that the landlords of this country cannot get rents in two ways—they cannot have the advantages of timber and of rent from the tenant at the same time (*loud cheers*). I object not to trees standing in our lawns, or standing in our parks, but I must say that, if landlords will insist on doing mischief to their tenants by keeping these trees, it ought to be considered in the rent; and more particularly if they are ash trees, which are more injurious than any other (*laughter and cheers*). I feel, also, that there is another point which is of great importance. Since I came into this town my attention has been called to a pamphlet, written on a subject of great importance to us all. I think we might with great advantage take a leaf from the Chinese. I think we do allow to run to waste a great quantity of manure in this country. I believe that instead of allowing the water to flow into our yards, by which we spoil a great quantity of our manure, we ought to have tanks for the reception of this liquid manure, and I would recommend to the landlords to build these tanks. (*Loud cheers.*) I feel, however, that I ought not to trespass longer on your attention. I feel what my noble friend says, that agriculture is a very amusing pastime. He states that you may either grumble or look on the bright side of the question, as it suits you; and he says that for himself he likes to take the bright side of the picture. I have no doubt that I might take the bright side, too, in looking at my farming operations, when I have had the advantage of gaining great premiums, and being in possession of a fashionable flock, which bring great prices; but I call upon you to say, does the tenant farmer, struggling with difficulties, and having a large family, does he stand in the same position that we do? (*Loud cheers.*) In the worst of seasons we can always get some rent, if we do not get the whole of what we got heretofore; so that we stand in the situation where bad prices are not so mischievous to us in the first instance as they are to the tenant farmer. (*Cheers.*) I can only conclude by adding that the expression of kindness and friendship which I have ever experienced at the hands of the farmers of the empire is a proof to me that you do believe that I am justly proud of the confidence you repose in me. (*Great cheering.*) I am deeply grateful to you for the favours I have received at your hands, when it has been my good fortune to meet you. Entreating you to continue to take a deep interest in the cause of agricultural improvement—desirous to extend it far and wide over the face of the country—entertaining strong feelings of regard and esteem for the farmers and tenantry of England—(*Applause*)—anxious to elevate the condition of the true-hearted generous British labourer, you will ever find me ready to use my best efforts—humble and inefficient as I feel them to be—for the promotion of the well-being of the agriculturists of the country, for the increase of the comforts of the cultivators of the soil. (*Cheers.*) I know that you entertain like feelings with regard to the manufacturing and commercial interests of the country. We have no jealous feelings with regard to them. All we wish is to live and to let live. (*Loud applause.*) All we feel called upon to do is, to perform our duties in those stations in which it has pleased Providence to place us; and I believe my duty is, to promote the improvement of agriculture and the welfare of the agriculturist; because I believe that by doing so I shall best promote the interests of all classes of my fellow-subjects. (*Great applause.*) Gentlemen, from my heart I thank you for the manner in which you have received me. I hope and trust you will never find me ungrateful; and now I wish you and yours health, wealth, and every happiness which this world can bestow. (The noble Duke resumed his seat amidst loud and general cheers.)

Lord HATHERTON rose to propose "The health of the labouring classes" *(applause)*; not merely the health of the labouring classes connected with agriculture, but the labouring classes in every department of industry in the United Empire *(cheers)*. Whether it was the labourer in the mill or in the mine, whether ploughmen or handicraftsmen, there was no class of men in the kingdom in whose welfare and happiness they ought to take a deeper interest; and the first duty of every one of them, within their several spheres, was to spread among them the means of education, to prove to them that they felt united with them in all their interests, and that they desired no kind of separation (*loud cheers*). As regarded the agricultural labourers, he was sure they all felt how deeply important it was to maintain their sound physical condition as a class. Their moral condition was indeed all-important; but then all present must know that their moral condition depended in a very great degree upon their physical condition. He called upon them, therefore, to omit no opportunity of promoting the comfort of the labouring classes, and in this respect to imitate the conduct of the noble duke in the chair, who not only interested himself in the condition of the labourers on his own estates, but who was always found, from the commencement to the end of every session of Parliament, the vigilant sentinel of the interests of the labourer. The duties which he so well performed were duties which they all owed to their God and to their fellow men, and he trusted that his noble friend's example would be imitated by all the country gentlemen of England *(applause)*.

The CHAIRMAN, in proposing the Highland and Agricultural Society of Scotland, and the Royal Agricultural Improvement Society of Ireland, regretted the absence of the Duke of Sutherland, who was to have given this toast, but who had sent him a letter, stating that nothing but the advice of his medical man prevented him from being present. The Highland Society of Scotland had been long established, and the Royal Agricultural Society of England must consider itself as the offspring of that society. After they had been incorporated, the gentlemen of Ireland met, and established their society. He thought they were bound to pay a compliment to those whose example they followed, and also they were bound to pay a compliment to those who followed their example. He begged, therefore, to propose the toast, and to couple with it the Earl of Mansfield, one of the presidents of the Highland Society *(cheers)*.

The Earl of MANSFIELD returned thanks. It was true the Highland Society was first in the field—it was true that the English Society ought to regard it as its parent; but it was no less true that the parent now felt her offspring had outgrown her. (*Great laughter and cheers*). They had had long experience of the benefits of such a society; they found thousands and tens of thousands of acres had been reclaimed from a state of desolation, and were now teeming with most beautiful crops. Our lands, said the noble lord, are perhaps more sterile than yours, our climate inferior; so that we felt there was necessity for great exertion, and our energies have rendered us successful (*applause*). It was with no little interest that we in Scotland regarded the first attempts of this Society, and now our care must be that you do not exceed us. But a few days more, and our annual meeting will take place in Scotland. Allow me to offer you there the hospitality which you have afforded us. May I ask you to reciprocate the visit which we have paid you, and to instruct us in some facts where we may be deficient, and perhaps there may be—I do not say there are—some points in which we may instruct you. I do not feel competent to do justice to that part of the toast which relates to Ireland; but if any Irishman is present, I hope he will convey across the channel the expression of regard which this society entertains for them. I hope he will tell them that Englishmen drank prosperity to Ireland; and in the same breath, let him tell them that a Scotchman responded to the toast *(loud applause)*. From the end of England to the end of Scotland let him assure them that all feel the greatest interest in Ireland—that we feel we are all one people, and that we hope they will soon become our rivals in all that can advance the physical or moral interests of mankind *(applause)*.

Lord CLIVE then proposed "The health of Lord Portman," the president elect; and trusted that his lordship would have the satisfaction of presiding over a meeting at Newcastle next year as large or larger than the present one. The noble Lord then good humouredly defended the ash trees of the county against the censure of the noble President, and said that the Salopians were proud of their county, and would not exchange it for Sussex, notwithstanding the seductive eloquence of the Chairman, and the advantage of his having the last word *(great laughter)*.

Lord PORTMAN returned thanks. He agreed with all who had preceded him, that agriculture was of the greatest importance to the welfare of the world. He believed that without attending to the cultivation of the soil neither manufactures nor commerce could—he would not say flourish—but they could not exist *(applause)*. With regard to the show of next year, he hoped as many of them as were able would make a point to come to Newcastle. He was sure his noble friend in the chair would do so; for he knew he never would have assisted in putting him (Lord Portman) into the chair, if he did not mean to support him in it; but he felt, at the same time, that unless there was a good attendance of the tenant farmers, the show would be worthless. He then adverted to a new species of rye, which had been introduced for feeding stock at the early periods of the year—a matter of great importance to the farmers; and, therefore, he hoped the farmers would try the experiment this coming spring, and report the result at Newcastle. At the same time, he felt the force of what the noble president had said, that the improvement of the soil did not rest so much upon the tenant farmers as upon the owners of land; and he was sure that that class could not better serve the interests of the farmer than by becoming practical farmers themselves; and then they would know how to allow for ash-trees and game—(*loud applause*)—and so effectually carry out the maxim of "live and let live." He wished them all to bear in mind that the first thing a farmer had to do was to root the weeds out of his field, and the prejudices out of his heart (*hear, hear*). They should try experiments cautiously; but they should not lightly abandon them because they might fail in one instance. He knew a farmer who had been advised to subsoil his field; which he did—but he made the experiment in a sandy soil, where it was worse than useless, instead of trying it in a field where there was a pan which required breaking up in order to let the roots of the vegetables down to a better soil. He would say, therefore, when they received advice, to ask where it was applicable—whether for the whole farm or only for a part of it. He had now come to a painful part of his duty: it was for him to speak the last word (*a laugh*). Wishing them long life and happiness, at least till they met again next year, he very reluctautly bade them farewell.

The company then gave three cheers for "Lord Portman and a good show at Newcastle next year," after which the Duke of Richmond left the chair, and the company retired a few minutes before eight o'clock.

AWARD OF PREMIUMS.

CATTLE I. Short-horns.

Names of the Judges.—John Grey, Dilston, Northumberland; John Wood, Kimblesworth, Durham; John Booth, Killerby, Yorkshire.

To James Banks Stanhope, of Revesbey Abbey, near Boston, Lincolnshire, the prize of 30 sovs., for his two years and eight months old short-horned Bull, bred by Mr. Parkinson, of Ley-fields.

To John Forrest, of Stretton, Warrington, the prize of 15 sovs., for his six years and four months old short-horned Bull, bred by Mr. Thomas Forrest, of Stretton.

To Capel Hanbury Leigh, of Pontypool Park, Monmouthshire, the prize of 20 sovs., for his two years five months and sixteen days old short-horned Bull, bred by himself.

To James Banks Stanhope, of Revesbey Abbey, of the prize 15 sovs., for his four years and three months old short-horned Cow, bred by Mr. John Booth, of Killerby.

To Viscount Hill, of Hawkstone, Salop, the prize of 15 sovs., for his two years nine months and twenty-seven days old short-horned Heifer, bred by Mr. Jaques, of Easeby.

To Edward Lakin, of Beauchamp Court, near Worcester, the prize of 10 sovs., for his one year and eleven months old short-horned Heifer, bred by himself.

To Viscount Hill, of Hawkstone, the prize of 10 sovs., for his nine months and twelve days old short-horned Bull-calf, bred by Mr. Richard Almond, of Orrell, near Wigan.

CATTLE II. Herefords.

Judges.—Richard Hewitt, Dodford, Northamptonshire; Walter Anderson, Oakley, Bedfordshire; William Pratt, Newfield, Warwickshire.

To Thomas Sheriff, of Coxall, Herefordshire, the prize of 30 sovs., for his five years six months and twenty-one days old Hereford Bull, bred by himself.

To Edward Gough, of Gravel Hill, Salop, the prize of 15 sovs., for his two year and seven months old Hereford Bull, bred by the late Mr. Edward Gough.

To Edward Urwick, of Felton, Salop, the prize of 20 sovs., for his one year and seven months old Hereford Bull, bred by himself.

To J. N. Carpenter, of Eardisland, Herefordshire, the prize of 15 sovs., for his three years, eight months, and ten days old Hereford Cow, bred by himself.

To J. N. Carpenter, of Eardisland, the prize of 15 sovs. for his two years, seven months, and twenty-four days old Hereford In-calf Heifer, bred by himself.

To Thomas Lockley Meire, of Cound Arbor, Salop, the prize of 10 sovs., for his one year and six months old Hereford Heifer, bred by himself.

To John Thomas, of Cholstrey, Herefordshire, the prize of 10 sovs., for his Hereford Bull Calf, bred by himself.

CATTLE III. Devons.

Judges.—Edward L. Franklin, Ascott, Oxon; Henry Trethewy, Grampound, Cornwall; Thomas Umbers, Wappenbury, Warwickshire.

To Thomas White Fouracre, of Durston, Somerset, the prize of 30 sovs., for his four years and seven months old Devon Bull, bred by Mr. W. Stone, Dulverton, Somersetshire.

To James Quartly, of Molland, near South-Molton, the prize of 20 sovs., for his two years and five months old Devon Bull, bred by hinself.

To James Quartly, of Molland, the prize of 15 sovs., for his six years and three months old Devon Cow, bred by himself.

To George Turner, of Barton, near Exeter, the prize of 15 sovs., for his two years and six months old pure North-Devon In-calf Heifer, bred by himself.

To George Turner, of Barton, the prize of 10 sovs., for his one year and six months old pure North-Devon Yearling-Heifer, bred by himself.

To George Turner, of Barton, the prize of 10 sovs., for his seven months and two weeks old pure North-Devon Bull Calf, bred by himself.

CATTLE IV. Any other Breed.

Judges.—Edward Clarke, Canwick, Lincolnshire; Samuel Umbers, Cubbington Heath, Warwickshire; Charles Stokes, Kingston, Nottinghamshire.

To the Hon. M. W. B. Nugent, of Higham Grange, near Hinckley, Leicestershire, the prize of 20 sovs. for his four years and four months old pure Leicester or long-horned Bull, bred by Mr. Slingsby, of Foleshill, near Coventry.

To John Lees Brown, of Farewell, near Lichfield, the prize of 10 sovs., for his three years and six months old pure long-horned Bull, bred by himself.

To the Hon. M. W. B. Nugent, of Higham Grange, the prize of 15 sovs. for his aged pure Leicester or long-horned Cow, bred by Mr. Gibbs, of Henley-in-Arden.

To the Hon. M. W. B. Nugent, of Higham Grange, the prize of 10 sovs., for his two years ten months and eighteen weeks old pure Leicester or long-horned Heifer, bred by himself.

To the Hon. M. W. B. Nugent, of Higham Grange, the prize of 10 sovs., for his one year and nine months old pure Leicester or long-horned Yearling Heifer, bred by himself.

HORSES.

Judges.—W. F. Karkeek, Truro, Cornwall; John Claydon, Littlebury, Essex; William Day, Ensham, Oxon.

To Henry Crosse, of Boyton Hall, Suffolk, the prize of 30 sovs., for his nine years old Cart Stallion, bred by the late Mr. W. Crosse, of Little Finborough Hill, Suffolk.

To Hillyer Reeve, of Wroughton, Wiltshire, the prize of 15 sovs., for his six years old Cart Stallion, bred by Mr. Renshaw, of Aston, Derbyshire.

To Frederic Thomas Bryan, of Knossington, Rutlandshire, the prize of 15 sovs., for his two years old Cart Stallion, bred by Mr. Richard Brown, of Elsworth, Cambridgeshire.

To Viscount Hill, of Hawkestone, the prize of 20 sovs. for his Cart Mare and Foal, the sire of the foal being the property of his lordship, and the mare bred by the late Viscount Hill, of Hardwick Grange, Salop.

To George Townshend, of Sapcote-Fields, Hinckley, Leicestershire, the prize of 10 sovs., for his Cart Mare and Foal, the sire of the foal having been the property of Mr. Hipwell, of Swinford, Leicestershire.

To Lord St. John, of Melchbourne, near Kimbolton, the prize of 10 sovs., for his two years old Filly, bred by himself.

To J. B. Minor, of Astley, Salop, the prize of 30 sovs., for his nine years old thorough-bred Stallion; got by Sultan, dam Clara, by Fillo-da-Puta, bred by the Hon. Sydney Herbert, of Wilton House, Wiltshire.

SHEEP I. Leicesters.

Judges.—Thomas Chapman, Stoneleigh, Warwickshire; Robert Smith, Burley, Rutlandshire; John Purser.

To Thomas Edward Pawlett, of Beeston, Bedfordshire, the prize of 30 sovs., for his sixteen months old Leicester Ram, bred by himself.

To Samuel Bennett, of Bickerings Park, Bedfordshire, the prize of 15 sovs., for his sixteen months old pure Leicester Ram, bred by himself.

To Robert Burgess, of Cotgrave Place, Nottinghamshire, the prize of 30 sovs., for his sixty-five months old pure Leicester Ram, bred by himself.

To Robert Burgess, of Cotgrave Place, the prize of 15 sovs., for his forty-one months old pure Leicester Ram, bred by himself.

To William Gregory Watkins, of Woodfield, Worcestershire, the prize of 10 sovs., for his sixteen months old pure Leicester Shearling Ewes, bred by himself.

To George Turner, of Barton, near Exeter, the prize of 5 sovs., for his sixteen months old Leicester Shearling Ewes.

SHEEP II. South-downs.

Judges.—William Stace, Berwick, Sussex; John Teverson, Great Wilbraham Farm, Cambridgeshire; James Brine, Tolpuddle, Dorset.

To Jonas Webb, of Babraham, Cambridge, the prize of 30 sovs., for his sixteen months old Southdown Ram, bred by himself.

To His Grace the Duke of Richmond, of Goodwood, Sussex, the prize of 15 sovs., for his sixteen months old Southdown Ram, bred by himself.

To His Grace the Duke of Richmond, the prize of 30 sovs., for his twenty-eight months old Southdown Ram, bred by himself.

To Stephen Grantham, of Stoneham, Sussex, the prize of 15 sovs., for his forty months old Southdown Ram, bred by himself.

To His Grace the Duke of Richmond, the prize of 10 sovs., for his sixteen months old Southdown Shearling Ewes, bred by himself.

To David Barclay, M.P., of Eastwick Park, Surrey, the prize of 5 sovs., for his sixteen months old Southdown Shearling Ewes, bred by himself.

SHEEP III. Long-wools (not Leicesters).

Judges.—Robert Beman, Donnington, Gloucestershire; Henry Bateman, Asthally, Oxon; Philip Skipworth, Aylesby, Lincolnshire.

To Edward Handy, of Sevenhampton, Gloucestershire, the prize of 30 sovs., for his sixteen months old improved Cotswold Ram, bred by himself.

To Charles Large, of Broadwell, near Lechlade, the prize of 15 sovs., for his sixteen months old New-Oxfordshire Ram, bred by himself.

To Edward Handy, of Sevenhampton, the prize of 30 sovs., for his forty months old improved Cotswold Ram.

To Edward Smith, of Charlbury, Oxfordshire, the prize of 15 sovs., for his sixty-four months old long-woolled Oxfordshire Ram, bred by himself.

To Charles Large, of Broadwell, the prize of ten sovs., for his sixteen months old New-Oxfordshire long-woolled Ewes, bred by himself.

To Edward Smith, of Charlbury, the prize of 5 sovs., for his sixteen months old long-woolled Oxfordshire Ewes, bred by himself.

SHEEP IV. Mountain.

Judges.—Griffith Evans, Maesypandy, Montgomeryshire; Richard Henderson, Langlesford, Northumberland; Robert Elliot, Hardgrave, Dumfriesshire.

To John Robson, of East Kielder, Northumberland, the prize of 15 sovs., for his three years and three months old Cheviot Ram, bred by himself.

To John Robson, of East Kielder, the prize of 10 sovs., for his four years and three months old Cheviot Ram, bred by himself.

To John Robson, of East Kielder, the prize of 5 sovs., for his two years and three months old Cheviot Ram, bred by himself.

To Lord Bagot, of Pool Park, Denbighshire, the prize of 10 sovs., for his fourteen months old Cheviot Mountain Shearling Ewes, bred by himself.

PIGS.

Judges.—Jesse Kemp, Utterby Grove, Lincolnshire; William Sandy, Holme-Pierrepont, Notts; Samuel Jonas, Ickleton, Cambridgeshire.

To Moses Cartwright, of Stanton House, near Burton-on-Trent, the prize of 10 sovs., for his one year and six months old Boar, of a large breed, bred by himself.

To Charles Randel, of Chadbury, Worcestershire, the prize of 5 sovs., for his two years, three months, and twenty-one days old enlarged Essex boar, of a large breed, bred by himself.

To Viscount Hill, of Hawkestone, Salop, the prize of 10 sovs., for his one year and twenty-two days old Boar, of a small breed, bred by himself.

To Edward Urwick, of Felton, Salop, the prize of 5 sovs., for his one year and eleven months old Essex Boar, of a small breed, bred by Mr. Henry Quikampton, of Little Totham, Essex.

To Viscount Hill, of Hawkestone, the prize of 10 sovs., for his three years and one month old Leicestershire Sow, of a large breed, bred by Mr. W. Houghton, of Parbold, Lancashire.

To William Fisher Hobbs, of Marks Hall, Kelvedon, Essex, the prize of 10 sovs., for his seven months old improved Essex sow, of a small breed, bred by himself.

To William Fisher Hobbs, of Marks Hall, the prize of 10 sovs., for the best pen of three Pigs of the same litter, either of the large or small breed—namely, for his thirty-three weeks and five days old improved Essex Sow Pigs, bred by himself.

EXTRA STOCK.

To Jacob Brown, of Shrewsbury, the sum of 3 sovs., for his eleven months old Hereford Calf, bred by Mr. Edward Humphreys, of Walcot, Salop.

To W. Taylor, of Dyffryd, near Llanymynech, Salop, the sum of 5 sovs., for his four years and four days old Hereford Heifer, bred by Mr. Richard Hill, of Golding Hall, Salop.

To Charles Large, of Broadwell, the sum of 5 sovs., for his four years and four months old New-Oxfordshire long-woolled Ewe, bred by himself.

To John Gregory Watkins, of Woodfield, Worcestershire, the sum of 2 sovs., for his five years and four months old pure Leicester Ewe, with her lamb.

To Thomas Turnor, of Pool Park, Ruthin, Denbighshire, the prize of 5 sovs., for his Welsh-mountain Stallion Pony.

CHEESE.

Judges—Samuel Jonas, Ickleton; Charles Stokes, Kingston; Walter Anderson, Oakley.

To John Justice, of Tyhtfield, Whitchurch, Salop, the prize of 10 sovs., for his sample of one hundred weight of Cheshire Cheese.

To John S. Wilkinson, of Madeley, near Newcastle, Staffordshire, the prize of 5 sovs., for his sample of one hundred weight of Cheshire Cheese.

COMMENDATIONS.

[The mark * signifies "Highly Commended", the omission of it "Commended" by the Judges.

* A. Bannerman's Short-horned Cow, bred by Mr. Booth.
* E. W. Smythe Owen's Short-horned yearling Heifer, bred by himself.
* W. Eyton's Hereford Bull, bred by the late Mr. Morris.
* T. Lockley Meire's Hereford in-calf Cow, bred by himself.
* J. Corbett's Hereford Yearling Heifer, bred by himself.
T. Lockley Meire's Hereford in-calf Heifer, bred by himself.
J. N. Carpenter's Hereford Bull Calf, bred by himself.
* H. Allen's Cart Stallion, bred by Col. Wood, M.P.
T. Carpenter's Oxfordshire Ram, bred by himself.
* Rev. J. Hill's Essex and Neapolitan Sow, bred by himself.
* Philip Pusey's Berkshire Sow-pigs, bred by himself.
Viscount Hill's improved Lancashire Sow, bred by Mr. Jebson.
W. Fisher Hobbs's improved Essex Sow, bred by himself.
* Rev. J. Hill's Essex and Neapolitan Sow, bred by himself.
* Viscount Hill's Short-horned Heifer, bred by Mr. Jaques.
Viscount Hill's Short-horned Cow, bred by Mr. Holmes.
* Eyton and Forester's Hereford Bull, bred by the late Mr. Jeffries.
* Sir Francis Lawley's Hereford in-calf Heifer, bred by himself.
* T. Lockley Meire's Hereford Bull Calf, bred by himself.
Sir Francis Lawley's Hereford Yearling Heifer, bred by himself.
T. Lockley Meire's Hereford Bull Calf, bred by himself.
* T. Carpenter's Oxfordshire Ram, bred by himself.
* W. Fisher Hobb's improved Essex Boar, bred by himself.

Rev. J. Hill's Essex and Neapolitan Sow, bred by himself.
W. Fisher Hobb's improved Essex Boar, bred by himself.
Rev. J. Hill's Essex and Neapolitan Sow, bred by himself.
W. Fisher Hobb's improved Essex Sow, bred by himself.
E. Gough's Hereford Cow, bred by the late Mr. E. Gough.
Matthew and Arthur Mountford's Durham and Short-horned Cow, bred by themselves.

IMPLEMENTS.

Judges.—William Bennet, Lewsey, Bedfordshire; Charles Burness, Woburn, Bedfordshire; Albert Edmonds, Long-Worth, Berks; William Heseltine, Worlaby House, Lincolnshire; Thomas P. Outhwaite, Bainesse, Yorks; Josiah Parkes, C. E. Westminster; William Shaw, jun., Far-Cotton, Northampton.

To the Earl of Ducie, of Tortworth Court, Gloucestershire, the prize of 10 sovs., for his Wrought-iron Cultivator or Scarifier, with five Tines; invented by John Morton, and manufactured by Richard Clyburn.

To John Cornes, of Barbridge, Cheshire, the prize of 10 sovs., for his Chaff-cutting Machine, improved and manufactured by himself.

To Sanders, Williams, and Taylor, of Bedford, the prize of 5 sovs., for their Set of Strong Iron Harrows, improved by Samuel Taylor, and manufactured by themselves.

To Richard, Hornsby, of Spittlegate, Grantham, the prize of 10 sovs., for his Two-row Drill Presser, invented and manufactured by himself.

To James Richmond, of Salford, Manchester, the prize of 5 sovs., for a churn, invented, improved, and manufactured by himself.

To H. G. James, of Fish-street Hill, London, the prize of 10 sovs., for his Machine for Weighing Lime, Cattle, and Farm-produce generally, invented by M. George, of Paris, and manufactured by Mr. James.

To James Richmond, of Salford, the prize of 5 sovs., for his Portable Steaming Apparatus, for Roots, &c.; invented, improved, and manufactured by himself.

To Henry Lowcock, of Westerland, near Marldon, Devonshire, the prize of 5 sovs., for his One-way Plough, with Ransome's trussed iron beams; invented and improved by Mr. Lowcock, and manufactured by Messrs. Ransome.

To John Bruce, of Tiddington, near Stratford-on-Avon, the prize of 5 sovs., for his Skim-Plough; invented, improved, and manufactured by himself.

To John Read, of Regent's Circus, London, the prize of 10 sovs., for his Subsoil Pulverizer, with iron beam and handles; invented by himself, improved by B. Stratton, and manufactured by R. Stratton, of Bristol.

To William Crosskill, of Beverley, Yorkshire, the prize of 10 sovs., for his Clod Crusher Roller; invented, improved, and manufactured by himself.

To James Wilmot Newberry, of Hook Norton, Oxon, the prize of 15 sovs., for his five-rowed Horse Dibbling Machine; invented and improved by Messrs. Saunder and Newberry, and manufactured by Mr. Newbury.

To Alexander Dean, of Birmingham, the prize of 10 sovs., for his Machine for Crushing linseed, rape, and other seeds of an oily nature; improved and manufactured by himself.

To Edward Hill, of Brierly-Hill, Dudley, the prize of 10 sovs., for his wrought-iron Sheep-Fold; invented by Mr. Munn, of Throwley House, Fearsham, and manufactured by Mr. Hill.

To George Edward Frere, F.R.S., 11, East Claremont-street, Edinburgh, an award of 10 sovs., for his Norwegian Harrow or Clod Crusher combined with a Field-Roller; invented in Norway, improved by Mr. Frere and Mr. Stratton, and manufactured by Mr. Stratton, at Bristol.

To William Edward Vingo, of Penzance, an award of 10 sovs., for his Seed-Depositing or Planting Machine; invented, mproved, and manufactured by himself.

To Mrs. Mary Cartmell, of London-road, Liverpool, an award of 2 sovs., for her Weighing Machine; invented by James Herriot of Glasgow, and improved and manufactured by John Craig, of Liverpool.

To the Earl of Ducie, of Tortworth Court, an award of 2 sovs., for his Corn Crusher; invented by Persons and Clyburn, and manufactured at Uley.

To David Harkes, of Mere, near Knutsford, an award of 2 sovs., for his Parallel Exhausting Horse Hoe or Scarifier; invented and manufactured by himself.

To Thomas Dickson, of Thoresway, near Caistor, an award of the Silver Medal of the Society, for his Iron Horse Hoe; invented and manufactured by B. Dawson, of Caistor.

To the Earl of Ducie, of Tortworth Court, an award of 5 sovs., for his Richmond Cart for general purposes; invented and manufactured by R. Clyburn, of Uley.

To William Crosskill, of Beverley, an award of 2 sovs., for his Improved One-horse Cart; improved and manufactured by himself.

To Edward Hammond Bentall, of Heybridge, near Maldon, Essex, an award of the Silver Medal of the Society for his Hand Seed Depositor; invented and manufactured by himself.

To John Read, of Regent's Circus, London, an award of 5 sovs., for his Double-Action Fire-Engine; invented and manufactured by himself.

To Richard Hornsby, of Spittlegate, Grantham, an award of 3 sovs., for his Double Oil-Cake Breaker; invented, improved, and manufactured by himself.

To William Sanday, of Holme-Pierrepoint, Nottinghamshire, an award of 10 sovs., for his Winnowing Machine; improved by himself, and manufactured by Samuel Wheatly, of Holmelane.

To Messrs. Charles Phillips and Co., of Bristol, an award of 5 sovs., for their Turnip-Cutting Machine; invented by C. Phillips, and manufactured by themselves.

To James Spencer, of Hopton, near Wirksworth, Derbyshire, an award of 5 sovs., for his large Chaff Cutter, for one or two men, and for horse or engine power; invented and manufactured by himself.

To Messrs. Wedlake and Thompson, of Hornchurch, Essex, an award of 3 sovs., for their Hay-making or Tedding Machine; invented by Robert Wedlade, and improved by H. Hankinson, and manufactured by Messrs. Wedlake and Thompson.

To Lieut. James Vibart, of Chilleswood House, near Taunton, an award of five sovs., for his Compound Lever-Power, invented by himself, and manufactured by Mr. Richards, of Taunton.

To the Earl of Ducie, of Totworth Court, an award of 10 sovs., for his Thrashing and Dressing Machine, invented by Parsons and Clyburn, and manufactured at Uley.

To Alexander Dean, of Birmingham, an award of 10 sovs., for his Portable Steam Engine, of four-horse power, invented, improved, and manufactured by himself.

To William Cambridge, of Market Lavington, Devizes, an award of 5 sovs., for his Portable Steam Engine, of four-horse power, invented, improved, and manufactured by himself.

To Edward Hill, of Brierly Hill, Dudley, an award of 2 sovs., for his Iron Granary or Store-room Crane and Winch, invented and manufactured by himself.

To Edward Hill, of Brierly Hill, an award of the Silver Medal of the Society, for his general exhibition of Gates, Hurdles, Cribs, &c.

To James Richmond, of Salford, Manchester, an award of the Silver Medal of the Society, for his Machine for Washing Vegetables; invented, improved, and manufactured by himself.

To Evan Thomas, of Keel Meifod, near Welshpool, an award of the Silver Medal of the Society, for his application of leverage in his scarifier; invented and improved by himself.

PLOUGHS, DRILLS, & TILE MACHINES, SELECTED BY THE JUDGES FOR FURTHER TRIAL (previously to a decision on their merits, or an award of prizes).

David Harkes, of Mere: Plough for heavy land; manufactured by himself.

William Howard, of Bedford: Iron Plough with two wheels; invented and manufactured by himself.

Mapplebeck and Lowe, of Birmingham: new and improved Rutland Plough; invented and manufactured by Messrs. Ransome.

Sanders and Co., of Bedford: Wrought-iron Plough, with two wheels and improved coulter; invented and improved by themselves.

William Wood, of Knutsford: Wrought-iron Swing Plough; invented and manufactured by himself.

E. H. Benthall, of Heybridge: Iron Plough; invented and manufactured by himself.

Richard Hornsby, of Grantham: Ten-coulter Drill for Corn and general purposes; invented, improved, and manufactured by himself.

Richard Hornsby, of Grantham: six-row Turnip Drill, for flat work; invented, improved, and manufactured by himself.

Richard Hornsby, of Grantham: two-row Ridge Drill; invented, improved, and manufactured by himself.

James Smyth, of Peasenhall: Ridge or Broad Work, Turnip or Mangel-Wurtzel seed, and Manure Drill; invented, improved, and manufactured by himself.

Richard Garrett, of Leiston: two-row Lever Ridge Drill, for turnips, &c.; invented and manufactured by himself.

Thomas Scragg, of Calverley: machine for making Draining Tiles and Pipes for agricultural purposes; invented by himself, and manufactured by James Hewett, of Calverley, Cheshire

Henry Clayton, 21, Upper Park Place, Dorset Square, London; Hand-machine for the manufacture of Drain Pipes, Tiles, and Bricks; invented, improved, and manufactured by himself.

Robert Beart, of Godmanchester: machine for making Draining Pipes, Tiles, and Soles; invented by himself, and manufactured by Messrs. Clarke, of Houghton, Huntingdonshire.

[*The Council have decided that the Winning Implement of the previous year, in each of these three classes, shall be tried along with the Implements thus selected by the Judges on the present occasion.*

LORD KENYON'S PRIZE.

The prize of 20 sovs. for the best Essay on gorse, as the food of cattle, horses, or sheep, has been awarded to Mr. Roberts, of Bangor.

A LIST OF THE VARIOUS AGRICULTURAL IMPLEMENTS, MACHINES, AND OTHER ARTICLES FOR FARM PURPOSES; MANURES, SEEDS, ROOTS, &c.; EXHIBITED AT THE SOCIETY'S SHOW AT SHREWSBURY, JULY 15TH, 16TH, AND 17TH, 1845:—

STAND No. 1.—William Joseph Joyner, Aveley Hall, Romford, Essex.

Article No. 1 (new implement), a chaff cutter; invented and manufactured by the exhibiter.

STAND No. 2.—Mr. William Abraham, of Barnetby-le-Wold, Brigg.

Article No. 1 (improved implement), a combined drag, harrow, and scarifier; invented, improved, and manufactured by Mr. Joseph Miller, of Barnetby-le-Wold.

STAND No. 3.—Mr. Robert Beart, of Godmanchester, Huntingdon.

Article No. 1 was selected for trial.

Articles No. 1 (new implement), a patent machine for making draining pipes, tiles, and soles; 2 (new implement), a patent machine for making bricks, draining pipes, tiles, soles, &c.; 3 (new implement), a patent machine for making draining pipes, tiles and soles; all invented by the exhibiter; manufactured by John and George Clark, of Houghton, Hunts.

STAND No. 4.—Mr. Thomas Bigg, of 15, Crawford-street, Portman-square, London.

Article No. 1, a sheep-dipping apparatus; invented and improved by the exhibiter; manufactured by Mr. Robt. Wade, 113, Crawford-street, London.

STAND No. 5.—Mrs. Mary Cartmell, of 34, London Road, Liverpool.

Article No. 8 obtained a prize of 2 sovs.

Articles No. 1, a four-knife hay and straw-cutter (diagonal knives for hand or power); invented by the late William Cartmell, of Doncaster; improved and manufactured by the exhibiter. No. 2, a three-knife hay and straw-cutter for hand power; invented by William Cartmell, of Liverpool manufactured by the exhibiter. No. 3, a three-knife hay and straw-cutter for hand-power; invented by Mr. Thomas Pasmore, of Doncaster, improved by Wm. Cartmell, of Liverpool, and manufactured by the exhibiter. No. 4, an oil-cake crusher; invented by Mr. John Cartmell, of Liverpool, and manufactured by the exhibiter. Nos. 5, a grain bruiser; 6, a grain bruiser; invented by Thomas Cartmell, of Doncaster, improved by William Cartmell, of Liverpool, and manufactured by the exhibiter. No. 7, a double turnip-cutter, invented by William Cartmell, of Liverpool, and manufactured by the exhibiter. Nos. 8, 9, 10, weighing machines; invented by James Heriot, of Glasgow; improved and manufactured by John Craig, of Liverpool.

STAND No. 6.—Egerton W. Harding, of Old-springs, near Market Drayton.

Articles No. 1 (new implement), a one-horse cart; 2, a harvest cart; 3, a scarifier; 4, a subsoil pulverizer; invented and manufactured by the exhibiter.

STAND No. 7.—Mr. James Wilmot Newberry, of Hook Norton, near Chipping Norton.

Article No. 1 obtained a prize of 15 sovs.

Articles No. 1, a five-rowed dibbling machine, invented and improved by Saunder and Newberry, of Hook Norton; and manufactured by the exhibiter. No. 2 (new implement), a one-rowed dibbling machine, invented by Saunder and Newberry, of Hook Norton; improved and manufactured by the exhibiter.

STAND No. 8.—Mr. William Bullock Webster, of Hounsdown, near Southampton.

Articles No. 1 (new implement), a hand pipe and tile machine; invented by the exhibiter, and manufactured by Tasker and Fowle, of Waterloo Iron Works, Andover, Hants. No. 2, a level for the purpose of draining, &c., &c.; invented by the exhibiter, and manufactured by George Cox, Optician, of 128, Holborn-hill, London. No. 3 (new implement), a beam draining level, with parallel plates, tripod stand, altitude and depression piece, with centre to move round on; 4 (new implement), a simple workman's level, with line and plumb, and moveable spirit-tube; invented by the exhibiter, improved and manufactured by George Cox, Optician, of 128, Holborn-hill, London. No. 5 (new implement), a patent hand-dibble, for making the hole, and depositing the seed in any quantity; invented by the exhibiter; improved and manufactured by Richard Clyburn, of Uley, near Dursley, Gloucestershire. No. 6 (new implement), a small seed depositor for hand-dibbling; invented by the exhibiter, and manufactured by Richard Clyburn, of Uley, near Dursley, Gloucestershire. No. 7, an agricultural test chest; invented and manufactured by George Cox, optician and practical chemist, of 128, Holborn-hill, London. No. 8, an angle meter; invented by Mr. T. R. Bakewell, civil engineer and mineralogical surveyor, and manufactured by George Cox, optician, &c., of 128, High Holborn, London. No. 9, the orthochronograph; invented by Mr. Lowman, of Ramsgate; improved by R. Webster, of 128, Holborn-hill, and manufactured by George Cox, optician, of 128, Holborn-hill, London. No. 10, a model of the tile machine exhibited. No. 11, tiles, pipes, bricks, &c., &c., made by machine exhibited, with specimens of clay they are made from. No. 12, some agricultural books. No. 13, a model of a set of iron machinery for drawing water; invented and manufactured by Tasker and Fowle, of Waterloo Iron Works, Andover, Hants.

STAND No. 9.—Mr. Edward Hammond Bentall, of Heybridge, near Maldon.

Article No. 1 was selected for trial, and Article No. 4 obtained the silver medal.

Articles No. 1, a patent iron plough; 2, a patent iron universal double-breasted plough; 3 (new implement), a patent dynamometer; 4 (new implement), a patent seed depositor; all invented and manufactured by the exhibiter. No. 5, a pair of Essex wheat dibbs; improved and manufactured by the exhibiter.

STAND No. 10.—Mr. James Comins, of South Molton.

Articles No. 1, a plough adapted to light land; improved and manufactured by the exhibiter. No. 2, a plough adapted for heavy or light land; 3, a one-way or turnover plough, registered; 4 (new implement), a registered one-way plough, improved for hoeing or earthing-up potatoes; the three last articles invented, improved, and manufactured by the exhibiter.

STAND No. 11.—Mr. Joshua Cooch, of Harleston, near Northampton.

Articles No. 1, a winnowing machine; 2, a barley hummeller; invented, improved, and manufactured by the exhibiter. No. 3, an improved cultivator or scarifier; invented by Earl Ducie, of Uley; improved and manufactured by the exhibiter.

STAND No. 12.—Lieut. James Vibant, of Chilleswood House, near Taunton, Somerset.

Article No. 1 obtained a prize of 5 sovs.

Articles No. 1 (new implement), a compound lever power (patent); 2 (new implement), a patent bell-crank lever thrashing machine; 3 (new implement), a patent bell-crank lever power; the three articles invented by the exhibiter, and manufactured by Mr. Richards, engineer, of Taunton. No. 4, a thrashing machine; manufactured by Mr. Richards, engineer, Taunton, Somerset. No. 5 (new implement), a chaff cutter; 6 (new implement), a turnip cutter; these two were invented by the exhibiter, and manufactured by Mr. Richards, engineer, of Taunton.

STAND No. 13.—Mr. Forbes M'Neill, of 44, Finsbury Circus, and Lamb's-buildings, Bunhill-row, London.

Articles No. 1, a variety of models, showing the application of his patent asphalted felt roofing to cottages, sheds, hay and corn ricks, &c. No. 2, a sample of felt; invented by Mr. Williams; and improved and manufactured by the exhibiter. No. 3 (new implement), a portable and economical tar kettle; invented and manufactured by Mr. Williams, of Lamb's-buildings, Bunhill-row.

STAND No. 14.—Mr. Frederick W. Etheredge, of 15, Park-street, Westminster.

Articles No. 1 (new implement), a horse tile-machine; invented by W. Worley, of Ipswich, and the exhibiter, and manufactured by Messrs. Ransome, of Ipswich. No. 2 (new implement), a hand tile-machine; invented by the exhibiter, and manufactured by Messrs. Ransome, of Ipswich, Suffolk. No. 3 (new implement), a hand brick-making and compressing machine; invented by the exhibiter; improved and manufactured by S. J. Knight, of Maidstone, Kent. Nos. 4 and 5, models of a tile yard; invented by the exhibiter. No. 6, a horse tile machine; invented and improved by the exhibiter, and manufactured by Messrs. Ransome, of Ipswich.

STAND No. 15.—Richard Robinson, Lisburn, near County Antrim.

Articles No. 1 (new implement), a churn; 2 (new implement), a churn made of block tin; invented by John Rowan and Sons, of Ballyclare; 3 (new implement), a churn, all improved and manufactured by the exhibiter. Nos. 4 and 5 (new implements), milk ripeners, invented and manufactured by the exhibiter. No. 6 (new implement), a steaming apparatus (cast metal boiler); 7 (new implement), a steaming apparatus (copper boiler); 8, a steaming apparatus, of an improved and enlarged construction on the foregoing; the boilers of each implement invented by Jennings, of America; improved and manufactured by the exhibiter. No. 9, an economical cottage cooking apparatus, invented by a person in the county Wexford; improved and manufactured by the exhibiter. No. 10, a set of Rowan's patent axles, invented and manufactured by John Rowan and Sons, of Ballyclare.

STAND No. 16.—Mr. William Clay, of Lineal, Ellesmere, Salop.

Articles No. 1, an iron threewheel double plough; invented and manufactured by the exhibiter. No. 2, an iron three-wheel single plough, press, &c.; invented by Bethuel Phillips, of Wackley Lodge; improved and manufactured by the exhibiter. No. 3, an iron two-wheel single plough; 4, an iron swing plough; 5, an iron swing plough; 6, an iron two-wheel ridge plough and horse hoe complete; 7, an iron two-wheel ridge plough; 8, an iron scarifier, with ten tines and ten hoes; 9, an iron horse hoe for turnips, and to regulate the plants; 10, an iron horse hoe; 11, an iron three-wheel single plough; all invented and manufactured by the exhibiter.

STAND No. 17.—Mr. William Crosskill, of the Beverley Iron Works, Hull.

Article No. 1 obtained a prize of 10 sovs., and Article No. 10 a prize of 2 sovs.

Articles No. 1, a patent clod-crusher roller; 2, a patent wheat or corn presser roller; 3 (improved implement), a patent grass land cultivator; the three articles invented, improved, and manufactured by the exhibiter. No. 4 (improved implement), a two-horse straw cutter, with five knives; improved and manufactured by the exhibiter. No. 5 (new implement), an iron liquid manure cart, with watering apparatus; invented, improved, and manufactured by the exhibiter. No. 6 (improved implement), a patent, portable iron liquid manure pump; invented by Beare, of London; improved and manufactured by the exhibiter. No. 7 (new implement), an iron liquid manure cart, with watering apparatus; invented, improved, and manufactured by the exhibiter. No. 8 (improved implement), a patent portable iron liquid manure pump, small size; invented by Beare, of London, improved and manufactured by the exhibiter. No. 9, a portable four-horse thrashing machine; 10 (improved implement), an improved one-horse cart; 11 (improved implement), a set of improved harvest shelvings; 12 (improved implement), a one-horse cart; the four last articles improved and manufactured by the exhibiter. No. 13 (improved implement), a set of patent wheels and axletree for agricultural carts, &c.; 14 (improved implement), a set of patent wheels and axletree; the two last articles invented, improved, and manufactured by the exhibiter.

STAND No. 18.—Mr. John Gillett, of Brailes, near Shipston-on-Stour.

Articles 1, a rick ventilator, invented and manufactured by the exhibiter. No. 2, a guillotine chaff machine; 3, a large size guillotine chaff machine; the two last articles invented by Messrs. Ward and Colbourne, of Stratford-on-Avon; manufactured by the exhibiter.

STAND No. 19. — Mr. Peter Love, of Naseby, near Welford.

Articles No. 1, a scarifier or grubber, for pulverizing the soil and eradicating all root weeds; 2, a scarifier or grubber; both articles invented and improved by the exhibiter, and manufactured by Alexander Ogg, of Northampton. No. 3 (new implement), a one-horse Scotch cart; invented and improved by the exhibiter, and manufactured by Eli Adnett, of Naseby, Northamptonshire. No. 4, a plough; improved and manufactured by Mr. Crawford, of Uddingston, near Glasgow. No. 5 (new implement) a set of equalizing swingle-trees and pulleys, for from two to eight horses; invented by the exhibiter, and manufactured by Eli Adnett and Alexander Ogg, of Naseby and Northampton.

STAND No. 20.—Mr. John Pritchard, of Broseley, Salop.

Articles No. 1 (new implement), a swing plough without wheels, invented, improved, and manufactured by William Wallace, of the Hill Farm, Chetton, near Bridgnorth, Salop. No. 2 (new implement), a swing plough with wheels, manufactured by William Wallace, of the Hill Farm, Chetton, near Bridgnorth, Salop. No. 3 (new implement), a wood double shieldboard plough, improved and manufactured by William Wallace, of the Hill Farm, Chetton, near Bridgnorth, Salop.

STAND No. 21.—Mr. Evan Thomas, of Keel Meifod, near Welshpool.

Article No. 2 obtained the silver medal.

Articles No. 1 (new implement), a combined furrow slice and subsoil plough; invented by T. W. Poundley, of Brook Cottage, near Newton; improved and manufactured by the exhibiter. No. 2, a scarifier or cultivator, improved and manufactured by the exhibiter.

STAND No. 22.—Mr. Abraham Vickers, of Manchester.

Articles Nos. 1, 2, 3, & 4 (new implements), churns; invented by John Rowan, of Ballyclare; and manufactured by the exhibiter. Nos. 5, 6, 7, and 8 chaff cutters, invented, improved, and manufactured by the exhibiter. No. 9, a chaff cutter, invented and manufactured by the exhibiter. Nos. 10 and 11, corn crushers, invented and manufactured by the exhibiter. No. 12, an improved steaming apparatus, for vegetables, &c.; 13, an improved cheese press; both articles invented, improved, and manufactured by the exhibiter. No. 14, an improved haymaking machine, invented and manufactured by the exhibiter. No. 15, an improved winnowing machine, invented, improved, and manufactured by the exhibiter. No. 16, a turnip cutter, invented and manufactured by the exhibiter.

STAND No. 23.—Mr. Samuel Beardmore, of Leek.

Article No. 1, a chaff cutter; invented and manufactured by the exhibiter. No. 2 and 3 chaff cutters; invented, improved, and manufactured by the exhibiter. No. 4, rack and lever cheese press, made of wrought-iron; invented and manufactured by the exhibiter.

STAND No. 24.—Mr. John Bruce, of Tiddington, near Stratford-on-Avon, Warwickshire.

Article No. 1 obtained a prize of 5 sovs.

Articles Nos. 1, a skim plough; 2, a patent subsoil plough; 3, a patent scarifier; 4 (new implement), a subsoil pulverizer; 5, a plough; all invented, improved, and manufactured by the exhibiter.

STAND No. 25.—Mr. Henry Clayton, of 21, Upper Park-place, Dorset-square.

Article No. 1 was selected for trial.

Article No. 1, a patent hand machine for the manufacture of drain pipes, tiles, and bricks; invented, improved, and manufactured by the exhibiter. No. 2, a set of various kinds of tools for cutting the drains for pipe tiles and other descriptions of drain tiles; improved by, and manufactured under the superintendence of, the exhibiter.

STAND No. 26.—Messrs. Barrett, Exall, and Andrews, of Reading.

Articles Nos. 1, a double plough; 2, a universal plough; 3, a potato plough; all invented and manufactured by the exhibiters. No. 4 (new implement), an improved turnwrist plough; invented by Mr. W. Exall; manufactured by the exhibiters. Nos. 5 and 6, improved subsoil ploughs; 7 (new implement), a light two-share subsoil plough; 8, a light one-wheel plough; 9, a light one-wheel plough; 10, a light one-wheel plough; 11, a strong one-wheel plough; 12, an all-iron one-wheel plough; 13, a two-wheel and swing-plough; 14, a two-wheel and swing plough; 15, an all-iron two-wheel and swing plough; 16, a light swing plough; 17, an all-iron swing plough; the above 13 articles invented and manufactured by the exhibiters. No. 18, an iron double cylindered field roller (16 in.); invented by Mr. W. Exall; manufactured by the exhibiters. No. 19, a two-wheel seam presser (36 in.); inventor not known; improved and manufactured by the exhibiters. No. 20, a gorse or furze-crushing machine; invented and improved by Mr. Wm. Exall, of Reading; manufactured by the exhibiters. No. 21, a two-horse bevil gear work; invented and manufactured by the exhibiters. No. 22, an improved chaff engine, No. 1 (8 in.); invented and improved by Mr. Wm. Exall, of Reading; manufactured by the exhibiters. No. 23, an improved chaff engine. No. 2 (9 in.); 24, an improved chaff engine. No. 3 (10 in.); 25, an improved chaff engine. No. 4 (11 in.); 26, an improved chaff engine. No. 5 (12 in.); the last four articles invented by Mr. Wm. Exall, of Reading; manufactured by the exhibiters. No. 27, an improved horse gear for one or two horses; invented and manufactured by the exhibiters. No. 28, a two-horse-power thrashing machine; invented and improved by Mr. Wm. Exall, of Reading; manufactured by the exhibiters. Nos. 29, a one-horse-power thrashing-machine; 30, a hand-power thrashing machine; both articles invented by Mr. Wm. Exall, of Reading; manufactured by the exhibiters. Nos. 31 (new implement), a winnowing or corn-clearing machine; 32 (new implement), an improved lever horse rake; manufactured by the exhibiters. No. 33 (new implement) a continuous-feeding, self-cleaning pipe and drain tile machine; invented by Mr. Wm. Exall, of Reading; manufactured by the exhibiters. No. 34, a strongly-geared oilcake breaker; invented and manufactured by the exhibiters. No. 35, a malt, oat, &c., crushing machine; manufactured by the exhibiters. No. 36, a grass, turnip, and other small seed machine; invented by Mr. Bennett, of Farnham; manufactured by the exhibiters. No. 37, a three-row universal drill; manufactured by the exhibiters. No. 38, a universal expanding seed and manure drill; invented and manufactured by the exhibiters. Nos. 39, a pair of rhomboidal grass harrows; 40 (new implement), a light pair of patent axle cart wheels; 41, a pair of strong cart or waggon wheels; 42, a wrought-iron shifting horse hoe; the last four articles manufactured by the exhibiters. No. 43, a model of an improved kiln for drying tiles, &c., &c. Nos. 44 to 55, baskets of the working parts of the above implements.

STAND No. 27.—Messrs. Young and Spence, of Shrewsbury.

Articles No. 1, A three-horse thrashing machine; improved and manufactured by the exhibiters. No. 2, a two-horse thrashing machine; improved and manufactured by the exhibiters. No. 3, a horse movement; manufactured by the exhibiters. No. 4 (new implement), a clod crusher; invented and manufactured by the exhibiters. No. 5, a clod crusher; invented by Wm. Crosskill, of Beverley, and manufactured by the exhibiters. Nos. 6, a scarifier with nine tines; 7, a seven-tine scarifier; both articles invented by Biddell, of Suffolk, and manufactured by the exhibiters. No. 8, a triangular scarifier with seven tines; improved and manufactured by the exhibiters. No. 9, a triangular scarifier with five tines; improved and manufactured by the exhibiters. No. 10 (new implement), a couch grass rake and seed drill; invented and manufactured by the exhibiters. No. 11, a couch grass rake; improved and manufactured by the exhibiters. No. 12 (new implement), a scuffle; invented by Mr. Samuel Meire, of Berrington, and manufactured by the exhibiters. No. 13, a single-row turnip drill; improved and manufactured by the exhibiters. No. 14, a drill harrow; manufactured by Drummond, of Stirling. No. 15, a barley hummeller; improved and manufactured by the exhibiters. No. 16, a sheep rack and troughs on wheels; manufactured by the exhibiters. No. 17 (new implement), a grass scarifier and seed drill; invented and manufactured by the exhibiters. Nos. 18, a two-row turnip-drill, with self-adjusting rollers; 19, a wheat mill, with French burr stones and dresser, for one horse; both articles manufactured by the exhibiters. No. 20, a chaff cutter, with thirty knives; invented by Worth, and manufactured by Richmond, of Salford. No. 21 (new implement), a train of iron harrows; invented by Geo. Hilditch, of Treflack Hall, and manufactured by the exhibiters. Nos. 22, a pair of two-horse iron harrows; 23, a pair of light seed harrows; 24, a liquid manure barrel; the three articles manufactured by the exhibiters; No. 25, a patent winnowing machine; invented by Salter, and manufactured by Ransomes, of Ipswich. Nos. 26, an iron wheel plough, improved by Mr. B. Phillips, of Wackley Lodge, Salop; 27, an iron wheel plough; 28, an iron double mould-board plough; 29, an iron swing plough; 30, a subsoil plough, invented by Wilkie, of Udderstone; 31, a universal ridge plough and horse hoe, invented by Clarke; 32, a mole, draining, and sub-turf plough, invented by Sir Edward Stacey, Bart.; 33, a bone and turnip drill; the last eight articles manufactured by the exhibiters. Nos. 34, a fourteen-row corn drill; 35, a nine-row corn drill; both articles invented and manufactured by James Smyth, of Peasenhall. No. 36, a winnowing machine; manufactured by Thomas Davies, of Oswestry. No. 37, a corn crusher; manufactured by the exhibiters. No. 38, a bean crusher; manufactured by J. R. and A. Ransome, of Ipswich. No. 39, a corn crusher; invented and manufactured by Alexander Dean, of Birmingham. No. 40, a turnip cutter; invented and manufactured by Charles Phillips and Co., of Bristol. No. 41, a turnip cutter; invented and manufactured by James Gardner, of Banbury. No. 42, a horizontal turnip slicer; manufactured by the exhibiters. No. 43, a steam presser, with drill; invented and manufactured by Hornsby, of Grantham. No. 44, a hay-tedding machine, double barrel; invented by Wedlake, of Hornchurch, and manufactured by the exhibiters. No. 45, a twenty-four-inch land roll, with two barrels and hinges; manufactured by the exhibiters. No. 46, a twelve-feet barrow clover drill; manufactured by Thomas Davies, of Oswestry. No. 47, a No. 6 chaff engine; improved by J. R. and A. Ransome, of Ipswich, and manufactured by the exhibiters. No. 48, a chaff engine, with two knifes; invented by J. R. and A. Ransome, of Ipswich, and manufactured by the exhibiters. No. 49, a chaff engine; invented and manufactured by Wilkes, of Sheffield. No. 50, a lever cheese press; invented by Mr. B. Phillips, of Wackley Lodge, Salop, and manufactured by the exhibiters. No. 51, a hand dibble, invented and manufactured by Smith, of Droitwich. No. 52, an iron field barrow, invented by the Coalbrookdale Company, of Salop, and manufactured by the exhibiters. No. 53, a weighing machine; manufactured by W. and T. Avery, of Birmingham. No. 54, a steelyard, sack, and sheep weigher; invented by W. and T. Avery, of Birmingham, improved by the exhibiters, and manufactured by W. and T. Avery, of Birmingham. Nos. 55, a wrought-iron hay rack; 56, an iron hurdle wicket, and posts; both articles manufactured by the exhibiters. No. 57, a wrought-iron rolled field gate; invented by J. Boydell, of Oak Farm Company, Staffordshire, and manufactured by the Oak Farm Company, of Staffordshire. Nos. 58, a wrought-iron field gate with flat bars; 59, five pattern iron hurdles; both articles manufactured by the exhibiters.

STAND No. 28—Messrs. Cottam and Hallen, of Winsley-street, Oxford-street, London.

Articles Nos. 1, a cycloidal tooth grubber, with seven tines, invented by G. Cottam, of Winsley-street, London; 2, a cycloidal tooth grubber, with five tines, invented by G. Cottam, of Winsley-street, London; 3, a subsoil plough, invented by Mr. Jas. Smith, of Deanston, improved by the exhibiters. Nos. 4, horse hoe for ridge work, or on the flat; 5, a serrated chain harrow, invented by Mr. Jas. Smith, of Deanston; 6, a serrated chain harrow, invented by Mr. Jas. Smith, of Deanston; 7, an anti-patent clod crusher; 8, a seed and manure drill for one row; 9, a seed and manure drill for two rows; the last six articles improved by G. Cottam, of Winsley-street. Nos. 10, a two-row dibble, invented by G. Cottam, of Winsley-street; 11 (new implement), a two-row dibble and drop drill, in one machine, invented by G. Cottam, of Winsley-street; 12, a seed dibble No. 1; 13 (new implement), a seed dibble No. 2; 14 (new implement), a seed dibble No. 3, called the fish mouth seed dibble; the last three articles invented and manufactured by Richard Smith, of Upper Hall, Hampton Lovett, Worcestershire. Nos. 15, a land presser, improved by J. Bennett, Esq., M.P., of Pythouse, Hindon, Wilts; 16, a liquid manure cart; 17, an iron-framed saw table, and boring machine, invented by G. Cottam, of Winsley-street; 18, a set of horse work for four horses, improved by G. Cottam, of Winsley-street; 19, a vertical turnip cutter; 20, a bruising machine for grain; 21, a flax-seed crusher; 22, an oilcake crusher for sheep and cattle; 23, a tile machine for all kinds of tiles and pipes, invented by John Hatcher, of Benenden, Kent; 24 (new implement), a pug mill in iron case, invented by G. Cottam, of Winsley-street; 25, a set of draining tools; 26 (new implement), an improved draining level, invented by Mr. Samuel S. H. C. Payne, of Llanelly House, Carmarthenshire; 27, a set of digging forks; 28, a weighing machine for sheep, calves, pigs, &c., invented by G. Cottam, of Winsley-street; 29, a weighing machine for sacks, &c.; 30, a double weighing machine; 31, a weighing machine, with iron frome and wheels; 32, a wrought-iron sack truck, invented by G. Cottam, of Winsley-street; 33, a dynamometer, or draught gauge, invented by G. Cottam, of Winsley-street; 34, an odometer, or land measurer, invented by G. Cottam, of Winsley-street; 35, a salting machine, invented by Carson, of York-street; 36, a pair of patent iron cart wheels and axle, invented by G. Cottam, of Winsley-street; Nos. 37, 38, 39, and 40, metallic churns with pans for hot or cold water, invented by Johnson of London; Nos. 41 and 42, wrought-iron welded field gates; Nos. 43 and 44, wrought-iron sheep hurdles; 45, a wrought-iron light cattle hurdle; 46, a wrought-iron strong cattle hurdle; Nos. 47 and 48, wrought-iron ox hurdles; 49, a wrought-iron wheel-barrow; 50, a liquid manure pump, improved by G. Cottam, of Winsley-street; 51, a cast-iron stable pump; 52, an assortment of garden tools; 53, a wrought and cast-iron rick stand; Nos. 54 and 55, cast-iron rick posts; 56 (new implement), a walking-stick level, invented by G. Cottam, of Winsley-street; 57, a Roman stada, or weighing machine for sheep, pigs, &c., invented by G. Cottam. The whole of the articles in this stand, except Nos. 12, 13, and 14, are manufactured by the exhibiters.

STAND No. 29.—Mr. Wm. Colbourne and Mr. James Ward, of Stratford-on-Avon.

Articles, Nos. 1, a guillotine chaff engine; 2 (new implement), a Cam chaff engine; 3 (new implement), a guillotine Cam chaff engine; all invented and manufactured by the exhibiters.

STAND No 30.—Mr. Thomas Dickson, of Thoresway, near Caistor.

Article No. 2 obtained the silver medal.

Articles, Nos. 1, an iron plough; 2 (new implement), an iron horse-hoe; both articles invented and manufactured by Benjamin Dawson, of Caistor.

STAND No. 31.—Mr. David Harkes, of Mere, near Knutsford.

Article No. 1 was selected for trial, and No. 2 obtained a prize of 2 sovs.

Articles No. 1, a plough for heavy land, manufactured by the exhibiter. No. 2, a plough for light land, manufactured by the exhibiter. Nos. 3, a subsoil pulverizer; 4, a parallel expanding horse hoe, or scarifier; 5, a parallel expanding horse hoe; 6 (new implement), a horse hoe; the last four articles invented and manufactured by the exhibiter. No. 7, a churn, invented by Mr. George Brown, of Capesthorne, and manufactured by the exhibiter. No. 8, a cultivator or scarifier, invented by Finlayson, improved and manufactured by the exhibiter. No. 9, a pipe and drain tile-making machine, invented and manufactured by the exhibiter.

STAND No. 32.—Samuel Harris, of Barker-street, Shrewsbury.

Articles Nos. 1 (new implement), an iron plough; invented by Mr. Ransom, of Ipswich; 2, an iron plough; invented by Mr. Ransom, of Ipswich; both articles improved and manufactured by the exhibiter. Nos. 3, a ridge plough; 4, a turnip drill; 5, a set of iron harrows; the three articles invented and manufactured by the exhibiter.

STAND No. 33.—Mr. Joseph Haywood, Little Leigh, near Northwich.

Articles Nos. 1, a plough, adapted for either heavy or light land; 2, a plough, adapted for either heavy or light land; both articles invented by the exhibiter.

STAND No. 34.—Mr. George Kelby, of Queniborough, near Leicester.

Articles Nos. 1, 2, and 3, machines for cutting hay or straw into chaff; 4, a corn and turnip drill; the above articles invented and manufactured by William West, of Leicester. 5, a turnip and manure drill, invented by Thomas West, of Higham, Hinckley, improved and manufactured by William West, of Leicester.

STAND No. 35.—Mr. Thomas Teago, of Longworth, near Abingdon.

Article No. 1 (new implement), a drill for general purposes, invented and manufactured by the exhibiter.

STAND No. 36.—Mr. Humphrey Chamberlaine, of Bredicot, near Worcester.

Article No. 1, a drain tile machine, invented by the exhibiter, and manufactured by Messrs. Hardy and Padmore, of Worcester.

STAND No. 37.—Mr. Thomas Coombs, of Nether Wallop, near Andover.

Article No. 1 (new implement), a drill for general purposes, invented and manufactured by the exhibiter.

STAND No. 38.—Mr. John Cornes, of Barbridge, near Nantwich, Chester.

Article No. 1 obtained a prize of 10 sovs.

Article No. 1, a chaff-cutting machine, with three knives, to be worked by two men or machinery, improved and manufactured by the exhibiter. No. 2, a chaff-cutting machine, with three knives, to be worked by machinery, manufactured by the exhibiter. No. 3, a chaff cutter, with two knives, to be worked by two men, improved and manufactured by the exhibiter. No. 4, a chaff cutter, with two knives, to be worked by one man, manufactured by the exhibiter. No. 5, a churn, improved and manufactured by the exhibiter.

STAND No. 39.—Mr. Thomas John Croggon, of 2, Ingram-court, Fenchurch-street, London.

Article No. 1, rolls of patent asphalte felt, invented and improved by Thomas Robinson Williams, of London, manufactured under the direction of the exhibiter by Pocock and Co., of Belfast. No. 2, a model of allotment farm, invented by Peter Thompson, of Limehouse, improved and manufactured by the exhibiter. No. 3 (new implement), a movable sheep fold, invented, improved, and manufactured by the exhibiter.

STAND No. 40.—George Edward Frere, F.R.S., of 11, East Claremont-street, Edinburgh.

Article No. 2 obtained a prize of 10 sovs.

Article No. 1 (new implement), a Norwegian harrow or clod crusher; invented by a Norwegian implement maker in Norway; imported from Norway for his Grace the Duke of Buccleuch by Mr. Andrew Black, Smeaton, Dalkeith; improved by the exhibiter and Richard Stratton, of Bristol, and manufactured by R. Stratton, of Bristol. No. 2 (new implement), a Norwegian harrow or clod-crusher, combined with a field roller; invented by an implement maker in Norway; imported from Norway for his Grace the Duke of Buccleuch by Mr. Andrew Black, Smeaton, Dalkeith; improved by the exhibiter and Richard Stratton, of Bristol, and manufactured by R. Stratton, of Bristol.

STAND No. 41.—Mr. Thomas Hunter, of Ulceby, near Barrow-upon-Umber.

Articles Nos. 1, a drill for general purposes, with ten coulters for corn and five for turnips; 2, a turnip drill, either for ridges or flat surface, with two or three coulters; 3, a corn and turnip drill, with eight coulters for corn and four for turnips; the above articles invented by Mr. Cartwright, of Fordington, improved and manufactured by the exhibiter. No. 4, a drill for drilling grass seeds, with twenty coulters, invented and manufactured by the the exhibiter.

STAND No. 42.—Mr. William Newzam Nicholson, of Newark-upon-Trent, Notts.

Articles No. 1, 2, and 3 (new implements), machines for breaking oilcake for beasts, sheep, &c. (with registered improvements), invented and manufactured by the exhibiter. No. 4 (new implement), a machine for breaking oilcake for beasts, sheep, &c., and small for the purposes of tillage (with registered improvements), invented, improved, and manufactured by the exhibiter. No. 5 (improved implement), a machine for croshing beans, oats, barley, malt, &c. (with registered improvements), improved and manufactured by the exhibiter. No. 6 (improved implement), a machine for grinding linseed, and may be used for malt, oats, and other small grain (with registered improvements), improved and manufactured by the exhibiter. No. 7 (new implement), a registered copying press, invented and manufactured by the exhibiter.

STAND NO. 43.—Mr. William Sanday, of Holme-Pierrepont, Nottingham.

The following article obtained a prize of 10 sovs.

Article No. 1, a winnowing machine, improved by Wm. Sanday, of Holme-Pierrepont, and manufactured by Samuel Wheatly, of Holme Lane.

STAND NO. 44.—Mr. John Teasdale, of Burneston, near Bedale.

Article No. 1, a drill for ridge-work, invented, improved, and manufactured by the exhibiter.

STAND NO. 45.—The Earl of Ducie, Tortworth Court, near Wotton-under-Edge.

Article No. 9 obtained a prize of 5 sovs; No. 12, 10 sovs.; No. 17, 2 sovs.; and No. 19, 10 sovs.

Articles No. 1, an iron swing plough, improved and manufactured by Richard Clyburn, of Uley. No. 2, a subsoil plough, invented by Mr. Smith, of Deanston, and manufactured by Rd. Clyburn, of Uley. Nos. 3 (new implement), a dynamometer, recording 160 stones; 4 (new implement), a dynamometer, recording 64 stones: both articles invented and manufactured by Richard Clyburn, of Uley, near Dursley. No. 5, a subpulverizer, invented by the Hon. M. W. B. Nugent, of Higham Grange, Hinckley, Leicestershire; improved by John Morton, of Whitfield Example Farm, and manufactured by Richard Clyburn, of Uley. No. 6, a five-tine fixed horse-hoe, improved and manufactured by Richard Clyburn, of Uley. Nos. 7, a parallel expanding horse-hoe, with five hoes and five tines; 8, a parallel expanding horse-hoe, with three hoes and three tines: both articles invented by John Morton, of Whitfield Example Farm, and manufactured by Richd. Clyburn, of Uley. No. 9, a Richmond Cart, invented and manufactured by Richard Clyburn, of Uley. No. 10, a single row turnip and manure drill, manufactured by R. Clyburn, of Uley. No. 11, a set of improved screw spanners or wrenches, invented and manufactured by Richard Clyburn, of Uley. Nos. 12, a cultivator or scarifier with five tines, covering a space of 40 inches; 13, a cultivator or scarifier with seven tines, covering a space of 56 inches; 14, a wrought iron cultivator or scarifier with five tines, covering a space of 40 inches: the three articles invented by John Morton, of Whitfield Example Farm, improved and manufactured by Richard Clyburn, of Uley. Nos. 15 and 16, patent chaff cutters with two spiral knives; invented by the Earl of Ducie, R. Clyburn, and E. Budding, of Tortworth, Uley, and Dursley, and manufactured by Richard Clyburn, of Uley. No. 17, a patent corn crusher; invented by George Parsons and Richard Clyburn, of West Lambrook and Uley, and manufactured by Richard Clyburn, of Uley. No. 18 (new implement), an improved cart axle, with cast iron naves, improved and manufactured by Richard Clyburn, of Uley. Nos. 19 (new implement), a patent thrashing machine; 20 (new implement), a patent winnowing machine; both articles invented by George Parsons and Richard Clyburn, of West Lambrook and Uley, and manufactured by Richard Clyburn, of Uley. No. 21, a four-rowed dibbling machine, invented and improved by Saunder and Newberry, of Hook Norton and Bloxham, and manufactured by Richard Clyburn, of Uley.

STAND NO. 46.—Mr. Richard Hornsby of Spittlegate, Grantham.

Articles Nos. 2, 4, and 6, were selected for trial; No. 8 obtained a prize of 10 sovs.; and No. 10, 3 sovs.

Articles, Nos. 1, a one-row ridge drill; 2, a two-row ridge drill; 3, a one-row drop ridge drill; 4, a six-row turnip drill for flat work; 5, a ten-coulter corn and seed drill; 6, a ten-coulter drill, for corn and general purposes; 7, an improved winnowing machine, registered June 14, 1844; 8, a two-row drill presser: all invented, improved, and manufactured by the exhibiter. No. 9, Read's patent subsoil pulverizer, invented and improved by John Read, of Regent circus, London; manufactured by the exhibiter. Nos. 10, a double cake breaker; 11, a single cake breaker; both articles invented, improved, and manufactured by the exhibiter.

STAND NO 47.—Mr. Edward Hill, of Brierley Hill Iron Works, Dudley.

Article No. 18 obtained a prize of 2 sovs.; No. 22 a prize of 10 sovs.; and a silver medal was awarded for the general exhibition of gates, hurdles, cribs, &c.

Articles, Nos. 1, a wrought iron two-wheel pulverizing plough, invented by William Mason, late of Warwickshire, of Brierley hill iron works; 2, a wrought iron two-wheel pulverizing plough, invented by William Mason, late of Warwickshire, of Brierley hill iron works; both articles improved and manufactured by the exhibiter. Nos. 3, an iron G. O. or swing plough; 4, an iron two-wheel plough; 5, an iron double furrow plough; 6, a wrough iron paring or skim plough; the last four articles invented and manufactured by the exhibiter. Nos. 7 and 8, iron skims, invented by Mr. J. Allen Stokes, of Harvington, near Evesham; improved and manufactured by the exhibiter. No. 9 (new implement), an iron skim, invented by Mr. Charles Grazebrook, of Summerhill, near Stourbrige; manufactured by the exhibiter. Nos. 10 and 11, iron scarifiers; invented and manufactured by the exhibiter. No. 12, an expanding horse hoe, manufactured by the exhibiter. No. 13, an expanding horse hoe, invented and manufactured by the exhibiter. Nos. 14, an iron pulverizing plough, invented by Mr. J. Wilson, of Aston; 15 (new implement), an iron subsoil plough; both articles improved and manufactured by the exhibiter. Nos. 16, a set of iron harrows; 17, an iron barley roller; 18 (new implement), an iron granary or store room crane and winch; 19, an iron sheep rack; 20, an iron corn crib; 21, an iron sheep feeder; the last six articles invented and manufactured by the exhibiter. No. 22 (new implement), a wrought iron sheep fold, invented by Mr. W. A. Munn, of Throwley House, Feversham, and manufactured by the exhibiter. Nos. 23, an iron wheelbarrow for stable or garden purposes; 24, an iron tree guard; both articles invented and manufactured by the exhibiter. No. 25, an iron tree guard, invented, improved, and manufactured by the exhibiter. Nos. 26, an iron tree guard; 27, a wrought iron farmer's field gate and post; 28, a wrought iron field gate; the last three articles invented and manufactured by the exhibiter. No. 29, a length of strained wire fencing, improved and manufactured by the exhibiter. Nos. 30, 31 and 32, sheep folding hurdles, invented and manufactured by the exhibiter. Nos. 33, 34 and 35, sheep hurdles, invented and manufactured by the exhibiter. Nos. 36, 37 and 38, iron cattle hurdles, invented and manufactured by the exhibiter. Nos. 39, 40 and 41, iron ox hurdles, invented and manufactured by the exhibiter. Nos. 42, 43 and 44, lengths of a new description of running sheep fence, invented and manufactured by the exhibiter. Nos. 45, 46 and 47, lengths of a new description of running cattle fence, invented and manufactured by the exhibited. Nos. 48, 49 and 50, lengths of a new description of running ox fence, invented and manufactured by the exhibiter. No. 51, 52 and 53, lengths of a new description of running deer fence, invented and manufactured by the exhibiter. Nos. 54, 55 and 56, rabbit-proof iron hurdles, invented and manufactured by the exhibiter.

STAND No. 48.—Messrs. Robert Wedlake and Charles Thompson, of Hornchurch, near Romford.

Article No. 1 obtained a prize of 3 sovs.

Articles No. 1, a hay-making or tedding machine, invented by Robert Wedlake, of Horncurch, improved by Henry Hankinson, of Hornchurch, and manufactured by the exhibiters. No. 2, a thirteen-hoed iron-frame scarifier ; improved and manufactured by the exhibiters. No. 3 (new implement), an oil-cake breaker ; invented and manufactured by the exhibiters. No. 4, a turnip and manure drill presser ; 5, a broad-cast seed machiue, 8 ft. 6 in. long ; 6, a chaff cutter, to be driven by horse or steam power ; the last three articles improved and manufactured by the exhibiters. No. 7, a chaff cutter, or cane-top cutter ; 8, a chaff cutter ; 9, a scarifier, with three hoes ; 10 (new implement), a double-jointed iron-frame roller, invented by Robert Wedlake, of Hornchurch. No. 11, a barley hummeller ; 12, an iron turnip cutter ; the last six articles manufactured by the exhibiters. No. 13, a subsoil plough ; improved and manufactured by the exhibiters. No. 14, an earthing-up potato or mould plough ; 15, a foot plough ; both articles manufactured by the exhibiters. No. 16, a light two-wheel plough ; 17, a winnowing machine, with double motion, for corn and small seeds ; both articles improved and manufactured by the exhibiters.

STAND No. 49.—Messrs. Mapplebeck and Lowe, of Bull Ring, and Smithfield, Birmingham.

Article No. 60 was selected for trial.

Article No. 1 (new implement), a Fairbank's patent ten hundred-weight weighing machine ; improved and manufactured by W. and T. Avery, of Birmingham. No. 2, a ten hundred-weight weighing machine ; invented and manufactured by W. and T. Avery, of Birmingham. No. 3, a Fairbank's patent twelve hundred-weight weighing machine ; improved and manufactured by W. and T. Avery, of Birmingham. No. 4, a five hundred-weight weighing machine ; improved and manufactured by W. and T. Avery, of Birmingham. No. 5, a four hundred-weight weighing machine ; improved and manufactured by W. and T. Avery, of Birmingham. No. 6. a four hundred-weight weighing machine ; invented, improved, and manufactured by W. and T. Avery, of Birmingham. No. 7, a three hundred-weight weighing machine ; 8, a four hundred-weight weighing machine ; 9, 10, 11, three-hundred-weight weighing machines ; improved and manufactured by W. and T. Avery, of Birmingham. No. 12, a steel-yard, with frame for weighing sacks ; manufactured by W. and T. Avery, of Birmingham. No. 13 (new implement), a Fairbank's patent weighing machine, with apparatus for measuring the height of persons ; 14, a sugar mill ; both articles improved and manufactured by W. and T. Avery, of Birmingham. No. 15, a portable kibbling mill, on a cast-iron frame ; 16, a portable kibbling mill, on a wood frame ; 17, a portable bean-splitting mill, on a cast-iron frame ; 18, a portable bean mill, on a wood frame ; 19, a malt mill, with wheel and iron hopper ; 20, a knibbling mill, with wheel and iron hopper ; 21, a bean-splitting mill, with wheel and iron hopper ; 22, a bean-splitting mill to work by power ; 23, a kibbling mill to work by power ; the last nine articles improved and manufactured by W. H. Reynolds, of Birmingham. No. 24, an iron field roller ; 25, an iron field roller ; 26, a land presser, with an improved iron frame ; the last three articles improved and manufactured by the Coalbrookdale Company, Coalbrookdale. No. 27, an iron cattle crib, invented and manufactured by the Coalbrookdale Company, Coalbrookdale. No. 28, a Herefordshire cultivator, improved and manufactured by the Coalbrookdale Company, Coalbrookdale. No. 29, an iron sheep cratch on wheels ; 30, a two-horse power ; both articles invented and manufactured by the Coalbrookdale Company, Coalbrookdale. No. 31, a scutch rake, improved and manufactured by the Coalbrookdale Company, Coabrookdale. No. 32 (new implement), a cheese press ; invented and manufactured by the Coalbrookdale Company, Coalbrookdale. No. 33, a large iron wheelbarrow ; 34, a large iron wheelbarrow for manure ; both articles improved and manufactured by the Coalbrookdale Company, of Coalbrookdale. No. 35, an iron sack barrow ; invented and manufactured by the Coalbrookdale Company, of Coalbrookdale. No. 36, a cattle trough ; 37, a circular pig trough, with eight divisions ; 38, an iron pig trough ; 39, a set of iron stall posts and rails ; 40, a centre manger, three feet long ; 41, a centre hay-rack, three feet long ; the last six articles manufactured by the Coalbrookdale Company, of Coalbrookdale. No. 42, a cast-iron manure pump ; 43, a garden pump on frame ; both articles invented and manufactured by the Coalbrookdale Company, of Coalbrookdale. No. 44, a garden roller ; 45, a wrought-iron field gate ; both articles manufactured by the Coalbrookdale Company, Coalbrookdale. No. 46, a set of eight improved iron rick stands ; invented and manufactured by the Coalbrookdale Company, of Coalbrookdale. No. 47, a wrought-iron stable bucket ; 48, a two-knife chaff engine, invented by Passmore ; both articles manufactured by the Coalbrookdale Company, Coalbrookdale. No. 49, a guillotine chaff engine, invented by Ward and Colbourne, of Stratford, and manufactured by the exhibiters. Nos. 50 and 51, improved two-knife chaff engines, improved and manufactured by the exhibiters. Nos. 52 and 53, patent chaff engines, invented by Charles May, of Ipswich, and manufactured by J. R. and A. Ransome, of Ipswich. No. 54 (new implement), a registered hand-seed dibbler ; invented and manufactured by Joseph Brookhouse, of Smethwick. No. 55, a Budding's patent mowing machine, for cutting lawns, grass plots, &c. ; invented by E. Budding, of Dursley, and manufactured by John Ferrabee, of Stroud. No. 56, a patent hand machine for scraping roads ; manufactured by Bourne and Harris, of Ilchester. No. 57, a turnip and manure drill ; 58, a patching turnip drill, both articles invented and manufactured by White, Leith and Co., of Worksop. No. 59, a wrought-iron double ridge plough ; improved and manufactured by the Coalbrookdale Company, of Coalbrookdale. No. 60, a new patent plough, or improved Rutland ; 61, a new patent plough ; both articles invented and manufactured by J. R. and A. Ransome, of Ipswich. No. 62, a new patent plough ; invented by J. R. and A. Ransome, of Ipswich ; improved by B. Millington, of Agarsby ; and manufactured by J. R. and A. Ransome, of Ipswich. Nos. 63 and 64, new patent ploughs ; invented and manufactured by J. R. and A. Ransome, of Ipswich. No. 65, a new patent plough ; invented by John Clarke, of Long Sutton ; improved and manufactured by J. R. and A. Ransome, of

Ipswich. No. 66, a new patent plough; invented by Sir Edward Stracey, of Rackheath; improved and manufactured by J. R. and A. Ransome, of Ipswich. No. 67, a set of patent iron trussed whipple-trees; invented and manufactured by J. R. and A. Ransome, of Ipswich. No. 68, a patent scarifier; invented and improved by Arthur Biddell, of Playford; manufactured by J. R. and A. Ransome, of Ipswich. No. 69 (new implement), a pair of registered garden shears; invented and manufactured by the Brades Company of Birmingham. No. 70, a wrought-iron garden seat for three persons; invented and manufactured by the Coalbrookdale Company of Coalbrookdale. No. 71, a garden engine; improved and manufactured by the exhibiters. No. 72, a screw waggon Jack; manufactured by the exhibiters. No. 73, a pair of 2½-inch cart arms; manufactured by J. T. and C. W. Hill, of Birmingham. No. 74, a pair of cart springs; manufactured by the exhibiters. No. 75, a warranted black staple vice; manufactured by J. T. and C. W. Hill, of Birmingham. No. 76, a warranted anvil; manufactured by J. T. and C. W. Hill, of Birmingham. No. 77, a harness-room stove; invented and manufactured by the Coalbrookdale Company, of Coalbrookdale. Nos. 78, and 79, sets of hames; manufactured by the exhibiters. No. 80, a cattle gauge; invented by Chesterman, of Sheffield, and manufactured by J. P. Cutts, Sheffield. No. 81, a seed dibble; invented and manufactured by Richard Smith, Upper Hall, Droitwich. Nos. 82, and 83, rustic garden chairs, with arms; manufactured by Jeffs, of Derby. No. 84, a garden stool; manufactured by the exhibiters. No. 85, a stand of models. No. 86, boxes, baskets, &c., containing parts of machinery, tools, shares, boards, &c., &c.,

STAND No. 50.—Mr. William Henry Vingo, of Penzance.

The following article obtained a prize of 10 sovs.

Article No. 1, a patent seed-depositing or planting machine; invented, improved, and manufactured by the exhibiter.

STAND No. 51.—Mr. John Howard, of Bedford.

Article No. 1 was selected for trial.

Articles Nos. 1, 2, 3, 4, 5, and 6, patent iron ploughs, with two wheels; 7, a patent iron swing plough; 8, and 9, patent ploughs with two wheels; 10, a patent plough with a sliding foot; the whole of these ploughs invented and manufactured by Howard and Co., of Bedford. No. 11, a set of patent four-beam iron harrows, invented by W. Armstrong and exhibiter; and manufactured by Howard and Co., of Bedford. Nos. 12, 13, and 14, sets of patent four-beam iron harrows, invented and manufactured by Howard and Co., of Bedford. No. 15, a set of patent iron harrows; 16, a set of patent two-beam iron harrows; 17, a pair of patent drag harrows; 18, a set of patent iron harrows; 19, a cultivator or scarifier; the last five articles invented and manufactured by Howard and Co., of Bedford.

STAND No. 52.—Mr. Andrew Gower, of Market Drayton.

Articles No. 1, a corn and seed drilling machine; invented by the late Mr. Smyth, of Peasenhall, Suffolk; improved by Mr. A. W. Gower, of Hook, near Hartford-bridge, Hants, and manufactured by the exhibiter. No. 2, a turnip and manure drilling machine, for ridge work; invented and manufactured by the exhibiter.

STAND No. 53.—Mr. Wm. C. Cambridge, of Market Lavington, near Devizes, Wilts.

Article No. 1 obtained a prize of 5 sovs.

Articles No. 1 (new implement), a four-horse portable steam engine, complete with shafts and wheels for travelling; invented, improved, and manufactured by the exhibiter. No. 2 (new implement), a double-action chaff-cutter, with a single knife (patent); invented and manufactured by the exhibiter. No. 3, a thrashing machine (patent); 4, a patent 5ft. 6in. single-shaft press-wheel roller or clod-crusher; 5, a patent eight-feet double-shaft press-wheel roller or clod-crusher; these three articles invented, improved, and manufactured by the exhibiter. No. 6, a patent four-horse portable thrashing machine; 7 (new implement), a patent hand-lever thrashing machine, mounted on wheels and shafts complete for travelling; 8 (new implement), a patent hand-lever thrashing machine; 9 (new implement), a two-horse fixed or portable thrashing machine (patent); 10 (new implement), a hand-lever or two horse thrashing machine; the last five articles invented and manufactured by the exhibiter.

STAND No. 54.—Mr. J. Bailey Denton, of Gray's Inn, London.

Articles No. 1 (new implement), a drain pipe and tile machine; invented and patented by John Henry Charnock, of Wakefield, and the exhibiter, and manufactured by Messrs. Bradley and Co., of Wakefield. No. 2, same as art. No. 1, converted into a turnip cutter, invented by John Henry Charnock, of Wakefield, and the exhibiter, and manufactured by Messrs. Bradley and Co., of Wakefield. No. 3, a draining workman's level; invented by the exhibiter, and made by Messrs. Jones, opticians, of Holborn.

STAND No. 55.—Mr. John Elliott (Architect), of Chichester.

Articles No. 1, a chaff-cutter, worked by one or two men; 2 (new implement), a reaping or mowing machine, worked by a horse or two men; both articles invented by the exhibiter.

STAND No. 56.—Mr. Arthur Evans, of the Pheasant Farm, near Welshpool.

Article No. 1 (new implement), a two-horse plough, with or without wheels, adapted for heavy land; invented by the exhibiter, and manufactured by George Dudley, of Pool Quay.

STAND 57.—Edward Holland, of Dumbleton, Evesham.

Article No. 1 (new implement), a single-horse cart for a hill farm; invented and manufactured by Robert Staunton, of Dumbleton, near Evesham.

STAND No. 58.—Mr. John Cartwright, of Shrewsbury.

Article No. 1 (new implement), an improved lever corn-drill with twelve spouts; improved and manufactured by the exhibiter. No. 2 (new implement), a clod crusher roller; invented and manufactured by the exhibiter. No. 3, a four-horse power fixture thrashing machine; improved and manufactured by the exhibiter. No. 4, a three-horse power portable thrashing machine; manufactured by the exhibiter. Nos. 5, a two-horse power motion, with kibbling mill, straw cutter, and oat crusher; 6, a winnowing machine; both articles improved and manufactured by the exhibiter. Nos. 7 and 8, straw cutters; manufactured by the exhibiter. Nos. 9, a clover seed drill; 10, a crushing mill for oats, barley, &c.; both articles improved and manufactured by the exhibiter. Nos. 11, 12, and 13, cast-iron land rollers, with frames complete; manufactured by the exhibiter. Nos. 14, a lever cheese press; 15, a sugar mill; 16, a cider mill; 17, 18 and 19, turnip slicers; 20 and 21, hand kibbling mills; 22 and 23, hand bean mills; 24 and 25, single iron ploughs; 26, a single wood plough; 27, a double iron plough; 28, an iron ridge plough; 29, a turnip and manure drill; 30, a gorse crusher; 31, a straw cutter; all manufactured by the exhibiter.

STAND No. 59—Mr. Alexander Dean, of Birmingham.

Articles Nos. 1 and 12 obtained prizes of 10 sovs. each.

Articles No. 1, a portable steam engine of four-horse power, on wheels, with shafts, &c., complete for travelling; 2, a steam engine of six-horse-power, stationary; both articles invented, improved, and manufactured by the exhibiter. No. 3, a horse engine, or horse work, for one or two horses; 4, a thrashing machine, adapted to the power of six horses, and to steam engines of about four-horse power; both articles improved and manufactured by the exhibiter. No. 5, a new bolting thrashing machine (registered by act of Parliament) of four horse power; 6, a newly-invented thrashing machine of two-horse power; both articles invented and manufactured by the exhibiter. No. 7, a chaff cutter upon strong iron frame, suitable for one or two men, or for steam or horse power. No. 8, a chaff cutter upon strong iron frame, to be worked by hand; 9, a machine for crushing and breaking oilcake; both articles improved and manufactured by the exhibiter. No. 10, a very powerful machine for crushing barley, linseed, oats, beans, &c., and for rolling malt; invented and manufactured by the exhibiter. No. 11, a corn crusher for crushing oats, beans, malt, &c.; 12, a machine for crushing linseed, rape, and other seeds of an oily nature; 13, a hand flour mill, with french burr-stones, and patent dressing machine attached; the last three articles improved and manufactured by the exhibiter. No. 14, a portable corn mill, with french burr and grey-stones; 15, a portable circular-saw bench; 16, a patent liquid manure cart; 17, a patent fire engine; the last four articles invented and manufactured by the exhibiter.

STAND, No. 60.—Mr. Richard Garrett, of Leiston Works, near Saxmundham.

Article No. 5 was selected for trial.

Articles No. 1, a stand of models; manufactured by Richard Garrett and Son, Leiston Works. No. 2, a drill for general purposes; 3, a twelve-row lever drill, for all purposes of seed and corn; both articles improved by the exhibiter, and manufactured by Richard Garrett and Son, Leiston Works. No. 4, a drill for turnips. mangold-wurtzel, and other seeds with manure; invented and improved by the exhibiter, and manufactured by Richard Garrett and Son, of Leiston Works. No. 5, a two-row lever ridge drill, for turnips, &c., and manure; invented by the exhibiter, and manufactured by Richard Garrett and Son, Leiston Works. No. 6, an eleven-row lever drill for all purposes of corn; improven by the exhibiter, and manufactured by Richard Garrett and Son, Leiston Works. No. 7, a patent horse hoe; 8, a four-horse-power thrashing machine; both articles invented by the exhibiter, and manufactured by Richard Garrett and Son, Leiston Works. No. 9, a bolting thrashing machine; improved by the exhibiter, and manufactured by Richard Garrett and Son, of Leiston Works. No. 10, a patent sub-pulverizer plough; invented by John Reid, of London, and manufactured, by license, by Richard Garrett and Son, of Leiston Works. No. 11, a patent chaff-cutter; 12, a patent hand chaff cutter; both articles invented by the exhibiter, and manufactured by Richard Garret and Son, of Leiston Works. No. 13, a chaff-cutting engine; 14, and 15, rape and linseed-cake crushers; 15, a linseed-cake crusher; 17, a bean, pea, malt, and barley crusher, for horse power; 18, a bean, pea, malt, and barley crusher, for hand labour; 19, a patent lever drag rake; the last seven articles improved by the exhibiter, and manufactured by Richard Garrett and Son, of Leiston works. No. 20 (new implement), a tile-making machine (patent); invented by Richard Weller, of Caple, near Dorking, and manufactured by Richard Garrett and Son, of Leiston Works. No. 21, a corn-dressing machine; 22, a barley aveler or hummelling machine; both articles improved and manufactured by Richard Garrett and Son, of Leiston Works. No. 23, a patent rought-iron corn-rick stand, sixteen yards in circumference; invented by J. Springhall, of Ipswich, and manufactured by Richard Garrett and Son, of Leiston Works. No. 24, a patent clod crusher; improved by the exhibiter; and manufactured by Richard Garrett and Son, Leiston Works.

STAND No. 61.—Mr. Joseph Cook Grant, of Stamford.

Articles Nos. 1, a Grant's patent lever horse rake, for hay, corn, stubble, couch, or twitch, &c., &c.; 2, a Grant's patent lever pony rake; 3, a Grant's patent lever pony or hand rake; 4, a Grant's patent lever hand rake; all invented, improved, and manufactured by the exhibiter. No. 5, a Grant's improved haymaking machine; 6, a Grant's patent steerage lever horse hoe; both articles improved, and manufactured by the exhibiter. No. 7, a pair of Grant's patent self-cleansing lever harrows; 8, a Grant's new improved "G S" iron plough; 9, a Grant's improved Lincolnshire wood plough; 10, a Grant's new improved paring plough; 11, a Grant's seed and garden drill; the last five articles invented and manufactured by the exhibiter. No. 12, a Grant's seed and manure drill; invented, improved, and manufactured by the exhibiter. No. 13, a Grant's improved turnip and manure drill; improved and manufactured by the exhibiter. No. 14, an improved horse hoe, with moulding plough; 15, an improved chaff machine; 16, a stand of models; the last three articles invented and manufactured by the exhibiter.

STAND No. 62.—Mr. Henry Lowcock, of Westerland, Marldon, Paington.

Article No. 1 obtained a prize of 5 sovs.

Articles No. 1, a patent one-way plough, with Ransome's patent trussed iron beams; invented by the exhibiter, and improved by him, in the details of form of mould-boards and head-draught; and manufactured by J. R. and A. Ransome, of Ipswich. No. 2, a patent one-way plough, with beam of wood, plated with Iron; invented by the exhibiter, and improved by him, in the details of mould-board and head-draught; and manufactured by Robert Adams, of Marldon, Devon.

STAND No. 63.—Mr. William H. Roberts, of 10, Above-Bar, Southampton.

Article No. 1 (new implement), an economical machine for making drain-tiles, pipes, &c.; invented and manufactured by the exhibiter.

STAND No. 64.—Mr. Charles Montague, of Gloucester.

Articles No. 1, an improved horse power, for working agricultural machines; invented by the exhibiter, and manufactured by William Montague, of Gloucester. No. 2, an improved chaff cutter, with 14-inch mouth-piece; invented by the exhibiter, and manufactured by William Montague, of Gloucester (registered April 14th, 1845). Nos. 3 and 4, improved chaff cutters, with 11-inch mouth-pieces; invented and improved by the exhibiter, and manufactured by William Montague, of Gloucester (registered April 14th, 1845). No. 5, an improved chaff cutter, with 9-inch mouth-piece; invented and improved by the exhibiter, and manufactured by William Montague, of Gloucester (registered April 14th, 1845).

STAND No. 65.—Mr. William Morton, of Donnington, near Newport.

Articles Nos. 1 (new implement), a Scotch cart; 2 (new implement), a harvest cart; 3 (new implement), a two-wheel swing plough; 4 (new implement), a double furrow plough; all improved and manufactured by the exhibiter. No. 5 (new implement), a potato or couch plough; invented and manufactured by the exhibiter.

STAND No. 66.—Mr. Zachariah Parkes, of Birmingham.

Articles Nos. 1 and 2, mills invented and manufactured by the exhibiter. No. 3, a bean mill, invented, improved, and manufactured by the exhibiter. No. 4, a patent domestic hand flour mill, invented and manufactured by the exhibiter (patentee).

STAND No. 67.—Mr. James Richmond, of Salford, Manchester.

Articles Nos. 3 and 15 obtained prizes of 5 sovs. each.; and No. 14 obtained the silver medal.

Articles Nos. 1, an improved steaming apparatus for roots, &c.; 2, an improved steaming apparatus for roots, &c.; 3 (new implement), an improved portable steaming apparatus for roots, &c., invented, improved, and manufactured by the exhibiter. No. 4, a chaff engine, invented, improved, and manufactured by the exhibiter. No. 5, an improved chaff engine; 6, a registered chaff machine; 7, a registered chaff machine; 8, an improved mill for kibbling beans, oats, &c.; 9, an improved mill for kibbling beans, oats, &c.; 10, an improved mill for bruising linseed; 11, an improved mill for bruising linseed; 12, an improved mill for kibbling oats, beans, &c.; 13, an improved mill for bruising oats, malt, &c.; 14, an improved machine for washing vegetables; 15, an improved churn; 16, an improved double churn; 17, a machine for slicing turnips; all invented, improved, and manufactured by the exhibiter. No. 18 (new implement), a patent manure and seed plough: invented by George Browne, of Capesthorne, and manufactured by the exhibiter.

STAND No. 68.—Messrs. Charles Phillips and Co., of Bristol.

Article No. 1 obtained a prize of 5 sovs.

Article No. 1, a turnip-cutting machine, invented by Charles Phillips, of Bristol; improved and manufactured by the exhibiters. Nos. 2 (new implements), a turnip-cutting machine, invented by Charles Phillips, of Bristol; 3 (new implement), a turnip-cutting machine, invented by Charles Phillips, of Bristol; both articles manufactured by the exhibiters.

STAND No. 69.—Messrs. Sanders, Williams, and Taylor, of Bedford.

Article No. 1 was selected for trial, and No. 4 obtained a prize of 5 sovs.

Articles No. 1, a patent wrought iron plough, with two wheels and improved patent coulter; 2, a patent wrought iron plough, with two wheels and patent coulter; both articles invented and manufactured by the exhibiters. No. 3, a set of patent diagonal iron harrows; 4, a set of strong iron harrows, as above, for three horses; 5, a set of light seed harrows, as above, for one horse; 6, a patent horse ruge; 7 (new implement), a new two-knife chaff machine; the last five articles invented by Samuel Taylor, of Cotton End, Bedford, and manufactured by the exhibiters.

STAND No. 70.—Mr. Thomas Scragg, of Calveley, near Tarporley, Chester.

The following article was selected for trial.

Article No. 1 (new implement), a machine for making draining tiles and pipes for agricultural purposes; invented by the exhibiter, and manufactured by James Hewett, of Calveley.

STAND No. 71.—Messrs. H. Smith & Co., of Stamford.

Articles No. 1 (new implement), a patent chaff engine; 2 (new implement), a patent chaff engine; 3 (new implement), a patent chaff engine; 4 (new implement), a patent balance lever horse rake; 5 (new implement), a patent lever wheel hand rake; all invented and manufactured by the exhibiters.

STAND No. 72.—Mr. Richard Smith, of Upper Hall, Hampton Lovett, Droitwich.

Article No. 1 (new implement), a drain tile and brick machine, the artillery tile engine; invented and manufactured by the exhibiter.

STAND No. 73.—Mr. James Smyth, of Peasenhall, near Yoxford, Suffolk.

Article No. 1 was selected for trial.

Articles No. 1, a patent ridge or broad work, turnip or mangel wurzel, seed, and manure drill; 2, a patent nine coulter corn drill; 3, a patent ten coulter lever corn drill; all invented, improved, and manufactured by the exhibiter. No. 4, a patent twelve coulter corn, seed, and manure drill, for general purposes; invented by the exhibiter, and improved and manufactured by James Smyth, jun., of Peasenhall, in Suffolk. No. 5, a patent thirteen coulter lever corn drill; 6, a patent fourteen coulter lever corn drill; 7, a patent fourteen coulter lever corn and seed drill; 8, a patent fifteen coulter lever corn drill; 9, a patent two-rowed drop drill; 10, a clover or rye-grass seed barrow; the last six articles invented, improved, and manufactured by the exhibiter.

STAND No. 74.—Mr. James Spencer, of Hopton, near Worksworth.

Article No. 1 obtained a prize of 5 sovs.

Articles No. 1, a large chaff cutter, for one or two men, and for horse or engine power; 2, a smaller sized chaff cutter; 3, an oat and bean crusher; all improved and manufactured by the exhibiter.

STAND No. 75.—Mr. John Twist, of Bridgetown, near Stratford-on-Avon, Warwickshire.

Articles No. 1, a registered skim or paring plough; 2 (new implement), a scarifier; 3, an iron plough; all invented and manufactured by the exhibiter.

STAND No. 76.—Mr. William Wood, of Knutsford, Cheshire.

Article No. 1 was selected for trial.

Articles No. 1, 2, and 3, wrought iron swing ploughs; all invented and manufactured by the exhibiter. No. 4, a pair of harrows; 5, a pig trough; 6, a double or drill plough, for ridges; 7, a parallel horse hoe; 8, a horse hoe; the last five articles invented and manufactured by the exhibiter. No. 9, a horse hoe; invented by Thomas Wood, of Knutsford, and manufactured by the exhibiter. No. 10, an apparatus for churning; 11, a churn; 12 (new implement), a wrought iron cultivator or scarifier; 13, a wrought iron cultivator or scarifier; 14, a pair of round harrows; 15, a subsoil plough; 16, a lever cheese press; 17 (new implement), a milk gauge; the last eight articles invented and manufactured by the exhibiter.

STAND No. 77.—Mr. Joseph Wragg, of Derby.

Article No. 1 (new implement), a plough; invented by the exhibiter, and manufactured by George Ford, of Derby.

STAND No. 78.—John Wright, of Chipping Ongar, Essex,

Article No. 1, a stack preserver; invented, improved, and manufactured by the exhibiter. No 2, a fruit gatherer; invented and manufactured by Thomas Dray, of 86, Chiswell-street. No. 3, a chaff cutter; invented and manufactured by the exhibiter. No. 4 (new implement), an apparatus for steaming roots for cattle; invented by David wright, of Chipping Ongar, and manufactured by the exhibiter. No. 5, an apparatus for steaming roots for cattle; invented and manufactured by the exhibiter. No. 6 (new implement), a sheep folding hurdle; invented by David Wright, of Chipping Ongar, and manufactured by the exhibiter. No. 7, a small iron garden and lawn seat; invented and manufactured by J. Kenrick and Sons, of West Bromwich. No 8, an improved patent mangle; invented by Mr. Joy, of Norwich, and manufactured by Andrew Smith, of Derby. No. 9, a self-acting machine for roasting coffee; invented and manufactured by George Orpwood, of 82, Bishopsgate-street.

STAND No. 79.—Mr. Wm. Ford, of Fulham, near London.

Article No. 1 (new implement), a machine for making tiles of any form, pipe, and pipe tiles, with mould for making socket pipes; invented by the exhibiter, and manufactured by Messrs. Simpson and Co., engineers, of Belgrave-road, Pimlico, London.

STAND No. 80.—Mr. H. G. James, of 44, Fish-street Hill, London.

Article No. 2 obtained a prize of 10 sovs.

Article No. 1 (new implement), a machine for weighing loaded carts, live cattle, and farm produce generally; invented and manufactured by the exhibiter. No. 2, a machine for weighing live cattle and farm produce generally; invented by Monsieur George, of Paris, and manufactured by the exhibiter. No. 3, a machine for weighing sacks, invented and manufactured by the exhibiter. No. 4 (new implement), a patent apparatus for preserving fruits without the aid of sugar, or any other ingredient; invented and manufactured by J. Cooper, of London. No. 5 (new implement), a safety stable lantern; invented and manufactured by the exhibiter. No. 6, specimens of James's artificial and chemical guano manures; manufactured by James and Co., 44, Fish-street Hill, London.

STAND No. 81.—John Read, of 35, Regent's Circus, Piccadilly, London.

Article No. 3, obtained a prize of 10 sovs.; and No. 6 a prize of 5 sovs.

Article No. 1, a new patent turnwrest plough; 2, a patent subsoil pulverizer, with wood beam and handles: both articles invented and manufactured by the exhibiter. No. 3, a subsoil pulverizer, with iron beam and handles; invented by the exhibiter; improved by Benjamin Stratton, of Bristol, and manufactured by Richard Stratton of Bristol. No. 4, a new patent scarifier, on wheels, nine tines; 5, a new patent scarifier on wheels, five tines, mole, and broad share; 6, a new patent double action fire engine; 7, a patent single action fire and garden engine; 8, sundry small implements for the relief of cattle: the last five articles invented and manufactured by the exhibiter. No. 9, a Read's patent subpulverizer; 10, a Read's patent subpulverizer, fitted with surface pulverizing tines: both articles invented by the exhibiter, and manufactured under licence by Richard Stratton, of Bristol.

STAND No. 82.—Mr. George Cornes, Wheelwright, of Weltenhall, parish of Overton, Winsford.

Article No. 1 (new implement), a drain plough, to prepare the drains for tiles, at one lift, one or two feet deep; invented, improved, and manufactured by the exhibiter.

STAND No. 83.—Messrs. William Stace and Philip Vallance, of Berwick, near Lewes.

Article No. 1 (new implement), an apparatus for drawing and working ploughs and other agricultural implements by wind; invented and manufactured by the exhibiters.

STAND No. 84.—Thomas Gibbs and Co., the Seedsmen, by Appointment, to the "Royal Agricultural Society of England; and to the Honourable Board of Agriculture of England and Sweden, corner of Half-Moon street, Piccadilly, London.

GRASS SEEDS.—Agrostis stolonifera, agrostis capillaris, agrostis alba, agrostis spica venti, aira canescens, aira cœspitosa lutescens, aira flexuosa, alopecurus agrestis, alopecurus nigricans, alopecurus geniculatus, alopecurus pratensis, arundo arenaria, anthoxanthum odoratum, bromus pratensis, bromus arvensis, bromus mollis, bromus distachyos, bromus pennatus, bromus rubens, briza media, cynosurus cristatus, dactylis glomerata, festuca fluitans, festuca tenuifolia, festuca ovina, festuca heterophylla, festuca elatior, festuca sylvatica, festuca rubra, festuca loliacea, holcus avenaceus, lolium multiflorum, lolium multiflorum submutica, lolium Bretagne, lolium arvense, lolium temulentum, lolium perenne var, lolium Italicum, mellium effusum, melica ciliata, melica altissima, molina cœrulea, panicum Germanicum, panicum meliaceum rubrum, panicum Italicum, panicum meliaceum glauce, panicum meliaceum album, panicum meliaceum nigrum, poa aquatica, poa distans, poa compressa, poa flexuosa, poa annua, poa nemoralis, poa nervata, poa fertilis, poa pratensis, poa trivialis, madia sativa, bunias orientalis, lotus corniculatus major, lotus corniculatus minor, ervum monanthos, melelotus officinalis, specimens of the plant and seed of the tussac grass from the Faulkland Islands.

TURNIPS.—Gibbs's fine purple-top Swedish turnip, combining small top and beauty of form; Gibbs's fine green-top Swedish turnip; Gibbs's large green-top yellow hybrid turnip, a useful turnip to sow after Swedes; Gibbs's large red-top yellow hybrid turnip, do. do.; green globe turnip; white globe do.; red do. do.; green tankard turnip; white do.; red do.; early stubble do.

MANGOLD WURZELS.—Long red mangold wurzels, producing heavy crops; yellow globe do., highly approved for shallow ends; red globe do. do. do.; long yellow do.

CARROTS.—Large white Flemish carrot, producing extraordinary crops; large Belgium do.; Altringham carrot; early horn carrot; long orange carrot.

WHEATS.—Flander's wheat, Hunter's wheat, Belle-Vue Talavera wheat, white Hungarian wheat, Hickling's wheat, Touselle wheat, Fellemburgh wheat, Picton wheat, Paris winter wheat, Cressy wheat, common March wheat, Saumur wheat, Chili wheat, Tunstall wheat, Odessa wheat, Indian wheat, Chinese wheat, Naples white Richell wheat, Whittington wheat, Grant's wheat, Massalarge wheat, Marianople wheat, red March wheat, golden drop wheat, early striped chaff wheat, Lammas wheat, red Mancha wheat, blood-red wheat, red Provence Tonselle wheat, red Caucasian wheat, Sicilian wheat, Cretan wheat.

Miscellaneous.—Sainfoin, red clover, white clover, trefoil, chicory, burnet, spurry, rib grass, astragalus bœticus; trifolium hybridum, or alsike; trifolium medium, trifolium repens, medicago sativa, achellea mellifolium, trifolum filliformis, Gibbs's large drum-head cattle cabbage, large green kohl rabi, large purple kohl rabi, rape or cole-seed; a collection of field and kitchen peas and beans; a general assortment of of agricultural seeds; dried specimens of grass, clover, wheat, oats, barley, rye, beans, peas, &c., &c.

Stand No. 85.—Thomas Taylor, of Banbury.

Articles Nos. 1, a patent inflated saddle; 2, a patent saddle, with moveable pannel; both articles invented and manufactured by the exhibiter. No. 3, a registered bit for riding and driving bridles; invented by the exhibiter.

Stand No. 86.—Mr. George Bruce, Liverpool.

Articles Nos. 1, a specimen of black japan varnish; 2, a specimen of blue varnish; 3, a specimen of red varnish; 4, a specimen of green varnish; all invented by the exhibiter.

Stand No. 87.—Mr. Freeman Roe, of 70, Strand, London.

Articles Nos. 1, an improved hydraulic ram, for raising water without labour, invented by Mongolfier, of France; 2, a new pump, invented by Harrison and Manning, of Ashford; both articles improved and manufactured by the exhibiter. No. 3, a glass pipe; invented by the exhibiter. No. 4, an hydraulic cylinder for purifying water; invented and manufactured by Mr. Truman, of Brompton. No. 5, a liquid manure pump; invented and manufactured by the exhibiter.

Stand No. 88.—Messrs. Edward and John Davis, of Shrewsbury and Derby.

Articles, Nos. 1, a water level for agricultural purposes; 2, a spirit level for agricultural purposes; both articles improved and manufactured by the exhibiters.

Stand No. 89.—George Gibbs, and Co., Seedsmen, &c., to the Agricultural Society of Belgium, &c., 26, Down-street, Piccadilly, near Hyde Park Corner.

Alsike hybrid clover; a valuable variety both for hay and feeding. It is a lasting plant, and is found spontaneous in the meadows and grass lands of Sweden. South American clover, dwarf perennial red clover of the meadows, Flemish white clover, English white clover, trifolium minus, trifolium incarnatum. Samples of the most approved permanent grass seeds. A collection of dried specimens of British and other grasses, specifying the sorts adapted to various soils, &c. Samples of the mixtures of grass seeds, as they are prepared for various soils, &c. Tussac grass seed; the plant is a native of the Falkland Islands. Italian rye grass, evergreen perennial rye grass, spurry (used in Flanders for autumn feeding on stubble), chicory, burnett (very useful in mixtures for sheep feeding on thin surface soils), sainfoin, lucerne, sheep's parsley, white mustard, camelina sativa (oil plant), furze or gorse (French and English), broom, Ashcroft's large Swedish turnip (an excellent and nutritive variety; it is a heavy cropper, and stores well; it will bear sowing later than most other Swedes), Skirving's Swede, Laing's new Swede, Matson's purple-top Swede, Pain's hardy green crown Swede turnip seed, true purple-top seed, G. Gibbs's green crown hybrid yellow turnip, G. Gibbs's purple crown ditto, Dale's hybrid ditto, Scotch yellow bullock ditto, yellow Tankard or Tankard Swede turnip, Tankard turnips (white, red, and green), globe or improved common turnips (white, red, and green), early stone or stubble turnip, Kohl Rabi or Hungarian purple turnip (all stock relish this root; it is feeding and is very hardy; it may be sown in March, and transplanted like a cabbage plant; or it may be sown in drills the end of April or beginning of May, and treated like Swedes), dwarf rape or cole seed, thousand-head cabbage (should be sown in March; it is very useful for ewes and lambs in severe winters), large white Belgium carrot, pale yellow ditto, large Altringham ditto, long Surrey or orange ditto, large Jersey parsnip, long red mangold wurzel, orange, yellow, and red globe ditto, long white or sugar beet ditto.

Wheats.—Le Couteur's Belle Vue Talavera, Russell white (an excellent variety), chidum white, Eley's gigantic, chevalier white, Australian white (a very neat and heavy grain), Mr. Fisher Hobb's red marygold, red cluster, red burwell. A collection of wheats in ear and straw.

Barley.—Potter's prolific, Providence, Annat, Legborn, Moldavian, skinless, winter, &c.

Oats.—Scotch potato, Hopetoun, Tartarian, winter.

Stand No. 90.—Mr. Edward J. Lance, of Frimley, near Bagshot.

Articles No. 1, a hand-seed machine for one row of turnips or small seed; invented by Mr. J. Bennet, of Farnham; improved and manufactured by the exhibiter. No. 2, a hand-seed drilling machine, for using pulverized humus, or other manures, at the same time with the seed; invented and manufactured by the exhibiter. No. 3, a collection of agricultural soils, arranged geologically by the exhibiter. No. 4, a geological map of England and Wales; invented by J. A. Knipe, of Eccleston-street, London. No. 5, specimens of geological formations, sites of agricultural meetings; arranged by the exhibiter. No. 6, specimens of Lance's granulated manures; invented by the exhibiter, and manufactured by Mr. W. Redgrave, of London. No. 7, specimens of diseased corn. No. 8, specimens of corn, the effects of manure and labour; grown by the exhibiter. No. 9, the bane and the antidote of English farming. No. 10, agricultural books of exhibiter's own writing.

Stand No. 91.—Jabez Hare and Joshua B. Hyde, of 10, Nelson-square, Southwark, and 19, Cecil-street, Strand.

Article No. 1 (new implement), a working model of a machine for cutting heavy drains, &c., called the "English Excavator;" invented by William J. Olis, of Massachusetts, U.S., improved and manufactured by J. R. and A. Ransome, of Ipswich.

Stand No. 92.—Mr. W. D. Jones (saddler), of 5, High-street, Shrewsbury.

Articles Nos. 1 (new implement), an improved shot-belt; 2 (new implement), an improved game carrier; 3 (new implement), an improved spring starter or slips for a retriever dog; all improved and manufactured by the exhibiter.

BROMSGROVE FARMERS' CLUB.

The lecture which was to have begun at one o'clock did not commence till nearly two, when G. F. Iddins, Esq., of the Woodrow, was called to the chair, on the motion of the Rev. H. Aldham, seconded by Mr. Joseph Russon. There were then some sixty or eighty persons present in the large room of the Town-hall, among whom we noticed the Revs. H. Aldham and T. Houseman, James Sanders, Esq., and Messrs. John Penn, Joseph Wright, William Lilley, John Holmes, Joseph Cresswell, John Cresswell, Thomas Saunders, B. Maund, James Haywood, H. W. Baker, Joseph Russon, George Horton, William Harris (Fairfield), William Harris (Stoke), W. Parkes (Howrings), Thomas Durham, R. Heynes, John Robinson, Joseph Jones, and Messrs. H. F. Fardon and B. Taylor, jun., the secretaries of the Institution. The gentleman engaged to address the meeting was A. Gyde, Esq., agricultural chemist, of Painswick, Gloucestershire, and the subject chosen was the important one of manures.

The lecturer commenced by adverting to the importance of the subject to the practical farmer, as being the only means he had of so improving his soil as to produce crops sufficiently large to enable him to compete with foreign markets; and how effectually this might be done would be apparent from a statement of Mr. Pusey's, that if every acre of ground under cultivation in the United Kingdom produced only one bushel additional of wheat, reckoning its value at 50s. a quarter, the gross result would be 1,200,000*l*. He said that of course he could only advert to a few of the principal manures, and observed that their application much depended on the nature of the crops for which they were required; for though all plants were composed of the same constituents, yet these existed in very different proportions; therefore the manures applied must also be different. The component parts of plants might be divided in the first instance into two classes, the organic and the inorganic, the latter of which might be separated from the former by the influence of heat; and he exhibited a mass of inorganic matter which resulted from the burning of a rick of hay. After burning a thousand pounds of hay, it was found that a much greater amount of inorganic matter was left, than after burning the same quantity of turnips, &c., as would be seen by the following table—

Inorganic matter yielded by 1,000 lbs. of

	lbs.		lbs.
Meadow hay	60	to	100
Clover hay			90
Potatoes	8	to	10
Turnips	8	to	10
	Grain.		Straw.
Wheat	22		50
Barley	20		50
Oats	35		50
Peas	28		50

Elm, 19 lbs.; poplar, 20 lbs.; beech, 4 lbs.; birch, 3½ lbs.; pine, 3 lbs.; oak, 2 lbs.

The remainder, when subjected to chemical analysis, was found to be composed of eight different substances in different quantities, and these determined the nature of the manures necessary to be applied to them. All plants required oxygen, nitrogen, ammonia, and carbon, to maintain their existence. The two first they obtained from the air, the nitrogen and ammonia in a state of solution from the soil, and the carbon partly from decayed animal substances in the soil, and partly from the air; so that they would see that the soil was not only a bed for their roots to strike into, and from which they might grow, but it ought also to be a great magazine of food for them. The soil when first broken up was generally fertile, but when cultivated for a considerable time without being renewed by manures it lost its fertility. The following table would show the constituent ingredients of a soil that was fertile without manure, another which required manure to render it fertile, and of a third which was quite barren and would produce nothing:—

Composition of Soils.	Fertile without Manure.	Fertile with Manure.	Barren.
Organic matter	97	50	40
Silica	648	833	778
Alumina	57	51	91
Lime	59	18	4
Magnesia	8½	8	1
Oxide of iron	61	30	81
Ditto of manganese	1	3	0½
Potash and soda	6	trace.	—
Chlorine	2	—	—
Sulphuric acid.	2	0¾	—
Phosphoric acid.	4½	1¾	—
Carbonic acid	40	4½	—
Loss	14	—	4½
	1000	1000	1000

The principal part of the land in England was in the condition of the second kind, which required manure to render it fertile, though some alluvial soil by the banks of rivers was in the condition of the first. The next table would show them the way in which the soil was exhausted by a four years' rotation of crops, namely, turnips, barley, red clover, and wheat.

Crops—inorganic matter carried off in a four years' rotation of

	Turnips (Roots).	Barley, Grain or Straw.	Red Clover & Rye Grass.	Wheat, Grain and Straw.	Total.
Potash	145.5	10.1	73.5	3.9	233.0
Soda	64.3	6.9	21.0	4.4	96.6
Lime	45.8	15.0	79.5	8.7	149.0
Magnesia	15.5	5.4	9.5	2.5	32.9
Alumina	2.2	3.9	1.1	3.1	10.3
Silica	23.6	113.6	70.0	92.0	299.2
Sulphuric acid	49.0	4.0	18.0	1.8	72.8
Phosphoric acid	22.4	7.9	15.6	5.6	51.5
Chlorine	14.5	1.9	8.1	1.1	25.6
					970.9

From this it was clear that if the ordinary crops so exhausted the soil, it was quite necessary that manure should be applied. First, he should allude to the operation of vegetable manures. These acted mechanically as well as chemically by opening the pores of the ground, and they were not used in this country so much as in others. In the United States they sowed clover seed, and when the plant was in blossom they ploughed it in for the purpose of manuring the ground for corn. In other parts they manured their vineyards with the cuttings of the vines, and in Scotland and Kent, where access was had to the sea shore, the land was much more valuable, because they could use the sea weed as a manure, as that contained a great proportion of fertilizing substances. Dry vegetable refuse, together with urine and animal secretions, formed that never failing source of fertility to the husbandman, farm-yard dung; and it was lamentable to see the little attention which was paid to its preparation and preservation. It was often allowed to remain for months exposed to the air and sun; and the ammonia, which to the farmer was as valuable as gold, was allowed to evaporate, or the winter rains washed it out, and it was seen running along the ditches of the farm; and the manure, when it came to be put on the soil, was little better than rotten straw. There was much discussion as to the way in which farm-yard dung ought to be applied, whether in the shape of long or half rotten dung, or in the shape of short or fully decayed dung. It was necessary, in order to determine that question, to know whether the effect was required to be immediate, or to extend over a long period. If the first, then short dung would be applied, and *vice versâ*. The benefits of rape dust, bran, and other articles of that description, were two-fold. They contained a great quantity of earthy matter, and also much nitrogenous matter and ammonia, but their results were seldom lasting. Soot, employed as a top dressing, was also beneficial in its effects. Salts of ammonia and gypsum, employed in the same way, were also of great use; they principally deepened the colour of the foliage and increased the weight of straw. One hundred weight of nitrate of soda applied to an acre of land, which was accustomed to produce 30½ bushels of wheat, produced 6 bushels in addition; but the additional weight of straw was very great, and the clear profit was 19s. 5½d. It was discovered, too, by Mr. Hyatt, of Painswick, that wheat grown on soil so manured contained more gluten then other sorts, and this was borne out by Dr. Daubeny and Professor Liebig; such wheat was therefore more nutritious, and would go further than the common sorts. Salts of ammonia had the same result; but he must caution them against mixing lime with it, as that caused the ammonia to be given off into the atmosphere. Common salt was also very useful along with dung; especially, he should imagine, it would be beneficial in this neighbourhood, but it was not required near the sea. With regard to animal manures, these contained more nitrogen and ammonia than vegetable ones. They were principally flesh, blood, bones, urine, and all sorts of animal secretions. Flesh and blood contained large quantities of ammonia, and bones were also a very efficient manure, as would be seen by the following chemical analysis:—

Composition of Bone.

Phosphate of lime	555
Ditto of magnesia	30
Carbonate of lime	48
Salts of soda	35
Gelatine	332
	1000

Here it would be seen that phosphate of lime, a valuable fertilizer, was found in them abundantly; and this substance was found in Spain in large quantities in a separate state, but at present the difficulty of obtaining it was so great as to prevent its being used, though there was no doubt that when properly prepared it would answer all the purposes of burnt bones. It was also found in Cornwall. The richness of the dung of horses which had been fed on corn, and of cattle fed on oil cake, was owing to the presence of this substance. This sort of manure was necessary for the turnip crop; but as that crop required it in its early stages, and bones decomposed but slowly, it would not do to manure them with crushed bones merely, and the farmer was indebted for the obviation of this difficulty to the man of science. It was found that if the bones were dissolved in sulphuric acid they would be improved as a manure, and their virtue could be immediately taken up by the plant. A prize essay had lately been published on this subject, in which the advantages of this method were stated to be the greater abundance of the crop, its less liability to the attacks of insects, and the shortening of the time necessary to bring it to maturity by nearly a month. There were some very striking experiments recorded in the book, of which he would mention some. The writer placed upon an acre of land sixteen bushels of crushed bones, at an expense of 2*l.*, and the produce was 10 tons 3 cwt. of turnips, while when he placed two bushels of bones dissolved in sulphuric acid, on an acre of similar land, the produce was 11 tons 5 cwt.; and with four bushels similarly treated, costing him 19s. 6d., he obtained 14 tons 6 cwt. The usual proportion of mixture was 60 lbs. of bones to 30 lbs. of acid, diluted with 100 times its weight of water; but the English farmer had not yet learnt how to apply liquid manure to his land, and as so much water was not requisite, he should recommend that only two or three times as much water as acid be applied, and after the operation was completed, suck up the surplus moisture by throwing in vegetable refuse, &c., thus making a sort of dry compost, which would do quite as well. Mr. Gyde then referred to the refuse of sugar refineries, consisting of animal black, as a valuable manure. This substance had not been brought into much use in this country, but it was exported from hence to France for that purpose. The virtues of guano he need not state, as every farmer who had used it once wanted to do so a second time. He had here an analysis of it—

Composition of Guano.

	African.	Peruvian.
Water	24	10
Organic matter, with salts of ammonia .	38	66
Bone earth	34	22
Soluble salts. . . .	4	2
	100	100

He did not mean to say that these were invariably the proportions, for he had never found two samples exactly alike, but they were about the mean. He had several samples with him: one from Gibbs, Bright, and Co., of Bristol was the best specimen of Peruvian he had ever met with. The urine of cattle, and particularly of the cow, was invaluable as a manure; it consisted of urea, and contained more ammonia than any other substance known. It was quite as rich in fertilizing qualities as Guano. A gentleman applied one cwt. of that substance to ground usually producing 40 bushels of wheat and 20 cwt. of straw; and the produce next year was 50 bushels of wheat, and 25 cwt. of straw. He applied 1,000 gallons of the drainings of his farm and cow yard to another portion of the same land, and 52½ bushels of wheat and 26 cwt. of straw were the result. The loss sustained in this species of manure, by the farmer, was enormous. It had been calculated that a farm of 25 acres would produce 20 tons of liquid manure, worth 20*l.* a year, but at least 3-4ths of this was wasted. In Paris they refused to make any sewerage, because of the value which they attached to urine and night soil as manures. Mr. Gyde here gave an interesting account of how it was prepared. As to the objection started to using it in consequence of its disagreeable smell, that might be obviated in five minutes by the addition, of a little sulphate of iron. Mr. Gyde concluded amidst the cheers of the audience, by expressing a hope that the same spirit which had actuated the manufacturer to take advantage of the commonest substances, and turn them to account, would lead the farmer to take advantage to those stores of fertility around him which at present were so shamefully wasted.

Several questions were then put to Mr. G. by the Rev. T. Houseman, Mr. Maund, Mr. Lilly, and others, which he answered in the most polite and the clearest manner; after which G. F. Iddins, Esq., moved, and the Rev. T. Houseman, seconded, a vote of thanks to the lecturer, which was shortly replied to by him. The audience separated much pleased, and we are sure they could not fail to have been much instructed.

There was a very fine and extraordinary specimen of Battolian wheat, grown from a single corn, on the ground of the Rev. H. Aldham, of Stoke, planted in August last, which attracted considerable attention.

ISLE OF SHEPPY AGRICULTURAL ASSOCIATION.

TENTH SHEEP SHEARING MEETING, AND PRESENTATION OF A TESTIMONIAL TO MR. G. B. CHAMBERS, THE HON. SEC.

In our last annual report of the Sheppy Sheep Shearing Meeting we noticed the spirit and *éclat* which characterizes these anniversary assemblages in this district, and we instanced likewise the undoubted benefit following to the employer from the stimulating influence given by agricultural societies to improve the skill and to raise the moral character of the employed. On this occasion, therefore, we shall confine our remarks to the incidents of the day, content to commemorate the extraordinary event of thirty-five competitors entering the lists for the premiums so liberally offered by this Society.

From local causes the meeting had been deferred from the 5th to the 19th of June ult., and removed from its usual place of meeting at Maister to a meadow adjoining the Royal Hotel, Sheerness, delightfully proximate to the sea, and enlivened by an elegant marquee and a brilliant display of flags and banners of all nations.

Precisely at the time appointed the clipping process commenced, and from thence unto the close a steady stream of visitors evinced the lively sympathy felt in the animating spectacle, and proved how wisely the Society had decided in altering their place of meeting to the neighbourhood of Sheerness. On the ground we observed the Rev. Dr. Poore, the Rev. J. Barton, Mrs. Barton and family, J. Dixon Dyke, Esq., Rev. H. Hilton and Mrs. Hilton, W. A. Munn, Esq., and Mrs. Munn, G. S. Newbon, Esq., J. Gaze, Esq., and Mrs. Gaze, Captain Fleming, R.N., and officers of Her Majesty's ship Ocean, Major Blackburn and officers of the 69th regiment, J. Miller, Esq., Mrs. Miller and family, G. Buckland, Esq., author of the best essay on the agriculture of Kent, &c., &c., with the *élite* of the isle and neighbourhood, presenting

"A scene so gay.
Heroic noble youths in arts and arms renowned,
And lovely nymphs, the fairest of this isle,
Where Beauty dwells delighted."

At the close of their labour the candidates were pleasingly addressed, from a waggon, by the Rev. John Barton (president for the day), who subsequently distributed the premiums awarded by the judges—Messrs. J. Oakley, Darland, H. Pye, Boughton Place, and E. Carter Hughes, Belle Vue—in the following order:—

Class A. The championship 5 candidates. The premium of £1 to No. 4. James Whitehead, shepherd to Mr. Leese.

Class B. 20 candidates. First premium, £3 to No. 10; Henry Knowles, shepherd to Mr. Wood. Second premium, £2 to No. 22; James Hodge, shepherd to Mr. Matson. Third premium £1 to No. 6; James Knowles, shepherd to Mr. Wood.

Class C. Boys between 14 and 16 years of age; 4 candidates. First premium, £1 to No. 29; John Tong, in the employ of Mr. Walter. Second premium, 5s. to No. 26; George Dodd, in the employ of Mr. Matson.

Class D. Boys under 14 years of age; 6 candidates. First Premium, £1 to No. 35; William Hodge, in the employ of Mr. Matson. Second premium, 5s. to No. 32; George Wright, in the employ of Mr. Leese.

At the termination of this interesting scene, the rev. speaker called the attention of the candidates to the brilliant assemblage of visitors present to witness and honour their exertions; and as an additional proof of the lively interest felt in the prosperity of the Association by the ladies of Sheppy, he requested their notice of the handsome silk flag now waving over their heads, and which had been received by the Society that morning as a present from Miss Chambers, to whose honour he proposed three hearty cheers, which being responded to was followed, at the suggestion of the Rev. Dr. Poore, by a similar testimony of good-will to the Rev. J. Barton, whose zeal and devotion to local improvement is duly appreciated.

Prior to assembling for dinner, the company adjourned to enjoy a promenade in the beautiful gardens of the hotel, and the only drawback we observed to the admirable arrangements for the day was the absence of a military band.

Soon after 4 o'clock the Rev. J. Barton took the chair at the dinner, supported by Revs. G. Bryant, H. Hilton, A. Fielding, W. D. Astley; J. Dixon Dyke, Esq.; W. A. Munn, Esq.; G. S. Newbon, Esq.; Giles Morgan, Esq.; George Morgan, Esq.; J. Miller, Esq.; S. Seckette, Esq.; H. Everest, Esq., and upwards of one hundred gentlemen of the town and neighbourhood. The vice-chair was filled by Mr. Burford. On the removal of the cloth the Chairman rose and proposed, as the first toast, "The Queen," which having been drunk and honoured enthusiastically, was followed by the National Anthem, sung by Mr. Moody, whose professional services contributed greatly to the subsequent pleasures of the day. On proposing "The Queen Dowager," the Chairman alluded to the well-known benevolence of that illustrious lady, and instanced the assistance she had recently given to the national schools of the town wherein they were then assembled (*loud cheering*).

Song (Mr. Moody)—"The four-leaved Shamrock."

The Chairman next gave—"Prince Albert, and the rest of the Royal Family."

Song—"The Lass of Gowrie."

J. Dixon Dyke, Esq., presented himself to propose as the next toast "The Archbishop of Canterbury and the Clergy of the Diocese," and in so doing passed a handsome compliment to the clergy present for the zealous aid they had uniformly given to the Agricultural Association.

The Rev. G. Bryant acknowledged the compliment.

The toast in succession from the chair was "The Navy and Army."

Major Blackburn returned thanks.

Comic song—"Peel and Wellington at Greenwich Fair."

The Rev. Henry Hilton next rose to propose "The Health of the Judges," to whom a heavy debt of gratitude he felt was owing, not only for the valuable services they had conferred that day, but also for the generous sacrifice of their own time in travelling such a considerable distance to aid in the good work in which they were all so interested (*loud applause*).

John Oakley, Esq., on behalf of himself and colleagues, assured the rev. gentleman that it was a source of infinite pleasure to them to have been called upon to assist that day. Throughout his experience he could find no parallel to the Sheppy Shearing Meeting, and although on former occasions he had seen the work performed by the men equally good with that of to-day's, yet he had never seen anything to equal the boys, whose work was beyond all praise, particularly Nos. 29 and 35: in them we had a witness of the advantage of such meetings, and a promise of future excellence (*cheering*).

Song—"My native Hills."

The Rev. Chairman again rose and said, Mr. Vice-Chairman, and gentlemen, in proposing the next toast I shall take advantage of the opportunity which it offers of executing the commission you have entrusted to me, of presenting our worthy Secretary with a testimonial for his valuable services. Mr. Chambers, it is highly gratifying to me to be the instrument of presenting you—a second time since my residence in Sheppy—with a public testimonial from your neighbours and friends for important services rendered to the community among which you reside. When those exertions tend to benefit all classes, rich and poor, their value is considerably enhanced; that such has been the result of your labours past experience will bear me out in asserting. I remember the former testimonial bears the inscription, "For important services rendered to rich and poor, by zeal, ability, and discretion in the administration of parochial affairs for a series of years," and was given you on your retirement from the chair of the Board of Guardians, where I was myself a witness to the kind consideration, the good judgment, and sound discretion with which you discharged its important duties during the three first years of the operation of the Poor Law Amendment Act. Similar results in producing benefits to rich and poor have accompanied your connection with this Association, inasmuch as the owner and occupier derive advantage from the skill and industry employed in the cultivation of the soil; the labourer is encouraged by the rewards offered for the exercise of that skill and industry, and the faithful servant recompensed for lengthened service under the same employer. I am aware how unpleasant it is for a man to listen to his own praises in public, I will therefore refrain from indulging further in the expression of sentiments to which I should not hesitate to give utterance in your absence. The testimonial on the table before you marks the sense entertained of your valuable and indefatigable services in *originating and upholding* this Society. I am sure its value will be doubly increased in your mind when you learn that the proposal to offer you some acknowledgement beyond mere thanks was responded to by the most cordial and unanimous feelings of approbation, and the correspondence connected with it contains many most gratifying expresssions of the high sense entertained of your character and public services. In the name of the members of the Isle of Sheppy Agricultural Association, I beg your acceptance of these pieces of plate before you, and I am expressing their feelings as well as my own in offering the fervent wish that your life may long be spared, and blessed with health to pursue the same honourable and useful career which has hitherto marked your course. I will offer one wish more, that, high as your character stands, you may yet enter the privileged order of Benedicts, by which you will become qualified to receive those gifts of Providence to whom these testimonials may descend as heir-looms.

A simultaneous burst of applause followed this address, and was again resumed on Mr. Chambers rising, who, evidently overpowered by his feelings, briefly acknowledged his inability to express his heartfelt thankfulness for such manifestation of good will and esteem from his friends and neighbours, and emphatically referred them to judge by his future conduct how keenly he valued their present favour, and resumed his seat amidst cheering that lasted for a considerable time.

The testimonial consisted of a splendid silver inkstand, on which was the following inscription :—"Presented to Mr. G. B. Chambers by the members of the Isle of Sheppy Agricultural Association, as a testimonial of respect, and in acknowledgment of the ability and perseverance with which, during ten years, he successfully advocated the welfare of the Association as Hon. Sec. June, 1845." Also a coffee-pot, a liqueur-stand, and a pair of salvers, on each of which was an abridgment of the above inscription, forming together a splendid offering, alike honourable to the Society and Hon. Secretary. The articles were highly admired, and furnished from the well-known establishment of Hunt and Roskell, late Store and Mortimer; the value £80.

The Chairman next gave "The Health of the President (D. Banks, Esq.), and prosperity to the Isle of Sheppy Agricultural Association" (*applause*).

W. A. Munn, Esq., claimed the attention of the meeting whilst he introduced to their notice, as the next toast, the health of the rev. gentleman who so ably presided over them, and who had so eloquently expressed their united sentiments in his recent address to their Hon. Secretary. He well knew that strong interest alone in the welfare of the Society was the leading feature that induced his rev. friend, at considerable personal inconvenience, to preside at the present and on other occasions of their meeting together, and he felt it a supererogation to dwell at length on his subject, because his rev. friend, as a resident clergyman and zealous parish priest, was too well known to require eulogy from him; but he would not resume his seat without offering his personal thanks, as a member of the society, to his rev. friend, for acceding to their request in filling the chair on this interesting occasion (*great applause*).

The Chairman replied—Mr. Munn and gentlemen, I thank you sincerely for the honour you have done me, which I am not so presumptuous as to regard as a personal compliment, but rather to the accidental position which I occupy at the present moment. The kind feeling and forbearance with which you have at former meetings overlooked my inefficiency, emboldened me to consent to preside on the present occasion, combined too with the special request that I would on this day present in your name the testimonial to our worthy and most efficient Secretary. My own feelings would incline me to a less conspicuous place, but, as a resident in Sheppy, I have felt it a duty to waive all personal considerations, if by occupying the chair I could promote the welfare of the Society. I have been encouraged too by the kind feeling with which you have received the hints which I have ventured to make from time to time for the moral improvement and condition of the labouring class, an object which ought to be inseparable from the mind of a clergyman in his connexions with a society like the present. I feel I am trespassing too long on your patience, and will therefore only add, that so long as the meetings of this Society are attended with the good feeling and moderation which past experience leads me to hope they always will be, I shall be glad to give them all the support in my power, being well assured that you will never give me, or my rev. brethren around me, cause to regret that, by our personal presence and support, we have aided a society, bearing for its motto, "To promote industry and reward merit." The rev. gentleman sat down amidst great applause.

"The Members for East Kent" was given from the chair, who likewise read to the meeting a letter received that morning from Wm. Deedes, Esq., regretting that unexpected parliamentary business would deprive him of the pleasure of being at the meeting in accordance with his previous intentions.

Comic song, by Mr. Moody.

"The Rev. Henry Hilton and Landlords of Sheppy" followed.

The Rev. Mr. Hilton, in acknowledging the compliment, alluded to the pleasure he derived for some years during his residence at Sheppy, and the gratification it afforded him that his present residence was within a convenient distance to occasionally attend and take part in all their important meetings; indeed he was not unwilling to acknowledge that the remembrance of the past would occasionally create a feeling of regret that he had ever left the Island (*cheers.*) He presumed that it was this past connexion that afforded him the present pleasurable occasion of returning thanks on behalf of himself and brother landowners, between whom and their tenantry the Agricultural Society had proved a happy medium of more frequent intercourse, and producing thereby a mutual advantage (*applause.*)

The Chairman, in proposing "The Health of Mr. Knight, the treasurer, and prosperity to the Sittingbourn Agricultural Association," observed the pleasure it afforded them to recognise in a neighbouring association the same kindred spirit which animated their own body, and the satisfaction it gave to be honoured on this occasion by the presence of several of its leading members. He remembered, moreover, the honourable contest, two years since, between the two Associations, for the honour of possessing the best sheep shearers, when ten men from each district exhibited a specimen of their skill that could not be excelled; and although the palm of victory was awarded to the Sheppy men, yet it was only justice to acknowledge, the office of a judge proved on that occasion no sinecure; and he felt it would not be an improper subject of boasting that these kindred societies could, by union produce a body of shearers qualified to meet the whole county of Kent (*applause*).

Song—"The man who never got warm."

Mr. KNIGHT returned thanks, highly eulogising the unity and spirit he always witnessed in the Sheppy Association, and lamented the absence of it in his own district; nevertheless he concurred in the observation of the rev. Chairman, and should feel delighted to promote a friendly contest with other associations, feeling confidence that they must possess sharp shears indeed, to out-clip the united Associations of Sheppy and Sittingbourn (*cheers*).

J. S. KIDDEL, Esq., claimed the attention of the meeting to propose "The health of Miss Chambers," and to offer the cordial thanks of the Association for the present of the splendid banner which had that day ornamented their shear green; although absent herself from the ground, yet he had opportunities of knowing how lively was her sympathy for the welfare of the Association; and it was a satisfaction to know that the testimonial which had that evening been presented to the brother would awaken the tender cord of sisterly affection, and prove to that lady a daily source of pleasurable reflection (*applause.*)

The toast was acknowledged by S. Sackette, Esq., the brother-in-law of Miss Chambers.

"The health of the Vice-Chairman Mr. Burford," "Mr. Wood, and thanks to him for the sheep supplied for the occasion," "The Town and Trade of Sheerness," "Messrs. Palmer and Masters," &c., &c. having been respectively drunk and spoken to, was followed by "The Ladies," when the rev. Chairman, attended by visitors and others, took leave of the company about 9 o'clock; after which, Mr. Chambers being called to the chair, the conviviality and spirit of the meeting was maintained for upwards of an hour, when the party simultaneously broke up, to return home with the agreeable reflection of having passed a well-spent day in aiding "To promote industry and reward merit."

IMPORTANCE OF PRUDENCE TO THE FARMER.—There is a seede called Discretion: if a husbandman have of that seede, and mingle it amongst his other corne, they will growe doubtless much the better, for that seede will tell him how many casts of corn a land ought to have. And if a young husband, or, it may so fortune, a man that by possibility might have grey-headed experience, hath not sufficient of that seede, yet he that lacketh, it is lawfull for him to borrow of his neighbours that have, and his neighbours be unkind if they will not lende this young husband part of their seede, for this seede of discretion hathe a wondrous virtue, for the more it is eyther taken of or lent the more it is.—*Boke of Husbandrye, quoted by C. W. Johnson, Esq., Quarterly Journal of Agriculture.*

SALTING-IN GRASS AND HAY, IN WET SEASONS.

TO THE EDITOR OF THE EXETER FLYING POST.

SIR,—The present threatening to be a precarious hay time, you may perhaps render your farming readers an effectual service in recalling to their notice this method of saving so important a part of their produce.

Mouldy hay, put together with salt, from 8lb. to 25lb. per ton, was better relished by the cattle, and did them more good than sound hay stacked without salt; and this in many instances (Johnstone on Salt, p. 105).

The late Solomon Brown, of Landrake, many years ago, stacked damp hay with salt, which came out almost a paste when the rick was opened; but the cattle devoured it with avidity.

In Germany they cure grass, fresh cut, by packing in pits with 1lb. of salt to the cwt., and find it go much farther in food than the same quantity of grass made into hay.

In fact, by sun-drying, the hay seems to become rather more woody, and therefore less digestible and nutritious; but the salt seems to have a contrary effect, softening the woody stalks, and thus rendering them digestible food.

A method which appears to me preferable to these, both in convenience and economy, is to stack the green grass or clover in layers with straw or old dry hay, sprinkling the salt upon each green layer. Thus the juices drawn by the salt from the grass will be absorbed by the straw: and I think that not only the nutritive power of the damp hay or grass may be improved in this way, but that the straw itself may be brought back toward the state of green stalk, by the salt juice absorbed gradually softening and rendering it soluble and digestible.

The proportions may vary somewhat, according to the dampness of the grass. Good upland grass, cut in dry weather, may contain two-thirds its weight of water; that is, two tons in three; and one ton straw will absorb three tons water. But as we do not want it *wet*, say one ton straw to four tons grass; and suppose the grass to give out half its juice to the straw (by aid of the salt), we shall have the whole soft and damp, without being disposed to drop or leak.

If old hay is used instead of straw, perhaps one-third, or even one-half might be nearer the mark, as it is much less absorbent. For meadow grass or any green fodder, cut *damp*, the quantity of straw or old hay may be proportionably increased. For hay partly dried it may be reduced or omitted altogether.

The best proportion of salt must be determined by experience. One lb. per cwt. appears but little for fresh grass; 2lb. per cwt., or about ½ bushel to the ton of grass, I should think not more than the cattle would relish, and more likely to preserve the whole in a sweet and digestible state. For half dried hay 1lb. per cwt. may be enough.

Where the farmer is short of straw or old hay (as often happens before hay time) bran would be an excellent thing to use instead; its cost being well repaid by the increased nourishment. The doubt is how far it would be liable to *ferment and heat.* It may be worth trying on a ton or two, mixing the salt first with the bran, and strewing it in as the grass is stacked.

Chopped furze (gorse, whin) has been used as winter food for horses. Now if my notion be correct, that soaking with salt and vegetable juice tends to render woody fibre soluble and nutritious, stacking with grass and salt would much increase the value of furze; whilst its ragged form and stiffness would let the air through the rick, and dry it as it stands, or only prevent any chance of damage by heating, according to the proportion employed. Of this proportion the farmer can better judge on the spot, than the chemist by reasoning: probably one-third or half the weight of the grass, according to its dryness, may be near the mark; and since both are green, and the furze hard, the salt should not be less than 3lb. to the cwt. of grass. Yours, sir, &c.,

J. Prideaux.

ANNUAL MEETING OF THE SHAREHOLDERS OF THE ROYAL FARMERS' INSURANCE COMPANY.

At the annual meeting of the shareholders of the Royal, Farmers' Insurance Company, held at the Freemasons' Tavern, for the purpose of receiving the Report of the Directors for the past year, and for the transaction of other business: on the motion of Mr. William Shaw, seconded by Mr. Martin, Mr. George Parker Tuxford was unanimously called to the Chair amidst applause.

The Chairman, in opening the business of the meeting, said—Gentlemen, twelve months ago you were pleased to confer upon me the honour of electing me your Chairman, when for the first time the Shareholders of the Royal, Farmers' Insurance Institution met together within these walls, which special mark of approval you have done me the favour of repeating on the present occasion. That I should have temerity sufficient to give expression to the pride and heartfelt satisfaction such an additional proof of your confidence inspires me with, will I apprehend scarcely excite surprise when I tell you that my most sanguine expectations have never led me to anticipate a repetition of the compliment which has been so generously bestowed upon me by such a body of my brother shareholders as I see around me. When I addressed you at our last anniversary meeting, full well do I remember pledging myself faithfully to you, to discharge to the best of my humble ability the onerous and important duties of my office, as your Chairman; which pledge in all sincerity I now renew, and, without further preliminary of a personal character, will proceed at once to the business of the day we are here convened to consider and to settle. On our first meeting together to receive the report of the Directors of this Institution, it appeared to me as my incumbent duty to communicate to you, in the capacity I then stood as your Chairman, a detailed account of the rise and progress of the Royal, Farmers' Insurance Office. I informed you by whom it had been conceived; under whose auspices it had been fostered; the position it occupied in comparison with old-established offices; of whom the board of Directors was composed, and the individual qualifications of those gentlemen for the important position they occupied; with such other information as I thought you had an unquestionable right to possess. That statement, with the assistance of the agricultural press of this metropolis, has been given to the world, thereby rendering a repetition of it at the present moment a work of supererogation. The duties you had then to discharge were of an important character: three Directors going out by rotation necessarily involved a new election: whereas at the present meeting you have only to decide upon the election of one auditor, who, in accordance with the clause contained in the deed of settlement, retires from office, unless re-elected. Mr. Ardron is the gentleman to whom I refer. He again stands before you with the full concurrence of the Directors, who recommend him to your notice, believing him to be deserving of your confidence, from the experience they have had of the very able manner in which he has discharged his duty. From these observations you will perceive that our business to-day is comparatively unimportant, and will necessarily prove short when placed in juxtaposition with the various matters which engrossed your attention at the last annual meeting. I will not anticipate the Report, which will be now read by your Managing Director, Mr. Shaw, and which I believe will command, what it justly merits, namely, general satisfaction. Before I sit down, however, allow me to congratulate you on the daily increasing business of the Office in its different departments during the year, which has greatly exceeded the calculations contained in the last annual report, and cannot fail to produce the most gratifying reflections in the mind of every shareholder who has the prosperity of the Institution at heart (*cheers*).

Mr. Shaw observed that at the expiration of three years from the establishment of the Institution, the auditors went out of office, and new ones were elected. According to the deed of settlement, one would go out of office annually, but was eligible for re-election—this year Mr. Ardron; from what he (Mr. Shaw) had seen of the manner in which he performed the duties of the office, he was prepared to state that he considered him well qualified, and would, therefore, propose him for re-election.

Mr. Ford having seconded the motion, it was carried *nem. con.*

Mr. Shaw then read the report prepared by the Directors, and laid the balance-sheet on the table.

Mr. Brown rose, and said—Having heard the report read, it affords me great satisfaction in proposing its adoption. It must be a source of great pleasure to the shareholders to witness the progress of the Institution, and, considering the class to which it is devoted, it is still more gratifying to be enabled to state that amongst the other leading companies it stands fifth on the list, as regards insurance of farming stock (*cheers*). And, taking all those companies in the aggregate, the office stands remarkably well in reference to general business. The report states that a considerable increase has taken place in the business, which is very satisfactory. There is one part of the report demanding the most serious attention, viz., Life Assurance. If all connected with the Institution were to give it due consideration, and recommend the office to their friends, it would materially increase the business (*cheers*). I now beg to move that the report be adopted, and to state that we are all obliged for the very explicit manner in which the various tems are set forth.

J. W. Jeyes, Esq., of Uppingham, Rutlandshire, seconded the motion.

Mr. Newman said—It is far from my wish to throw any impediment in the way, but I beg to remark there are—as shown by the report—13,000*l.* in the hands of country agents. Now that is a large sum, and what I

N

wish to inquire is—Why should they not give security? When I insure my property, I pay instanter. I call, therefore, upon the Managers of the society to compel the agents to pay. The Society ought to have the benefit of the interest arising from these funds. I call attention to the subject, thinking it worthy of consideration.

Mr. SHAW observed, after the remarks made on this subject last year the Directors went through the accounts, and got in a considerable portion of the money in the hands of the agents; we have about seven hundred agents doing business, and we must not forget that fire insurance gives a good deal of trouble, and the agents therefore expect a little indulgence, in not having to make out their accounts too frequently. Many take the agency *con amore*, and not for the advantage to be derived from it. As regards the giving security, many of our agents are agents for landowners, managers of banks, and otherwise of such position and stability that we are obliged to wave the security. Not being an old office, the amount of business in each agency is not large; and hence we cannot say that we confer an obligation upon the agents—on the contrary, they rather confer one upon us.

B. PITTS SHEARER, Esq., thought that, where it was possible, security should be taken.

The CHAIRMAN observed, that a short time ago the Board of Directors deputed a gentleman to visit Scotland for the purpose of revising the agents, and appointing new ones where requisite, in the discharge of which duties he had given the greatest satisfaction. From one of these newly appointed agents, a banker of high standing, a letter was received yesterday to the effect that if the Directors were satisfied with an annual settlement, he should have no objection to continue the agency; but if otherwise he must resign it, as the amount of his commission, from the newness of his agency, would be so limited as not to be equivalent to the time that he should have to devote to making up quarterly accounts.

Mr. SHEARER meant to observe that security should be taken where possible.

The CHAIRMAN remarked it was not possible to obtain it in all cases, but where practicable, he believed that it was never omitted.

Mr. BROWN said—From what we have seen of the progress of the society, we may place every confidence in the assiduity of those immediately connected with it. Now, it is well known that we have many country bankers acting as agents; they are the most influential parties in the country, and it would unquestionably be very troublesome for them to send up quarterly returns. The earliest period we might expect would be half-yearly. We cannot do better than leave the matter in the hands of the Directors *(cheers)*.

Mr. NEWMAN said the reference made to Scotland was no doubt correct, yet he thought that 13,000*l*. was a large sum to have outstanding. He trusted, however, that it would reach the ears of the agents *(hear, hear)*, because that sum was considerable. Latitude might be given to small sums owing by the country agents, but payment should be required of the fifties and hundreds.

Mr. SHARP said, previous to the report being carried, he was desirous to make a few observations upon life assurance. A person wished to insure his life in the office for £1,500. He made the proper application to a Mr. Attfield, one of the country agents. It was agreed to be done: instructions were forwarded to London for that purpose; but a policy was forwarded for a larger amount of premium than that for which the policy was effected. Had the office two rates? for the policy was effected upon those in the printed forms, and which were handed to the party when the application was made.

Mr. SHAW explained that some time since it had been deemed advisable to revise the rates of premium, tables of the new rates had been issued, but the party in question had not seen them, and he expected the insurance would have been effected upon the old rates, whereas it should have been upon the new tables. The explanation was given at the time.

Mr. SHARP immediately rose, and said he was perfectly satisfied with the explanation as given by Mr. Shaw.

Mr. NEWMAN said he had insured in the office, and he hoped the Directors would not adopt a low scale of rates. He thought the old rates in fire not equal to the risk.

Mr. SHARP inquired whether the amount stated in the report set forth the disposable capital of the office.

Mr. SHAW replied in the affirmative.

The CHAIRMAN then put the question that the report be received and adopted. The motion was carried unanimously.

J. W. JEYES, Esq., of Uppingham, said, in reference to the question of giving security, he had appointed several persons as agents, from whom security could not be had. He thought it unnecessary. If a person came to him to ask such a question as that of becoming security, he (Mr. Jeyes) should refuse such an application without a moment's consideration.

Mr. BROWN observed that a circular had been issued from the government upon the subject of paying up the duties. It was therein stated that the money must be regularly remitted. It in some measure superseded the necessity of calling upon the agents for security. They all felt great difficulty in becoming security for their friends. Those who looked to the matter in all its bearings would see that it was not very easy to obtain security from the agents. The payment of the accounts at an earlier period would render it in some degree unnecessary. While they were extending their business, there must be an increase of the amount in the hands of the agents.

Mr. LANE moved that the best thanks of the meeting be given to the Directors—especially to the Managing Director—for the assiduity and zeal displayed in the management of the affairs of the Company, which, he felt assured, would command the approbation of every shareholder.

Mr. BLANCH seconded the motion.

The motion having been put, and carried unanimously,

The CHAIRMAN said—I have great pleasure in acknowledging the compliment now paid to the Directors. It cannot fail to be gratifying to those who are absent as well as those present, and I beg to return you our best thanks.

Mr. SHAW said—It would be ungrateful in me were I not individually to express my thanks to you for this additional mark of your approbation. It cannot be supposed that we should voluntarily place ourselves in any situation of difficulty in respect to the management of the business of the Institution. We exert ourselves to the utmost to do justice between the shareholders and the assured. We are none of us infallible, and I shall esteem it a great obligation if any shareholder will point out where an error has been committed, and afford us the opportunity of correcting it *(cheers)*. I can state with confidence that in so saying I speak the feelings of the board at large.

Mr. BROWN proposed that the best thanks of the meeting be given to the Secretary and the other officers of the establishment.

The motion was seconded, and carried unanimously.

Mr. HANSON briefly returned thanks.

Mr. SHARP begged to say that he considered the rates upon mill policies very high; he conceived a corn-mill to be as safe as a stable. Some other offices were taking mills at lower rates than the "Farmers'."

Mr. SHAW observed that not only Mr. Sharp, but some other parties residing in the neighbourhood of Abingdon and in Essex, had made the same remark. He (Mr. Shaw) had brought the subject before the board, and would do so again. He was sure it would receive every consideration, and he thought that a reduction might be safely made.

Mr. WILLIAM FORD rose, and said that, observing from the movement of their respected Chairman that the proceedings of the meeting were now about drawing to a conclusion, he should take upon himself with unaffected freedom the discharge of a duty to which he was prompted, not as to the performance of a mere formal courtesy, but for the purpose of making a cordial avowal of his (Mr. Ford's) obligations to their worthy Chairman, for his most effective discharge of the responsibilities of his present position *(cheers)*. Confident that the perfect application of Mr. Tuxford's opening observations to the subject matter of the meeting—his courteous desire to assist the shareholders in their inquiries, and to receive their suggestions as matter for the deliberation of the Board of Directors—would all be attested by the unanimous feeling of the gentlemen present, he (Mr. Ford) felt more than ordinary pleasure in moving the best thanks of the meeting to their worthy Chairman (*cheers*).

The motion was seconded by Mr. Jeyes, and carried unanimously.

The CHAIRMAN replied: I thank you most cordially for the unanimous expression of approbation which I have received from you for my humble services on the present occasion; and believe me, gentlemen, that I shall consider it a source of extreme gratification whenever I am able by my exertions to promote the prosperity of the Royal Farmers' Insurance Institution. *(Cheers)*

The Chairman then left the chair, and the meeting separated.

WHITE WINE FROM GREEN GRAPES.

BY J. TOWERS.

The season is far advanced, and the weather, though occasionally hot and sunny, has been of a character to prevent the rapid progress of the vines. It appears then more than probable that the out-of-door grapes of this year will not be favourably matured. I have observed that if June pass before the vines come well into blossom, and July be cool and rainy, the progress of the fruit is so retarded that the latter summer, however fine and hot it may be, cannot compensate for the time thus lost. Our climate is not propitious; and during the last ten years I can retrace but two wherein the sweetwater and muscadine brought their clusters to tolerable perfection during September.

But as respects wine-making this is a minor consideration, provided the grower pay due attention to lay in the fruit-bearing shoots close to the wall, to stop them all at one leaf beyond the point where they last pushed, carefully retaining all the leaves; but removing every useless, secondary, barren shoot; so that the wall may be completely filled with verdant foliage, and yet not burdened or crowded with weak twigs.

At the time I commence this article (July 10), the earliest clusters are in bloom; therefore, if the season be warm, and the primary leaves duly exposed to the utmost power of the south or south-by-east sun, we may reasonably hope to see the berries of the full size which they can attain, prior to swelling-off by maturity, by the third week of September; and that is the condition in which they are most suitable for the purpose of the vintage. A change takes place in the organic economy of the vine about the first or second week of August, according to the state of the season; for then the stems thicken by the final arrangement of tissue, and elongation is greatly reduced. Previous to that time the wandering shoots must be sedulously observed, as before directed; but subsequent to it, greater care is still required, to expose to the full sun all the parent leaves—that is, those which belong to the fruitful shoots—and to remove every unfruitful twig not wanted for the next year, in order to prevent the shading of those more important leaves which nurse and protect the clusters. It is a great truth, too little understood or acted on, both in the open air and under glass, that the shade produced by the main leaves, so far from retarding the fruit, is its most certain guardian from the scalding ray of the sun. So screened, the berries gradually and safely go through the precarious stages of the stoning process; when that is completed, and they begin to appear slightly transparent, they are in the precise condition required to produce the best grape wine.

The wines from green immature fruit is, as Dr. M'Culloch long ago asserted, of a quality not to be distinguished from those of foreign growth, and can be prepared at a very moderate expense. It would be natural to suppose that a perfectly ripe condition of the fruit would be preferable; but this is a mistake, for, as the same author further observes in his "Art of Wine-making," "so far from this being the case, it will invariably be found that the produce of the immature fruit is superior to that of the ripe. In the ordinary grapes of our own growth, with the exception of some of the sweeter varieties raised in hot-houses, the effect of maturity is to substitute little else than water for those principles essential to fermentation which exist in green fruits. The quantity of sugar generated in the act of ripening is of no value, as it is easily supplied by an admixture of common sugar with the juice; nor is any flavour gained by the maturation of the grape. At the same time those advantages which would arise from the leaven and acid of the fruit are lost; as these substances disappear in a great measure when the ripening is perfected."

The great objection to home-made wine is found in the quality of the sweets artificially added, and we could wish that the sugar of grapes could be substituted for that of the cane. Persons in general complain that home-made wines disagree with them: and others say that where starch sugar has been used, the wine produces no similar inconvenience. From any analyses it appears that grape and starch sugar contain at least five per cent. less of carbon than cane sugar: therefore it is desirable, if possible, to obtain a supply of refined (not moist) starch sugar, and thus to follow the example of the French, who, it is stated, are in the habit of strengthening their clarets by that adjunct, when unfavourable seasons have prevented the due formation of saccharine matter in the grape.

Preparation of White Wine.

The temperature to insure that perfect but gradual spontaneous fermentation which the prepared juice of the grape requires, is about 55° to 60° of Fahrenheit's thermometer, and towards the end of September (the period when our green sweetwater and muscadines are usually in a proper state) that temperature is of common occurrence.

Dr. M'Culloch assumes 10 gallons of wine as his standard quantity when fully completed; and for this he directs 40lbs. of fruit, 4 gallons of cold water, and 30lbs. of white sugar in the first instance: to be made up to 10½ gallons by more water, if required. These proportions will yield a dry wine, if the fermentation be propitious: but in order to be more precisely accurate, I have, during several years, been guided by the specific gravity of the must, after every addition of sugar; and now, in order to furnish definite information, I shall collect the details of a trial made in 1836, when, in consequence of a very warm temperature, the fruit was ready for the vintage by the third week of August. In this experiment I introduced the tender green shoots and tendrils of the vine, and now may remark, in passing, that very good wine can be made by these alone in the event of a failure of fruit.

August 18.—Prunings of the tender green shoots, leaves and tendrils, 2½lbs. boiled—after tearing them into small pieces—for twenty minutes with four gallons of spring water, and the liquor strained through a wicker sieve, and cooled in a broad earthen pan; 20lbs. of green clusters, bruised by a clean wooden rammer in a strong tub, but in detail, so as to observe that each berry was crushed. In this operation the seeds should not be cracked; but the stalks, whether bruised or not, yield no disagreeable flavour. As each parcel was thus prepared, it and the juice expressed were transferred to the pan containing the grape-leaf liquor.

In the experiment of 1836, having plenty of fresh honey, I washed the drained coombs with that fluid; but failing afterward in a similar process, I desisted from the use of honey, its results being uncertain. The fruit and liquor being together, they remained for twenty-four hours covered with a flannel, in a close room; and I think it advisable always to permit them so to remain, till a slight incipient fermentation be manifested by the appearance of a very few bubbles of froth, as then the water will have extracted the leaven and soluble matters of the pulp. At this stage the specific gravity of the fluid should be taken, unless there be a saccharometer at hand, which, of course, will at once decide the gravity by inspection. It will be found that the weight is greater than that of rain-water, the standard which is assumed as the unit, or divisor, one cubic foot weighing about 1,000 ounces. To take the specific gravity with sufficient accuracy, a long-necked phial, like a capillane bottle, is to be correctly weighed, and its tare noted. It is then to be filled to the level of the lip, or to some marked part of the neck near its summit, with rain-water, and the weight reduced to apothecaries' grains, of which there are 480 in the ounce. The bottle is then emptied, and shaken several times, after which it is filled to the mark or top of the neck with liquor, at the same heat as the water weighed, and the weight also brought into grains. The product being divided decimally by the weight of the water will give the comparative specific gravity of the grape-fluid.

Good loaf-sugar adds 36 per cent. or thereabout, to the gravity of a wine-gallon of water, and this being borne in mind, we may return to the details of the experiment of 1836.

The fermentation being visible, the liquid was strained and pressed from the husks, and sugar gradually added, stirring well occasionally till the specific gravity was 1,112—that is to say, 112 parts in the 1,000—greater than that of rain-water at 60° of Fahrenheit. If this gravity be produced, and the fermentation proceed quietly in a temperate close apartment, the wine will become dry by slow degrees; if 120 be attained, the sugar more than balances the leaven, and may leave the wine oversweet for seven years. The sweet must of the experiment remained in the pan, covered with flannel, till the 22nd, when finding the gravity reduced by the spirituous fermentation, or alcoholic process then established, to 1.0827, it was barrelled to within an inch of the bung, and placed in the cellar, which is always warm. It there remained till January 1, 1837, when it was racked off the lees. The cask was washed and drained, then rinced with a bottle of foreign Bucella, and the grape-wine returned upon it.

It is of great consequence to ascertain the gravity of the must after each addition of sugar, for thus these small parcels of wine may always be accurately sweetened. Fifteen pounds will usually suffice for 5½ lbs. of grape liquor; therefore 10lbs. may be added at first, and the remainder cautiously. The must should be reduced in gravity at least 30 per cent. before barrelling; and when in the barrel, the bung should be loose till the hissing nearly ceases, when it can be safely put in, leaving a spile or vent-hole open for some weeks.

I have rarely had occasion to rack twice; but once is indispensable, to separate all the lees, which in March would create a secondary fermentation; and the best season for racking is during a calm, bright frost, when the fluid is quite tranquil. The cask being then cleaned, or another perfectly sweet being ready, the wine should be returned, and bunged close down. As there is some waste of bulk, it is best to fill the cask with some foreign wine (avoiding spirit of every kind, and I think Bucella is to be preferred, as it approaches in quality to the Rhenish wines, which our green grape process is intended to imitate.

In a season gloomy and unsettled as the present, it is frequently impossible, even with the exercise of the greatest care and precaution, to guard against the over-heating of hay-stacks. The most simple and effective means ever yet discovered for allaying the mischief, and preventing the actual firing, is by using "Gillett's Rick Ventilator," of which a description will be found in an advertisement in another part of this paper. The saving of a single ton of hay will more than pay for the instrument. It is a really valuable implement in a "catching" season. We have no hesitation in recommending it in the strongest manner.

A REVIEW OF THE PAST, PRESENT, AND FUTURE STATE OF THE WOOL MARKET.

[ABRIDGED FROM THE ECONOMIST.]

The consumption of English wool during the last twelve months has unquestionably been on a larger scale than at any former time. And during the last four or five months the heavy stocks held (in the latter half particularly) last year have been very greatly reduced, and have presented the contrast with last year, that, so far from the stocks of wools of English growth being unusually large, they were probably never known to be so small. The effect which might have naturally been expected, from the small stocks of English wools, has been counteracted by two prominent causes:—First, notwithstanding the extraordinary increase of the import of foreign wools in 1844, that of the present year shows an increase over last year comparatively as great. And, second, some branches of trade in which English wools are largely used, especially that of Bradford, have been exceptions to the general brisk and highly remunerative character of the generality of manufactures. As compared, therefore, with this time last year, we conclude the season with probably a smaller quantity of English wool on hand, of former years' clip, than has existed for many years; while last year, at the same time, it was somewhat larger than usual.

By the accounts which we have this day published, in our "Monthly Supplement," of the quantities imported from the 5th January to the 5th May, we find the following comparison with respect to the imports of wool:—

Wool imported, Jan. 5 to May 5.

1843.		1844.		1845.
lbs.		lbs.		lbs.
7,273,118	..	10,800,430	..	14,529,273

This is the latest date for which we have any accurate accounts for the whole kingdom; but from information, on which we can sufficiently rely for all practical purposes, the following month, up to the 5th of June, will show a still greater relative increase. The imports to the 5th of June may be thus stated:—

1844.	1845.
lbs.	lbs.
14,650,430	19,705,593

Thus exhibiting an increase, even over the large imports of last year, of 5,000,000lbs.

In looking, however, at this large increase, we are led to believe, after somewhat minute investigation, in the absence of any actual and authoritative account, that the largest portion of the increase is of colonial wools, and that in consequence of the shipments being much earlier than usual. There is no doubt we shall again, in the present year, receive an additional quantity from the colonies, equal to their steady increase, but not in anything like the proportion which has already arrived, compared with last year. As far as our investigation goes, we are induced to believe that the import of European wools in the present year has rather diminished than increased. While, therefore, we unquestionably have a smaller stock of home grown wools, we have a larger one of those of foreign growth, though the latter may merely be in anticipation of shipments which arrived at a later period last year.

The re-shipment of foreign wools has also been on a smaller scale even than last year.

The whole of the quantity imported has been retained for consumption, except the trivial quantity of 275,325lbs.

But the export of English wools, however, shows a considerable increase in comparison with former years.

EXPORTS OF ENGLISH WOOL FROM JANUARY 5 TO MAY 5.

1843.	1844.	1845.
£92,966	£55,126	£152,491

So that, at an average of 15d. per lb., the quantity of English wool exported to the 5th of May was equal to 1,639,856lbs.

In forming an estimate of the supply of the future portion of the year, we will first advert to the circumstances which we think are likely to affect the supply of home-grown wools. There seems now to be no doubt entertained by any one that the clip of the present year will be considerably less than an average quantity. The long and severe winter, and the great scarcity of fodder, no doubt operated to induce the farmers to send an unusually large quantity of sheep to market, so that the number yielding fleeces will be much fewer at this clip than in recent years. Moreover, there is no doubt that the same causes have operated in making the average weight of each fleece less than usual. In some parts of the country, especially in some of the counties south of London, this deficiency has been carefully estimated at *one-fifth*; but, taking the average of the whole county, and from both causes, the lowest estimate of deficiency is from *one-eighth* to *one-tenth*.

From inquiries which we have instituted, we much fear that similar causes will operate in every part of Europe to produce lighter fleeces, and, in all the populous districts, a considerable diminution of their number. We cannot doubt the diminution of the whole clip on the Continent will be at least equal to that in this country. We are, therefore, brought undeniably to these conclusions:—First, that not only in England, but also throughout the Continent, the stocks of old wool were more closely worked up at the commencement of the present clip than in any recent year; second, that the produce of the clip must be considerably less throughout Europe than in average years; and, third, that up to the present time the report of colonial wool shows a great increase on any former year; but it remains to be seen what portion of that increase is actually greater production, and what part merely earlier arrivals. These are all the ascertained facts as to the present and future supply.

As far as regards the existing rate of consumption, we apprehend there can be no difference of opinion that it is in every department of trade greater than at any former period, and likely to continue so in every branch, unless the spinners at Bradford should be induced to lessen their produce, on account of the prices they obtain being barely remunerative. With regard to the consumption of the last three years, there is an important feature which every close observer connected with this trade must have seen, namely, that the consumption of each of these years has been greater than the actual growth and import, and has been made up by the gradual use of the stocks which accumulated from 1839 to 1842; and it is certainly within the truth, if we say that the consumption of the three years—Midsummer 1842 to this time—has been equal to four years' growth; and that the present year, into which we are now entering, is the first in which we have to rely simply on the produce of the year for the supply of the year.

As far as regards our export trade of woollen manufactures, the present year, so far, exhibits a further increase even upon last year, as shown by the following table:—

WOOLLEN YARN AND MANUFACTURES EXPORTED FROM JAN. 5 to MAY 5.

	1843.	1844.	1845.
Yarn........	£125,774	.. £210,439	.. £273,930
Manufactures	1,802,782	.. 2,351,884	.. 2,483,916
	£1,928,556	£2,562,323	£2,757,846

The present year is still in excess of last year, notwithstanding the large falling off to India, the United States, and some other important markets. We know of no good reason to apprehend any falling off during the rest of the year in this branch of the trade.

With regard to the home consumption, we have the best grounds for anticipating, not only a continuance of the late demand, but a considerable increase during the autumn and winter. There is no doubt the labouring population are now in a better state than they have been for a long time; and, as the railway projects come into activity during the autumn and winter, the quantity of employment will, with other branches, be greater than for many years past. We cannot, therefore, but anticipate a great increase in the home consumption of wools, in common with all other goods and produce during the next year.

The considerations and facts which we have now adduced, as likely to affect the price of wool, are strong in favour of its future prospects, inasmuch as stocks on hand are comparatively light, and the whole European supply will be considerably deficient, while the general consumption is likely not only to be sustained, but even increased, if not checked by too sudden a rise in price, which would be very prejudicial to all parties.

METEOROLOGICAL DIARY.

Barometer.			Thermometer.			Wind and State.		Atmosphere.		
Day.	8 a.m.	10p.m.	Min.	Max.	10p.m.	Direction.	Force.	8 a.m.	2 p. m.	10 p. m.
	in. cts.	in. cts								
June 21	30.13	30.04	51	70	60	N. East	lively	fine	sun	fine
22	30.00	30.06	56	68	55	N. N.W.	brisk	fine	sun	fine
23	30.14	30.14	49	68	60	West. by N.	liv. calm	fine	sun	cloudy
24	30.10	29.85	55	65	57	W. N.W.	strong	haze	sun	cloudy
25	29.86	29.86	54	64	56	West	brisk	cloudy	sun	cloudy
26	29.80	29.88	52	64	56	West	live. brisk	fine	sun	cloudy
27	29.80	29.48	53	58	57	West	brisk	cloudy	cloudy	cloudy
28	29.33	29.82	53	62	53	West by N.	brisk	cloudy	cloudy	fine
29	29.88	29.94	46	63	55	W. to S.W.	lively	fine	sun	cloudy
30	29.90	29.90	54	64	56	Westerly	gentle	fine	cloudy	cloudy
July 1	29.59	29.65	55	65	57	West	strong	cloudy	sun	fine
2	29.80	29.83	53	61	57	W. S. by E.	calm	cloudy	cloudy	cloudy
3	29.70	29.87	56	72	57	Every way	cal. brisk	haze	cloudy	fine
4	30.00	30.13	54	66	58	S. by East	gentle	cloudy	sun	fine
5	30.18	30.20	52	68	58	S. by East	variable	fine	sun	cloudy
6	30.10	30.00	56	76	67	S. by East	gentle	fine	sun	fine
7	30.00	30.02	60	73	63	Westerly	gentle	fine	sun	fine
8	30.01	30.00	58	68	58	S. by East	brisk	cloudy	sun	fine
9	30.00	30.00	57	65	57	S. West	brisk	cloudy	cloudy	cloudy
10	29.87	29.75	55	63	58	S. West	brisk	cloudy	cloudy	cloudy
11	29.56	29.78	57	63	52	S.W. N. by W.	brisk	cloudy	cloudy	fine
12	29.92	30.00	45	59	53	Northerly	live. calm	cloudy	cloudy	cloudy
13	30.00	29.92	52	65	58	N. West	calm	cloudy	cloudy	cloudy
14	29.92	30.05	56	63	54	North	brisk cal.	cloudy	sun	fine
15	30.08	30.08	49	62	53	North	gentle	cloudy	cloudy	cloudy
16	30.08	30.05	48	64	58	N.W. W.	lively	fine	sun	cloudy
17	30.04	30.06	55	66	59	W. W. by N.	lively	cloudy	sun	fine
18	30.11	30.12	55	68	60	W. by North	gentle	fine	sun	fine
19	30.11	30.08	57	68	57	W. by N.N.E.	gen. brisk	fine	sun	fine
20	30.08	30.00	54	59½	57	N. N.W.	gentle	cloudy	sun	cloudy
21	29.99	29.97	56	68	60	E. by North.	variable	cloudy	sun	cloudy

ESTIMATED AVERAGES OF JULY.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.30	29.39	76	42	61

Real Average Temperature of the period.

High.	Low.	Mean.
65.42	53.64	59.56

North and N. East Winds..	5½ days.
East and to South	6
South and South West......	9¼
West and to North	10½

Weather and Phenomena.—*June* 21st, 22nd. Beautiful—hot sun—brisk wind. 22rd. Change indicated. 24th. Hazy morning—great depression in temperature. 25th. Wind gradually veers to the wet quarter. 26th. The same—clouds give signs of rain. 27th, 28th, 29th, 30th. Rain more or less—low temperature and generally doubtful. *July* comes in wet. 2nd. Temperature improves. 2nd, 3rd. Both rainy—warmer. 4th to 6th. Rising barometer and great heat. 6th. Recorded for furious storms and hurricanes—in Berkshire the day most beautiful, with only a few evening coruscations. 7th. Brilliantly fine, but change indicated. 8th, 9th, 10th, 11th. Rain at intervals—strong wind—cold. 12th. Very cold and quite overcast. 13th, 14th. More or less rain. 15th. Swithin—fine forenoon—one shower. 16th. Fine. This superstition ought to be forgotten. July is the season for periodical rain: splendid weather frequently succeeds a wet Swithin's day, reducing the saint to the dilemma of a shuffle; at all events, we have had three fine days since the 15th. 17th. A little rain. 18th, 19th. Warmer and fine. 20th. Drizzle early—fine day. 21st. Much the same.

Lunations.—Last quarter, *June* 26th day, 3 h. 27 min. after. *July*. New moon, 4th day, 4 h. 30 min. after. First quarter, 12th day, 2 h. 22 min. after. Full, 19th day, 6 h. 3 min. morning.

Remarks referring to Agriculture.—The season is too cool, and, therefore, the harvest must be rather late. June promised to recover lost time, but the equinoctial prognostic of frequent, sudden, mutations has been, and is realized. To trust to appearances, *here* there is plenty, with capital quality and no damage, excepting from over heavy and luxuriant barley being partly lodged and twisted into gaps by this very windy season. It is to be hoped that our fears only have been excited, for we see no cause of alarm, and assuredly the corn crops give earnest of amazing improvement on the part of the cultivators.

J. Towers, Maiden-head Thicket.

CALENDAR OF HORTICULTURE.—AUGUST.

Retrospect.—July, to the middle of the month, was of an ungenial character; but there exists so great a disproportion between the meteorological phenomena of places, not even remote, that it is impossible to give any description of weather or results which can be generally applicable. Thus whole columns of reports refer to storms, on the 6th July, with devastating hurricanes, and hail, which laid waste fields, gardens, orchards. With us, not thirty miles direct west from London, the day was one of splendid sunshine, but oppressive heat. At eight, P.M., red and sombre clouds fringed the north-west horizon, wherein a few faint flashes were occasionally discerned; and two hours after, a fine cumulus cloud, in the south-east, was frequently illuminated. Not a roll of thunder was heard, nor did a drop of rain fall; and the next day was still more beautiful. The ground was dust dry; and though the weather had become rainy on the whole, the subsoil remained dry. Thus it will be evident that all our statements must be purely local and comparative; but, upon the whole, vegetation may be considered healthy and promising, though we are constrained to qualify our favourable statement with the more assured fear of short and injured crops of apples, pears, plums, cherries, and grapes.

Strawberries failed terribly, in ground so dry as ours, where rain scarcely fell till after the scorching, sudden heat of June, and nothing but well-water could be obtained. They have been numerous, though late, in irrigated gardens, and in rich, moist, retentive soils.

Operations in the Kitchen Garden.

First week.—If *turnips* are not already sown, omit them no longer, otherwise the bulbs will be small: there is a yellow, high-flavoured variety, which we seldom see; the yellow Dutch, or Maltese, are excellent.

Sow the Yorks, Nonpareil, and other favourite cabbages, within the first ten days, for coleworts, and spring hearting plants: the precise season depends on the experience of local capability; but, in every instance, a great allowance of manure must be given to the final beds: the seed-plots need not be rich with manure. Sow *cauliflower*, and again about the twenty-first day; and repeat, as occasion requires, sowings of small salading, radish, lettuce, also carrots, and onion for early spring use; parsley for a main crop. *Second week:* Sow the chief crop of winter spinach and endive.

Celery.—Transplant the last set of plants; and earth up very carefully those in the earlier trenches.

It is always prudent to consult the habits of plants for rotation, in reference to the varieties of soil. Loams, sand, rich and poor ground, are words of common occurrence; but they express little. A good loam is a combination of clay, sand, chalk, and oxide of iron, with chemical traces of phosphate and sulphate of lime; but these constituents admit of fifty modifications; yet, if the colour be hazel or rich brown, the texture unctuous, but not clodding, it is a soil wherein (when new) all the *Brassicas* will come to perfection without manure; and though, after a period of cropping, the natural salts may be reduced, yet manure, with the salts of ammonia (all rich in nitrogen), will restore it to heart directly. If sand abound, potatoes flourish the more; and these, as well as celery, revel in vegetable, peaty soils. Now, all soils must be duly enriched to bear successive crops; but rotation, to a certain extent, is still required; and, therefore, we would endeavour to make potatoes and *Brassica* alternate, recollecting that *nitre* (or saltpetre) is congenial to the former. After celery may succeed onions, because they like deeply wrought and enriched earth. Peas and kidney-beans affect nitrogenous earth with plenty of vegetable matter; and broad-beans like a stiff loam; herein the latter and the *Brassicas* may also alternate. These general directions are not given dictatorially, but are intended to induce watchfulness and forethought.

FRUIT DEPARTMENT.

Wall trees.—Many gardeners advocate and practise a much earlier regulation of peaches, nectarines, apricots, and plums; but they either overlook the vigour of the July shoot, or prefer two operations. It may be very well to cut right away those rampant shoots, which are fore-right; but we can see no advantage whatever in taking out young wood till the summer growth be completed; and particularly in a season like the present, which is at least a fortnight later than usual. Within the first week of this month, however, it is quite time to look over every tree; and selecting the shoots best prepared to be succession bearers of next year, to nail them in due order, and then to cut out every superfluous shoot. By so doing, the fruit will still be guarded by leaves, and yet exposed sufficiently to the maturing power of the sun. All spur-bearers ought to be pruned rather low, so as to cause the lowest buds to swell. Were apples, pears, and cherries cut back in July, three or four wood-shoots would break from lower buds, every one of which must again be shortened. The *wall-trees* and *espaliers* ought now, however, to be brought into neat, trim figure, not by close spurring, for that is the work of winter, but by due fore-shortening to within five or six eyes above the origin of the brushwood and secondaries, which advance from spurs already formed, or that may be converted to such by judicious pruning.

Vines are late: every lateral and useless green shoot should be removed, to let the sun have full power upon the main leaves and future bearing-wood.

Strawberries.—By the middle of the month, the runner-plants are pretty well rooted; and if the portions of ground intended for beds or rows be moderately moist, they can be more safely planted out than at any period of the autumn. To prepare beds, first scatter a peck of bone-dust over every pole of the surface; then open an eighteen-inch deep trench at one end, and carry the soil to the other; place four or five inches of good manure at the bottom; turn in half the soil of the next adjoining space, and fork it up with the deposited manure, laying on an another coat of manure, but only of half the depth, and place upon that the earth remaining in the second trench; so proceed, till the plot be completed. This work should be done early in the month, to allow of settling; and at the time of planting, fork over the surface for the first row, and set the runner-plants six inches apart, with as much soil as possible adhering to their roots, and give water to each. Work backward, and finish off, so as not again to tread the soil. Place each row two feet distant from the row last planted; and thus, at the end, there will be a bed formed so thoroughly in heart, as to remain richly fertile for three entire seasons. There will be another advantage from such thorough preparation of land; for when the strawberries become old, they can be digged in; and the site, with a little fresh dung, will thus be ready for any vegetable crop, deep enough, and stored with vegetable-decaying substances: thus a whole garden may be gradually trenched and enriched, rewarding labour all the time by one of the most delicious fruits due to industry. Of varieties, none equal for high flavour the old pine; and, if obtainable, the genuine purple hautbois. Kean's is a weighty bearer, early, and very prolific. British Queen, large, fine-flavoured, a good bearer where it takes: and Knight's Elton, late ripe, tart, and exceedingly handsome.

Cut away all the runners from plants which have done bearing, always keeping the rows distinctly apart; but never dig the spaces, hoeing lightly the surface only to destroy weeds. Keep all fruit plots, in like manner, clean and orderly.

Bud cherries, plums, apple and pear-trees.

FLORAL DEPARTMENTS.

Keep the ground clean; transplant perennials and biennials. Propagate, by off-sets, auriculas and primulas; support sweet-peas and other climbers; gather seeds, and remove all annual plants that are past flowering. Bud roses of every desirable variety, some on low, others on high stocks, as standards. Prune evergreens, dress lawns, roll them and the gravel walks.

FORCING DEPARTMENT.

Keep up a full growing heat in the pine stoves.

The *late Vinery* ripens its fruit, and therefore should enjoy abundance of air. If the nights become cold and damp, it must be prudent to light fires early in the day, so as to warm the flues, letting a stream of air pass from the front to an opening in the back-wall, under the sashes, which we hold should always be fixed, to avoid the temptation of leaving them open, and thus admitting foggy, damp air. West's St. Peter's will keep all winter, provided the house be dry; but its delicate berries suffer speedily from mouldiness.

Melons ripen fast, and like plenty of air: the glasses should be tilted, but not slided down, unless it be during the warmest nights; the heat by sun cannot be too high, provided the air be given behind by tilting.

Greenhouse plants are generally exposed; but they ought to have a north aspect, or rather, be in inclosures made of well-kept yew hedges. Geraniums are now propagated by cuttings; and these should have bottom heat, to strike in, and then be potted off into pots suited to their balls of roots.

Camellias are best in cool, shady pits, till the power of the sun abates. Heaths cannot have too much air, but should be under glass, with a northern exposure. At the end of the month begin to take up, and carefully pot some of the best shaped small Pelargoniums that have been in parterre.

Examine all the flues and water-courses, seeing that there be no defect in any machinery.

DENT v. ROYAL FARMERS' INSURANCE COMPANY.—In this case the Company disputed the claim made upon them for a loss by fire. The question was referred to arbitration, and an award given in favour of the Company, with full costs. This Company has only disputed two claims since its establishment, and in both cases the result was the same.

AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR JULY.

As is invariably the case at this particular period of the year—one of the greatest importance to the community at large, from the near approach of harvest work—the weather and the state of the crops in the fields have been the leading topics of discussion during the whole of the month just concluded. As usual, a multiplicity of statements has reached us from nearly every part of the United Kingdom, relative to the future prospects of the agricultural body: yet, many of them having evidently been written without a correct knowledge of matters in general, we feel some little difficulty in arriving at accurate conclusions. However, it appears to us tolerably evident that, notwithstanding the assertions of some parties to the contrary, the wheats (though their progress towards maturity has been considerably impeded by the prevailing changeable atmosphere, and which must, of course, render the commencement of harvest somewhat later than usual), with some few exceptions, have not suffered to any serious extent. It is quite true that, in places, they have been caught by the blight; but the instances are not, in our opinion, sufficiently numerous to warrant us in joining in the cry of alarm which has been so assiduously spread within the last two weeks. Looking, then, at all the circumstances which bear upon the future prospects of the agricultural body, we are free to confess that, should the weather during the next month prove fine, a full average supply of wheat will be gathered in most parts of England. The rains which fell during the last fortnight of the month have, as might be expected, been taken advantage of by the holders of wheat, who have raised their pretensions, not only at Mark Lane, but, likewise, at the whole of the leading country markets, where the prices of that article have improved from 3s. to 5s. per quarter, at which advance the millers have purchased freely. It would, of course, be impossible for us to say at what point the improvement may stop, as everything must, for some time hence, be principally regulated by the state of the weather; still, it is pretty evident that, from the fact of the stocks in the hands of the growers (arising from the unusually large consumption going on for some time past in our manufacturing and other districts) being by no means large for the present season, much lower prices than those now ruling cannot reasonably be expected. Besides which, the stocks of both free and bonded foreign wheat at this time in the country are extremely limited, without any prospect of any material addition to them for some time hence, although fresh supplies will from time to time continue to come in. Our letters, generally speaking, report in favourable terms of the crop of barley; yet we have advices from many quarters to the effect that extensive breadths have been lodged in some of the barley districts. Oats, beans, and peas, are well represented, and very large growths are expected by the growers.

In all quarters the appearance of the crop of turnips is extremely good. This, of course, is a matter of great importance to our graziers, who will now have an opportunity of feeding their beasts and sheep with what may be considered good and useful provender. Swedes are also looking well, and we expect a large crop of them. In some parts the hay harvest has been brought to a conclusion, under, for the most part, favourable auspices; while a good second crop may be fully expected. For quality and quantity, the supply of grass has never been exceeded.

Both in Ireland and Scotland, the weather has been extremely changeable; while the heavy rains appear to have done considerable damage to the turnips, as also to the heavy wheats and barleys. Yet, the accounts state that an average growth of those articles may be expected. The best wheats and oats have been in fair request at full prices; but all other grain has moved off slowly, and the rates have been with difficulty supported. The shipments of Irish oats have been large; those of all other grain limited.

The great attention now paid to the working of the new tariff induces us again to enter into the question of the imports of live stock, under that measure, for our markets, during the past month. On a comparison with those of previous months, we find a very great and important improvement in them; indeed, they have very considerably exceeded the expectations even of the most sanguine in these matters, with every prospect—knowing as we do that the Dutch graziers are making increased exertions to augment their supplies—of further improvements in them. We find, then, that from the 8th to the 26th of this month, the importations into London and at the outports—such as Hull and Southampton—were as under :—

	Head.
Oxen and cows	1,168
Sheep..................	136
Lambs..................	20
Calves.................	49
Total	1,373

Out of the above quantities, 1,079 oxen and cows came to hand from Rotterdam, and 89 from Hamburgh: the whole of the sheep, lambs, and calves being derived from the former port. Respecting the quality and condition of these arrivals, we have to state that they have proved extremely good; still, the meat does not come up to that produced at home in its eating qualities. However, it has proved useful, as will be seen by the quotations. For instance: in Newgate and Leadenhall markets, beef has produced from 2s. 10d. to 3s. 4d.; and mutton, 3s. to 3s. 8d. per 8lbs.; at which clearances have been effected without difficulty. We may mark, also, that most of the beasts carry a good quantity of internal fat, which, of course, renders them valuable to the slaughterers. The total imports of beasts this year have been 5,660 head.

The following is our usual monthly statement of the supplies and prices of fat stock exhibited and sold in Smithfield cattle market. The former have been as under :—

Per 8lbs. to sink the offals.

	s. d.		s. d.
Beef ....from	2 10	to	4 6
Mutton	3 6	,,	5 0
Lamb	5 0	,,	6 0
Veal	3 10	,,	4 8
Pork	3 0	,,	4 2

In comparing the above quotations with those at the same time in 1844, we find a considerable advance in them, as is thus shown :—

July, 1844.

Per 8lbs., to sink the offals.

	s. d.		s. d.
Beef ....from	2 4	to	4 0
Mutton	2 6	,,	4 0
Lamb	4 0	,,	5 0
Veal	3 0	,,	4 0
Pork	2 8	,,	4 0

During the month just concluded, the following supplies of fat stock have been on offer, the statement also embracing those last season :—

July, 1844.

Beasts	12,010
Sheep and lambs	159,290
Calves	2,041
Pigs	1,863

July, 1845.

Beasts	12,292
Sheep and lambs	118,300
Calves	2,360
Pigs	1,900

Owing to the great falling off in the arrivals of sheep up to Smithfield market, the mutton trade has ruled very active, and the advance which took place in the currencies at the beginning of June has been readily supported. Lambs have also been maintained in value, with a very steady inquiry. Some fluctuation has occurred in the value of beef, arising chiefly from the large imports from Holland and the increasing supplies from Scotland by steamers; yet on the 28th beef advanced from 2d. to 4d. per 8lbs., the primest Scots readily producing 4s. 6d. per 8lbs. Up to the 15th, the beasts from Norfolk, Suffolk, and elsewhere, came to hand in very middling condition: but towards the close of the month a decided improvement was noticed in them, as well as in the sheep. To the numerous inquiries made of us respecting the future value of stock in Smithfield, we beg to observe that our firm impression is that that of beef will not be maintained beyond the next fortnight or three weeks; but as regards that of sheep and lambs—arising from the shortness of stock in the country—we are of opinion that it is safe for the next six weeks. The simple question for our readers to consider is, how far it is expedient to over-supply our markets. If they send to the Metropolis only moderate supplies, and in which they would be pursuing a correct course for their own interests, our opinions will be verified. On the contrary, large arrivals would produce a heavy effect upon demand, and much difficulty would be experienced in maintaining present rates.

The droves of beasts for Smithfield have been chiefly derived from Norfolk, Suffolk, the northern districts, and the western and midland counties.

Notwithstanding the changeable state of the weather, extensive supplies of slaughtered meat have been again received up to Newgate and Leadenhall markets, they having amounted to nearly 1,000 carcasses of beef, 6,500 do. of mutton, 1,200 do. of lamb, 950 do. of veal, and 4,000 do. of pork. The trade in the above markets has ruled firm, at fully previous rates.

EAST CUMBERLAND.

As harvest approaches, every week that passes is of more importance than the preceding one, as the crop daily approaches to that state which becomes more critical as it is more influenced by, and dependent on, the state of the weather. Taking the season altogether, it may be considered as one of the most favourable description—much more favourable than on an average of years, the principal drawback being its lateness. It promises at present to be about perhaps three weeks more so than last year, but that will necessarily depend much upon the state of the weather between now and harvest. At present it threatens to be still later than lately anticipated, as the weather for some days back has been cloudy, with an extremely low temperature for July. During the month of May the temperature was exceedingly low, which retarded vegetation very much, but which circumstance was partially made amends for by the very warm weather experienced during a part of the month of June; and there being a sufficiency of moisture in the ground, produced by gentle refreshing showers, crops of all descriptions progressed rapidly to maturity. Its effect upon the wheat crop threatened to be unfavourable, as the straw increased so fast in length that, on dry loamy soils, and where put in in good time, there was every appearance of its being laid before the ears were fully developed, and a consequent bad sample of grain and a deficient yield. Fortunately this has not turned out to be the case, and entirely owing to the state of the weather, there never having been what could be called a heavy shower of rain up to the present time. Though showery for some weeks, the rain has fallen gradually, and never a great weight of it at any one time. During the time the earlier wheats were in bloom, the weather was frequently boisterous, accompanied with rain and a dull cloudy atmosphere, which would, of course, have an unfavourable effect. The later wheats bloomed under more favourable circumstances. On cold-bottomed soils, especically in the later districts, the wheats are thin and weakly, and suffered considerably from the boisterous weather a few weeks ago; and the effects of the wireworm on the late sown wheat on dry soils is still visible. But should the weather be fine between now and harvest, a good crop of wheat may safely be calculated on. Barley is a bulky crop, and stands well, owing to the absence of heavy rains, and bids fair to be well fed and strong in the pickle; but may not be so fine in the skin, in consequence of the lateness of the season. Oats promise to be a fair crop, with a considerable quantity of straw, but not quite so bulky as in some former years. Grass and clover seeds have hit well in all kinds of grain crops, and look strong and healthy; a good foundation is thus laid for a good hay crop next year. The weather being favourable for hay-making, very considerable progress has been made, and much of it has been secured and in excellent condition. The weather, though showery, and, consequently, retarding the operation of hay making, was not at all such as to do any injury to the quality. Sown grasses offered to be light during the month of May, being short, with the clover thin and weak. But the succeeding favourable weather has produced a considerable change for the better, and the crop has turned off an abundant one. The same applies to meadows, they having produced a very good crop; the rich natural meadows by the sides of rivers, &c., are better than for some years back. The weather, at the time for preparing the land for green crops, was exceedingly favourable, and there was every opportunity of getting the seed in under more than ordinarily favourable circumstances. Potatoes come well, being little affected with dry rot; and though they look only indifferent in some situations, on the whole they bid fair to be a good crop. There was never, perhaps, a finer season for turnips; there being plenty of moisture in the land, they came well, are growing rapidly, and promise to be a better crop than for many years back. A large breadth has been sown, the opportunity for doing so being now so great, owing to the use of guano, and so much land being now rendered fit for that crop by draining. Pasture lands have grown well, and cattle have improved in proportion; the influence of this has been felt in the markets for grazing stock, which have sold well, at considerably improved prices. Store sheep, too, have been selling well. Fat has maintained its price; and the demand being good, at better prices than for some time back, has caused many half-fat animals to go to market. The tendency of this must be to keep up the price, it requiring more of this sort to meet the demand than if they had been properly fattened; this must, of course, prolong the scarcity. The price of grain has been nearly stationary; the last two market days the sale has been a little more lively, at perhaps a shade of improvement in price. Labour has been plentiful, and all employed that were willing to work. Mowers have been scarce, and many have felt a difficulty to get the grass cut so fast as they wished, and the price by the acre has been higher than usual.—July 23.

AGRICULTURAL INTELLIGENCE, FAIRS, &c.

BRENTWOOD FAIR, on Friday last, was well attended by buyers; but the show was very short; consequently those sold went off at prices beyond those at previous fairs. It was remarked as a singular circumstance that there was not a single lot of Scot beasts shown. The steward of the Duke of Wellington was present, and bought a lot of very lean four-year-old short-horned steers at £15 a piece, and Mr. George Simpson sold to the noble duke's agent, ten little polled beasts at £7 10s. a piece.

COLCHESTER FAIR.—Owing to several fairs, Ipswich Races, and Braintree market, being held on Wednesday, there was a very thin attendance at this fair, and the show of stock was very limited compared with former years. There were between four and five thousand sheep and lambs penned, the major part of which were sold at prices quite equal to those which have been realized at Colchester market for the last few weeks. There were a few pens of very superior fat wethers, grazed by a farmer near by, which were greatly admired, and sold at prices full 3d. per stone beyond what has been before realized this season. There were no fat beasts, and not more than 400 of other descriptions. Fresh beasts sold well, but the demand for lean ones was slack, and sales could not be effected unless at a slight decline in prices. The horse fair was by no means well supplied. High prices were asked for the few best cart colts, but we did not hear of any sales effected at higher prices than were obtained for similar qualities and age at St. John's Green fair. Cart horses of mature age and nags were of secondary and inferior descriptions, and very few transfers took place, as there was an evident dulness in the trade throughout.

CROYDON WOOL FAIR.—The quantity for sale was said to be greater than last year; but as most of the farmers merely sent samples, the exact amount could not be ascertained. The principal buyers were Messrs. Legg, Lewes, Powell, Gibbs, and Goodhart; but there were not a great many sales effected during the morning. The company dined at the Crown, J. W. Sutherland, Esq., in the chair; there were present—T. L. Robinson, Esq.; — Chasemere, Esq.; T. Weal, Esq.; H. Rowland, Esq., and Messrs. Pymm, Langford, King, Stenning, Gutteridge, Brown, and about 40 of the principal farmers of the neighbourhood; J. Ellman, Esq., acted as deputy chairman. Both buyers and sellers appeared at first rather shy, there being a feeling on the part of the latter that, from the present state of the wool trade, there ought to be an advance, while the former did not seem inclined to meet this view of the case. The average price appeared to be about 13½d. for ewes and wethers, and about 15½d. for tegs; sellers were trying to get 14d. and 16d. Mr. Stenning offered 600 wethers and 400 tegs at 15d. all round. Mr. Legg said he would give 14d. all round. Mr. Powell said he would advance a little on Mr. Legg, and would give 14¼d. Mr. Stenning declined to sell. Mr. Weall announced that he had sold all his tegs at 16d., and his ewes at 14d. *(hear, hear).* Mr. Legg then offered Mr. Ellman 14d. and 16d. for his wool. Mr. Ellman said he had offered it at 16d. all round, and he should not take less. If he kept it a little longer he had no doubt the markets would get up, and he should obtain a better price. The Chairman said, that but for the large importations from Australia, wool at the present time would be 16d. or 18d. per lb. In the course of the evening a good many sales were effected, and altogether the result of the fair was considered to be satisfactory.

NORTHAMPTON WOOL FAIR was the largest that has taken place in this town. From an early hour in the morning waggons laden with wool began to arrive, and at eleven o'clock the arrivals had been so numerous that the space ordinarily devoted to the beast and corn markets was fully occupied. The total quantity of wool was 30,302 fleeces. The first part of the morning business was rather slack, prices not suiting the buyers. Later in the day, concessions on both sides having taken place, business became brisk, and large quantities of wool changed hands at good prices. The highest price, 35s., was obtained by the Marquis of Northampton. The lowest price paid was 29s. The average price was supposed to be about 32s. 6d. Some of the principal buyers were Messrs. Whitworth and Co., Varley, Vickers, Marriott and Son, Marshall, Coles, and Jacquest. We are informed that a large quantity of wool was disposed of that was not brought to the fair. Nearly every lot pitched was sold, but the weighing and clearing away were not finished until past midnight. We would suggest to the committee the propriety of adopting a different method of weighing the wool on future occasions. Much time and labour might, we are persuaded, be thus saved. There was an ordinary at the George Hotel, at two o'clock, which was attended by between thirty and forty persons. Nothing of general interest occurred.—*Northampton Herald.*

REVIEW OF THE CORN TRADE

DURING THE MONTH OF JULY.

The weather has since we last addressed our readers been extremely various, at times so cold and wet as to give rise to serious uneasiness respecting its probable effects on the crops; but these periods of unfavourable weather have generally been succeeded by short intervals of fine, during which powerful sunshine and drying breezes have been experienced, so that no material harm has been done.

The frequent changes which have occurred have naturally been productive of some excitement; for no sooner have the fears of one day been allayed by the auspicious weather which has succeeded, than an alteration for the worse has again occurred, calculated to revive the misgivings previously entertained respecting the ultimate result of the harvest. Under these circumstances, we need scarcely say the securing of the hay crop must have been attended with unusual anxiety and difficulty. In the Southern counties, a large proportion was carted before the fine weather of June broke up; where this was not the case, the quality must have been a good deal injured. Even in the immediate neighbourhood of London, many fields where the grass was cut quite in the beginning of the month it remained out till the 18th and 19th inst., it having at no previous period become sufficiently dry to admit of its being safely carried to the rick yard. In the North the bulk of the hay is still abroad, and much of the grass uncut. With all these disadvantages the yield will, we believe, be large, but the quality must of course be extremely various.

With respect to the appearance of the growing grain crops, reports are, as is usually the case at this season of the year, of a very contradictory character. Rumours of injury done to the wheat plant, or likely to be sustained under certain combination of circumstances, have at different times during the month been very prevalent. At one period, the heavy rain was said to have broken down the straw to such an extent as to render it impossible for the plant ever to regain an upright position. After a few days of fine sunshine, the matter was, however, admitted not to be quite so bad as at first anticipated; subsequently the straw was said to be of too dark a colour, and we have also heard of red gum maggots and blight. We do not mean to affirm that these reports have been wholly without foundation; but sure we are that the mischief likely to result from the weather hitherto experienced has been much exaggerated.

That too much moisture has fallen to be altogether favourable to wheat is unquestionable; but a very large breadth of land is under this grain, which, with the superior drainage and other improvements in the cultivation, will, we think, go far to counteract the effects of the superabundance of rain. The most serious cause for fear in our opinion is not that which has already occurred, but rather the danger which the crop may still be exposed to before it reaches maturity. The want of genial warmth, both in the spring and summer, has kept back the plant, and it is admitted on all hands that the harvest must inevitably be a late one. Here lies the real danger, a fortnight lost or gained in the fall of the year greatly lessens or increases the risks to which the produce must be exposed ere it reach the stack-yard. Up to the present period there is, we think, a fair promise of an average quantity of wheat, how the quality will turn out must depend on the weather in August and September. A considerable proportion of the growth will certainly not be secured till the latter month.

The unsettled state of the weather, and the various reports it has given rise to in respect to the probable result of the harvest, have caused more or less excitement in the trade, and prices of the article have steadily advanced in all parts of the kingdom. The rise has been more important at those markets depending entirely on the farmers for supplies, than at the towns where stocks of free foreign wheat, however small, were held. That the latter are quite trifling admits of no doubt, and unless the deliveries from the growers hereafter become more plentiful than has been the case of late, the usual order of things will be reversed. Instead of London, Liverpool, &c. leading the rise, as in ordinary years, the advance has this season had its origin in the agricultural districts. Already the value of wheat is nearly if not quite as high at the shipping ports on the east coast as at Mark Lane, good qualities of red having latterly been sold in Lincolnshire and neighbouring counties at 52s. to 53s. per quarter.

Those farmers who have been able to hold till now, are therefore obtaining more remunerating rates than any that have been made since last harvest. What quantity still remains in the hands of the growers we have no means of ascertaining; but that millers and merchants have little or nothing to fall back upon is certain. It is therefore probable that even with fine weather the recently established advance will be maintained until the new produce begins to come to market. Except in some very early districts, no wheat is likely to be cut till the second week in August, and reaping will probably not be general till about the 18th of next month; this is later than has been the case years past, and as the consumption of bread stuffs is at present extensive, there is little prospect of any surplus of old wheat remaining in the kingdom.

The aspect of the growing crops of spring corn and pulse is generally well spoken of. Barley is said to wear a very promising appearance in those counties where this grain is most extensively cultivated; the only complaint we have hitherto heard of is its somewhat too great luxuriance, and its consequent liability to be lodged: indeed in some districts it has suffered from this cause, though not to such a degree as to give rise to apprehension.

Of old English barley there seems to be scarcely any remaining, and in many districts supplies from the growers have wholly ceased. There is, however, still a considerable quantity of foreign left over, partly free and partly in bond. This circumstance, and the limited character of the demand at this season of the year, have prevented prices rising, and quotations of the article have remained very nearly stationary as well in the agricultural markets as at the ports where the bulk of the foreign is held. The present duty, 9s. per quarter, is likely to check further importations from abroad, and will prevent that under lock being entered for consumption; it is therefore more probable that the value of the grain will tend upwards than that any abatement from existing rates will occur.

The weather, though too wet for wheat, has been favourable for the growth of oats, and the reports relative to the outstanding crop are of a very satisfactory nature, not only as regards England, but also from Ireland and Scotland. The trade in this article has taken a different turn to what was expected, the advance established in prices at the principal English markets during May and June, in consequence of the extreme scarcity of the supplies, brought forward larger arrivals from Ireland in July than had been calculated on; and instead of the further rise anticipated, a reaction has occurred. The Irish receipts alone would probably not have had this effect; but about the same period that increased supplies from thence began to make their appearance at the principal English ports, rather important arrivals of foreign also came forward. We are inclined to think, however, that prices have now touched the lowest point; old corn is sure to be required for some months to come, and as there are comparatively few oats of home growth in the country, the recent receipts, and any quantity which is likely to arrive either from Ireland or abroad are likely to be all required.

Beans have held out rather better than was expected; the quantities brought forward at the different markets have, it is true, been sufficiently unimportant, still supplies have about kept pace with demand, and for some weeks past prices have scarcely varied. What we have just said with respect to oats is equally applicable to beans, viz., even after new shall have begun to come to market old will still be wanted; and, as there can be no doubt that the last crop is well nigh exhausted, we do not anticipate lower rates. The arrivals of foreign have been small throughout the spring and summer: from the north of Europe very few have been received; and the cargoes from Alexandria imported into London, Liverpool, Bristol, &c., have not on the whole amounted to the quantity expected. The duty on this article fell to 3s. 6d. per qr. on the 24th of July, the lowest rate chargeable since the existing corn laws have been in force. The stock in bond in the kingdom is by no means large; it amounted on the 5th inst. to 46,528 qrs.

With very trifling deliveries of peas from the farmers, and scarcely any receipts from foreign countries, the inquiry has continued slow; and notwithstanding the scanty nature of the supplies, quotations have hardly varied since our last. Good boiling peas have brought very nearly the same price all over the country, viz., 38s. to 42s. per qr., according to quality; and maple grey and other feeding sorts, 36s. to 38s. per qr. The duty has gradually receded, and is now only 4s. 6d. per qr., with a prospect of its receding another 1s. in a week or two; the stock at present under lock amounts to 13,455 qrs., will probably be liberated at the 3s. 6d. duty.

We shall commence our remarks relative to the trade at Mark Lane by laying before our readers the quarterly account of the arrivals into London, with a statement of the supplies during the corresponding quarter in 1844, some useful information being afforded by placing the quantities received in the respective periods in a juxta-position.

Arrivals from March 31 to June 28, 1845.		Arrivals from March 31 to June 28, 1844.	
Wheat, English-	100,807 Qrs.	Wheat, English-	80,468 Qrs.
Scotch -	32	Scotch -	1,410
Irish -	100	Irish -	10
Foreign-	44,315	Foreign-	142,993
Total - -	145,254	Total - -	224,881
Barley, English-	18,283	Barley, English-	20,690
Scotch -	7,807	Scotch -	4,110
Irish -	447	Irish -	1,870
Foreign	87,625	Foreign	179,607
Total - -	114,162	Total - -	206,277
Oats, English -	13,841	Oats, English -	28,422
Scotch- -	24,418	Scotch -	27,557
Irish - -	162,289	Irish - -	213,139
Foreign -	147,206	Foreign -	36,964
Total - -	347,764	Total - -	306,083
Beans, English-	9,328	Beans, English-	14,237
Scotch -	—	Scotch -	158
Irish - -	—	Irish - -	12
Foreign -	20,931	Foreign-	12,929
Total - -	30,259	Total - -	27,336
Flour, English -	83,661 Sks.	Flour, English -	77,582 Sks.
Scotch -	—	Scotch -	—
Irish -	608	Irish -	444
Foreign -	376	Foreign -	50
,, -	3,922 Bls.	,, -	14,908 Bls.
Total - -	84,645 Sks.	Total - -	78,076 Sks.
	3,922 Bls.		14,908 Bls.

We shall make no comments on the differences shown in the various items, but leave the figures to speak for themselves; it may be as well to observe, however, that since the close of June the arrivals of wheat have fallen off materially, the weekly supply of English having only averaged about 5,000 qrs. Though the town millers have acted cautiously throughout the month, the value of wheat has since the commencement risen 4s. to 5s. per qr. at Mark Lane; 50s. to 52s. was then about the top price of red, whilst 54s. to 56s. per qr. have latterly been currently paid. The first Monday in the month wheat began to tend upwards, on the 14th the advance amounted to about 2s., and a similar enhancement was again established on that day-week. So important and general an advance as has occurred within the last two months has caused a material alteration in the position of the averages, and though it is still doubtful whether any important fall will take place in the duty, there is every appearance of its receding a step or two below the maximum point. The last London average was 55s., and the general weekly return for the kingdom published on the 24th of July, 50s. per qr.; it will, however, still require a rise of 2s. 7d. per qr. on the aggregate by which the duty is regulated, to insure its fall below 20s. per qr.

For some time past the entries of foreign wheat for home consumption have been trifling in the extreme, the possibility of a lower duty having induced holders of bonded to allow their property to remain under lock; we have therefore had no additions to the stocks of free foreign by fresh importations, all that has come to hand from abroad having been warehoused in bond. The previously small quantity of duty-paid wheat in granary has consequently been further diminished, and there is now very little of good quality remaining at this port. The demand has at no period of the month been lively, still fine Danzig and the best sorts of red wheat have excited a moderate share of attention, and the rise on these descriptions has been fully as great as that established on English. About the third week in the month superior Rostock and Wolgast red wheat was sold at the high price of 58s., and for high mixed Danzig 60s., and we believe in one instance as much as 63s. per qr. was obtained. The transactions in bonded wheat have been comparatively unimportant, owing principally to the very high pretensions of holders. A disposition to enter into speculative investments has from time to time been manifested, but on every occasion business has been checked by the extravagant rates demanded. Moderately good parcels of red wheat have changed hands early in the month at 35s. to 36s., subsequetly at 37s. to 38s., and more recently at 40s. to 42s. per qr.; whilst for high mixed Danzig prices have reached 48s. per qr.; these prices are out of proportion to the value of the article free; and, even supposing the duty should hereafter fall to 18s. per qr., the buyer could scarcely be expected to reap any advantage; it is, therefore, by no means surprising that the operations should have been on a restricted scale. By the latest official account, published 25th inst., it appears that there were 365,702 qrs. of wheat under lock on the 5th of July, of which 110,564 qrs. were in the London warehouses.

The steady enhancement which has taken place in the value of wheat has obliged the millers to put up the price of flour. For some time there was much uncertainty respecting the nominal top quotation, but on the 14th the principal manufacturers agreed to fix it at 49s. per sack, which advance has since been maintained. Norfolk and other ship qualities have risen in the same proportion, good households which a month ago were obtainable at 34s., having lately commanded 39s. per sack. Some further arrivals of flour have taken place from Montreal for which high rates have been made, say for the best brands 28s. to 30s. per barrel. United States parcels in bond have been a good deal sought after and have risen 2s. per brl.

The arrivals of English barley into London have been very small; trifling, however, as has been the supply, it has proved sufficient to satisfy the limited demand. In the finer descriptions scarcely any thing has been done, and it is difficult to give accurate quotations of malting barley. Distilling sorts have also been neglected, and even feeding qualities, which have alone excited attention, have not risen in value. The latter circumstances may be accounted for by the fact that some quantity of free foreign barley still remains on the market, holders of which have been anxious to realise and have offered the inferior kinds at lower rates than sellers of English have been willing to accept; the loss to the importers must be considerable, as the greater part was bought abroad when prices were much higher both there and in this country than they have been of late, still arrivals continue to come forward from time to time partly from the Baltic and partly from the Black Sea. Since the duty has been at 9s. the greater proportion of what has been received has been landed under lock, and the quantity in bond has, therefore, slightly accumulated. On the 5th July there were 47,318 qrs. under the queen's locks in the kingdom against 18,972 qrs. the preceding month.

The maltsters have experienced some difficulty in inducing the brewers to pay previous prices for malt: really fine qualities having, however, become comparatively scarce, the best descriptions have been held very firmly at former rates. Secondary and inferior descriptions have been sold at irregular prices according to quality.

In our remarks relative to oats last month we predicted increased supplies from Ireland, and subsequent events have proved that our opinion on that point was correct. In addition to fair receipts from the sister Isle we have had large arrivals from abroad, and though the supplies from our own coast and Scotland have been scanty, the value of this grain has tended downwards. The fall, however, has been almost wholly confined to secondary and ordinary kinds.

Of the Irish oats which have come to hand, more than the usual proportion has consisted of light and otherwise inferior qualities, whilst the bulk of the foreign cargoes have arrived in very bad condition—some so hot as to be wholly unfit for use without being first landed and restored in some measure to condition. Under these circumstances importers have naturally been very anxious to sell from on board ship, and to effect this object they have shown a willingness to accede to low terms; the fall on some varieties from the highest point has amounted to 1s. to 2s. per qr. So material a reduction in the price of foreign has of course had more or less influence on the value of oats of home growth, and the trade has on the whole been exceedingly dull. As regards the future there is not much reason to anticipate higher rates, though we are inclined to think present quotations will be supported; the grounds for supposing that no great rise can take place are, firstly, the large quantity afloat unsold at this port; secondly, the expected Riga and Archangel supply, which must now be close at hand; and further, the receipts which must still be calculated on from

Ireland; added to which the crop on the ground is generally well spoken of, and green food of all kinds is abundant.

Beans have come forward sparingly; and, with only a limited retail enquiry, the scarcity of the article has enabled sellers to obtain quite previous prices. Good ticks have latterly been selling at Mark Lane at 37s. and 38s. per qr., and handsome samples 40s. and upwards. The few cargoes of foreign beans received have been placed without difficulty at high rates, and importers must have realised good profits. Egyptians in bond have been held at 29s. and even 30s. per qr. since the fall of the duty to 3s. 6d. per qr. The stock under lock in London consisted, on the 5th inst., of 14,206 qrs.

Of English white boiling peas scarcely a sample has appeared at market and very few maple or grey have come forward; the previous value of the former as well as the latter has therefore been fully maintained, though, at this period of the year, the demand for boiling peas is exceedingly trifling. It is not improbable that the duty in this article may fall to 3s. 6d. per qr. in the course of a week or two.

In taking our usual retrospect of the grain trade abroad, the weather experienced in the different countries from whence we are in the habit of receiving supplies of grain, and the prospects in regard to the crops require to be particularly noticed. Contrary to what is usually the case, the character of the weather has during the summer been widely different in this country and continental Europe. Whilst we had rather an excess of moisture in the early part of the season, in many parts of Germany, Poland, and Russia, the crops were actually suffering for want of rain: and if dependence may be placed on the reports received from the principal Baltic ports, the produce of wheat in the districts where this grain is most extensively grown is likely to be very deficient. Owing partly to this cause, partly to the generally reduced state of the stocks, the foreign merchants have, notwithstanding the comparatively small quantity bought abroad on British account, exhibited very little anxiety to make sales of wheat, and the value of the article has gradually advanced at the chief shipping ports. At Danzig a good deal of speculation appears to have been carried on, which, with what has been drawn from thence to supply the consumption of the neighbouring town of Königsburg, have enabled holders to realize very full terms. Good high mixed qualities, the growth of 1842, have, it appears, excited the greatest share of attention; and by the most recent advices we learn that equal to 42s. per quarter free on board had been paid. Wheat grown in 1843 and 1844, being of inferior quality, had been sold much cheaper; the supplies received from the interior down the Vistula, having been placed with some difficulty at 34s. to 36s. per quarter, according to quality.

At Rostock, Stettin, and other lower Baltic ports, the stocks of wheat are stated to be very small, which, with the advices of an advance in the British markets, have caused the value of the article to rise materially at those places. The most recent accounts from Rostock inform us that there were no sellers below 34s. to 35s. per quarter free on board; and even at those rates it is stated it would be impossible to secure a large quantity of fine quality. At Stettin prices have lately risen to an equal height, contracts having been closed there for 61 to 62 lbs. qualities at 35s. per quarter free on board.

Of spring corn and pulse very little appears to be left on hand at any of the continental markets; and beyond some further shipments of barley and oats from Denmark and Sweden, there is not likely to be any exports of consequence this side of harvest, old stocks of most other articles being nearly exhausted. In Holland and Belgium the growing crops of wheat are by no means favourably spoken of, and prices are quite as high in those countries as in the British markets.

From the foregoing remarks it will be readily inferred that but little excitement would suffice to drive prices of wheat up materially all over Europe; and should anything really occur of a nature to detract from the productiveness of our own crop, it would be necessary to pay very high rates abroad to make good the deficiency. We sincerely trust that so unfortunate a circumstance may not take place; for though high prices might be a temporary benefit to the farmer, he, like the rest of the community, must ultimately be injured thereby. Nothing would so much increase the power of the Anti-Corn Law League as a deficient harvest: whilst, on the other hand, a plentiful crop and moderate prices would be a severe blow to the agitation.

The cheapest markets for wheat at present are undoubtedly Odessa and the Danube; and whether we may require imports or not, some quantity will, we doubt not, reach us from the quarter named. The latest reports from Odessa state that sales of capital new wheat, weighing 62 to 63 lbs. had been made there at equal to 23s. and 24s.: whilst for the common kinds, prices varying from 16s. to 20s. 6d. per quarter had been realized. Vessels were however scarce, and freights high, which would, it was expected, act as a serious check to business.

By the most recent advices from the other side of the Atlantic, we learn that the crops in the ground had materially improved in appearance, and that the trade in wheat and flour had become dull at most of the principal markets of the United States. Good brands of western flour were nevertheless still comparatively dear; and even with the rise which has lately taken place in the value of the article at London, Liverpool, &c., it would not pay to import. From Canada we learn that the advices from Great Britain of the 4th of July had given an impetus to business in flour, and that some rather important contracts had been closed at 24s. to 24s. 6d. per barrel. These rates are high in comparison with prices here: still we are likely to receive rather a large supply from thence.

CURRENCY PER IMPERIAL MEASURE.

July 28.

Wheat, Essex & Kent, red ..	48	56	White	51	62
Norfolk and Suffolk ..	48	51	Do.	50	60
Rye, new				30	32
Indian Corn				31	33

BARLEY, Chevalier, new	31	33	Malting	30	31
Distilling	27	29	Grinding	25	27
Scotch	26	28	Irish	—	—
MALT, Brown	50	53	Pale Suffolk & Norfolk	55	57
Ware pale	56	58	Chevalier	60	61
OATS, English, feed	21	23	Potato, &c.	24	26
Irish, Youghall & Cork, bk.	21	22	Cork, white	21	22
Dublin ,,	21	22	Westport	21	22
Clonmel ,,	21	22	Limerick	21	22
Londonderry ,,	21	22	Sligo	21	23
Newry ,,	21	22	Galway	18	20
Waterford ,,	21	22	Ballina	21	22
Scotch, feed ,,	23	25	Potato	25	28
PEAS, white, Essex and Kent, boilers			new	35	36
Do. fine Suffolk				34	36
Do. do. extra				37	38
Do. foreign				35	36
Do. non-boilers				34	35
Maple				35	36
Blue				—	—
Grey or Hog				34	35
BEANS, Tick, new	32	34	old	34	35
Harrow	33	35		35	37
Pigeon	35	36		38	40
Mazagan	30	32		—	—
FLOUR, Town-made and first country marks, per sack				48	53
Norfolk and Suffolk				38	42
Stockton and Yorkshire				37	40

COMPARATIVE PRICES OF GRAIN.

WEEKLY AVERAGES by the Imp. Quarter, from the Gazette, of Friday last, July 25th, 1845.	s.	d.	AVERAGES from the corresponding Gazette in the last year, Friday, July 26th, 1844.	s.	d.
WHEAT	50	0	WHEAT	54	1
BARLEY	29	6	BARLEY	34	5
OATS	22	4	OATS	21	5
RYE	32	8	RYE	36	4
BEANS	39	9	BEANS	37	7
PEAS	40	2	PEAS	37	3

IMPERIAL AVERAGES.

Week ending	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.	
June 14th	48	2	30	3	22	8	31	4	38	1	37	0
21st	47	10	29	9	22	7	31	2	38	6	38	6
28th	47	11	29	7	23	2	32	1	39	3	38	3
July 5th	47	11	29	10	22	8	31	0	38	10	39	5
12th	48	10	29	0	22	6	31	11	39	8	38	11
19th	50	0	29	6	22	4	32	8	39	9	40	2
Aggregate average of the six weeks which regulates the duty.	48	5	29	8	22	8	32	0	39	0	38	8
Duties payable in London till Wednesday next inclusive, and at the Outports till the arrival of the mail of that day from London	20	0	9	0	6	0	10	6	4	6	4	6
Do. on grain from British possessions out of Europe	4	0	0	6	2	0	1	6	2	0	2	0

Account shewing the Quantities of Corn, Pulse, and Flour imported into the United Kingdom, in the month ended the 5th July, 1845; the Quantities upon which Duties have been paid for Home Consumption during the same month, and the Quantities remaining in Warehouse at the close thereof.

Species of Grain.	Quantity imported.		Quantity entered for consumption.		Quantity remaining in warehouse.	
	qrs.	bush.	qrs.	bush.	qrs.	bush.
Wheat, from British Possessions	7078	1	7065	6	105	0
Oats, do.	850	0	850	0	—	
Peas, from do.	3145	4	2700	0	445	4
Indian Corn, do.	1340	3	1310	3	—	
Wheat, foreign	63096	3	1103	3	365597	0
Barley, do.	37751	4	8564	5	47318	3
Oats, do.	71348	6	46633	1	95566	7
Rye, do.	1	4	1	4	—	
Peas, do.	8366	3	991	1	13010	0
Beans, do.	15004	4	5648	1	46528	7
Indian Corn, do.	7520	4	1598	6	6977	4
Buck Wheat, do.	—		—		—	
	cwts. qrs. lbs.		cwts. qrs. lbs.		cwts. qrs. lbs.	
Flour from British Possessions	75522 3 15		74874 0 0		3177 0 27	
Flour, foreign	3078 3 0		320 1 14		223428 0 13	

PRICES OF SEEDS.

JULY 28.

Cloverseed nominal at present.

Linseed, English, sowing	52	58			
Baltic	—	—	crushing	40	45 per qr.
Linseed Cakes, English	11*l.* 0s. to 11*l.* 5s. per 1000				
Do. Foreign	7*l.* 7. to 7*l.* 10s. per ton.				
Mediter. & Odessa	40	44			
Carraway	44	46	new	48	50 per cwt.
Coriander	12	18 per cwt.			
Mustard, brown, new	8	12	white	12	14 p bush
Rapeseed, English, new	23*l.*	30*l.* per last.			
Hempseed	35	38 per qr.			
Trefoil	17	24	old	—	new —
Tares, Spring	6s. 6d. to 7s. 6d.				

PRICES OF HOPS.

BOROUGH, MONDAY, July 28.

The market for Hops is dull, the accounts from the plantations being very favourable. The duty is called 200,000*l.* to 210,000*l.* The former is most generally backed.

WORCESTER, July 26.—Our hop plantations continue to improve in growth and luxuriance; but, as a considerable portion is still heavy in blight, and likely to suffer from its effects, the whole produce may, after all, fall very short of the present estimate, which is set at 18,000 to 20,000 duty. There is more disposition to buy Hops to-day, several long runs having changed hands at the late reduction in price.

WOOL MARKETS.

BRITISH.

LEEDS, July 15.—In combing and clothing wools the prices are firm at late quotations, and the demand is steady for the supply of the current requirements of the manufacturers.

YORK, July 24.—We have had but a moderate show of wool, with rather a slow sale, at the following prices:—hog, 15s.; hog and ewe, 11s. to 14s. 3d.; locks and cots, 9s. 6d. to 11s.; moor wool, 7s. 6d. to 8s. per stone. This market, for the remainder of the present season, will be once a fortnight.

LIVERPOOL, JULY 26.

SCOTCH.—There has been a moderate demand for laid highland Wool this week. The accounts from the fairs are rather conflicting, which makes buyers act with great caution. In white Highland we continue to have nothing doing. There has been a few sales of cross and cheviot Wool of the new clip, at barely late rates.

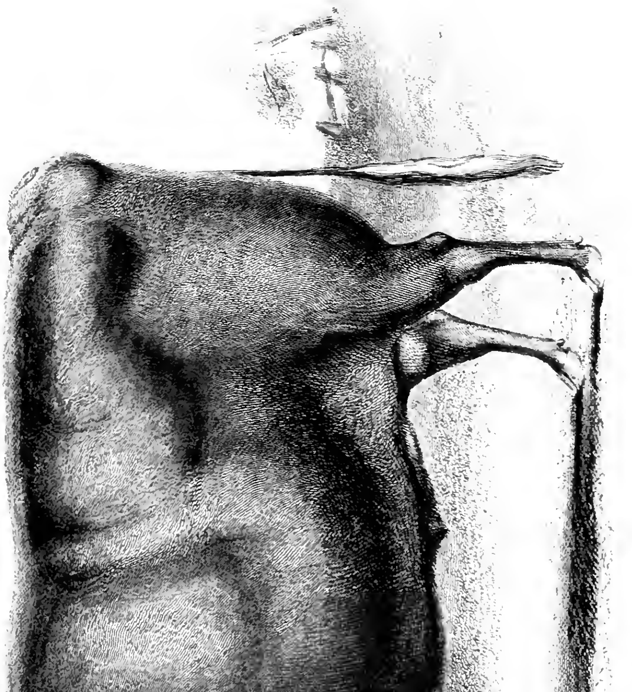
		s.	d.		s.	d.
Laid Highland Wool, per 24 lbs		8	9	to	9	6
White Highland	do	12	0		13	0
Laid Crossed	do.. unwashed	9	9		12	0
Do.	do.. washed	11	0		13	6
Do. Cheviot	do. unwashed	10	0		13	0
Do.	do.. washed	13	6		17	6
White Do.	do	23	6		26	0

FOREIGN.—The public sales of Wool in London continue to progress satisfactorily, which gives a healthy tone to our market, and we have a pretty steady demand by private contract.

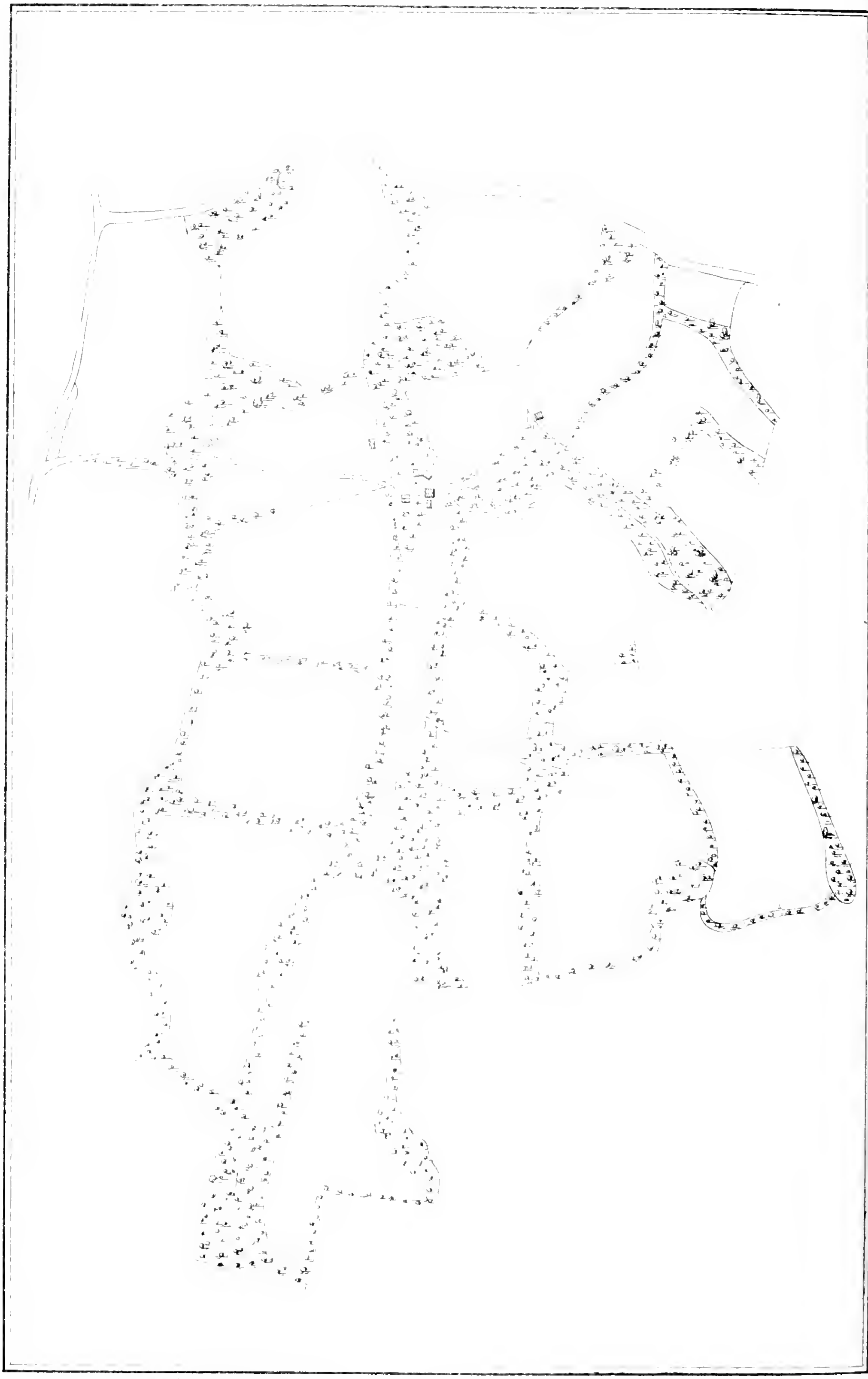
FOREIGN.

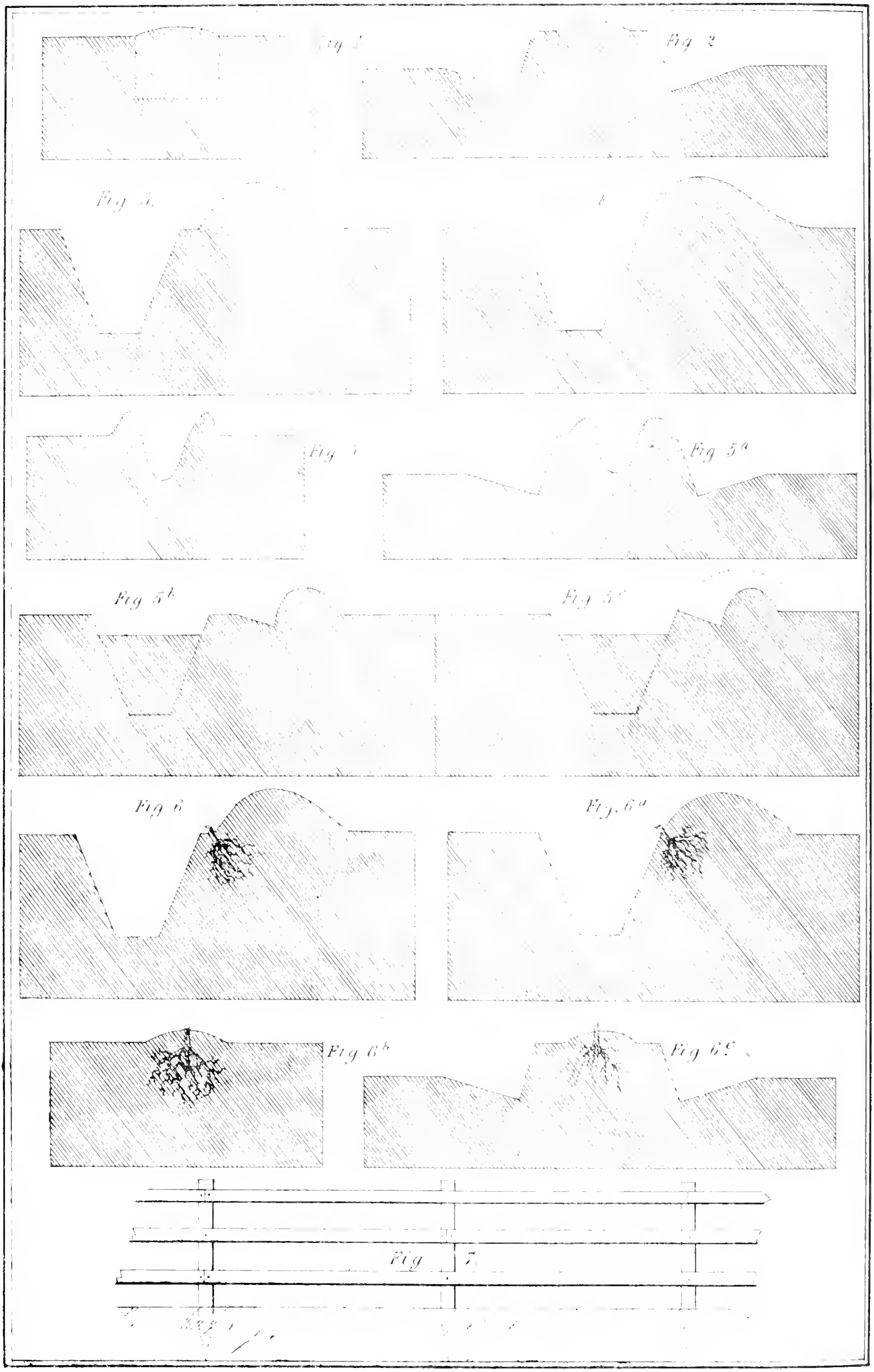
LEEDS, July 25.—A considerable business has been done in foreign wools, of nearly all descriptions and qualities, this week; and as the purchases made are almost exclusively to supply the immediate wants of the manufacturers, there appears every prospect of a continuance of the present fair demand. Prices remain very firm.

Printed by Joseph Rogerson, 24, Norfolk Street, Strand, London.



ILLUSTRATIONS TO THE ESSAY ON FENCES &c.





Rogerson, lith. 24 Norfolk St Strand.

THE FARMER'S MAGAZINE.

SEPTEMBER, 1845.

No. 3.—Vol. XII.] [Second Series.

PLATE I.

A HEREFORD OX.

The subject of our plate is a Hereford Ox, the property of John Hudson, Esq., of Castle Acre, Norfolk (3 years and 10 months old). It was bred by Mr. John Longmore, of Orlton, near Leominster, and carried off the second prize of £15 at the Smithfield Cattle Show at Christmas last. It was fed on grass, hay, Swedes, linseed cake, and mangel wurzel. This animal was of first-rate quality. A great deal of discussion was raised at the show on the comparative merits of Herefords and short-horns; we may mention an incident which occurred, and which would seem to tell in favour of Herefords. Mr. Minton, the Queen's purveyor, chose a Hereford beast, from which a baron of beef was taken as a present from her Majesty to the King of the French, and on last new year's day both their Majesty's tables were supplied from the same animal.

PLATE II.

ILLUSTRATIONS TO THE ESSAY ON FENCES, &c.

ESSAY ON FENCES, &c.

BY A PRACTICAL FARMER.

The proper formation of fences seems, from present appearance, to have been hitherto a matter of little consideration. A great part of this country seems to have had its fences left by merely having fields grubbed out of a large wilderness covered with wood.

These fences were, no doubt, composed of whatever the surrounding wood chanced to be. A considerable portion of the most fertile soil seems to have been cleared of the wood, and where the grubbing of it was left off, there the fence or row of timber and underwood seems to have been made. As the best land became by degrees grubbed up, the necessities of the people caused them to extend their fields, so that in the course of time land of good and indifferent quality became cultivated. In grubbing up wood in this manner the value of a few acres of land must have been an object of no importance, judging from the quantity of land left in the hedgerows. The size of the fields seems never to have had much attention bestowed upon them. It may be observed that the boundary between good and bad land is generally anything but straight; and as the first cultivators would not extend their operations beyond the precincts of the good land, we may thus account for those crooked fences which are seen in almost all parts of the country.

The first improvers of the soil having taken what they, no doubt, considered the best ground, would, if like the present generation, feel a degree of jealousy on seeing their neighbours begin to grub up the adjoining land. To prevent that feeling existing amongst them as little as possible, we may suppose that they must have left the large crooked divisions of fields, with the idea of not encroaching upon each other's rights. As their wants became more numerous, and people more civilized, divisions or boundaries would become lessened, till they became what they are at the present day.

In some parts of the country, wood appears to have been less abundant, and in other parts there seems to have been none at all; hence necessity compelled man to construct some other description of fence, for the protection and separation of his stock and crops.

It will be impossible, within the compass of an essay, to define all the different manners of fencing ground, as minutely as in a large work.

In describing the different articles used for the formation of fences, I shall begin with the one most in use, the white thorn, or hawthorn (*cratægus oxyacantha*). There are several other plants used for the formation of hedgerows, but as they are more of an ornamental nature than for the use of a tenant-farmer, and more slow and uncertain of growth than the hawthorn, I shall pass them over by merely giving their names. They are the sloe, or blackthorn (*pruuus spinora*); the crab, or wild apple (*pyrus acerba*); the beech (*fagus salvatica*); the hornbeam (*carpinus betulus*); and the holly (*ilex aquilfolium*).

In describing any subject, it is necessary, in order to give correct information, to begin at the root of the matter.

The extent and situation of the fields, although a matter of serious consideration, apart from this has no connexion with the formation of the fence. I shall, therefore, first take into account the formation of the bank, or line of fence; second, the preparation of the land, and the season of planting; third, the preparation and planting of the thorn; fourth, the protection and management of the thorn after planting until it attain sufficient size to become a permanent fence; and fifth, the management of the thorn after it becomes a fence.

For the better elucidation of the subjects treated of in this essay, I have thought it better, when necessary, to accompany the description with a diagram.

1st. As to the formation of the bank, or line of fence.

In describing the formation of the bank for the planting of thorn, I shall entirely confine myself to those methods which I have found, from experience and observation, to have answered best.

Difference of locality will, no doubt, considerably affect the formation of such banks.

In a suitable soil, and where the land is dry, the formation of a bank may be proceeded with in the following manner.

Let the ground on which the fence is to be planted be dug or trenched two feet and a half in width, and about eighteen inches deep. A transverse section of the ground thus prepared is shown in the illustration, figure 1.

This fence, including workmanship and all materials, will cost about eighteen-pence per rod of $5\frac{1}{2}$ yards. Another method on dry land is to construct the bank as shewn in the transverse section, figure 2.

By this plan a bank is raised about a foot above the level of the ground, by the sides being built up with turf cut from the adjoining land or brought from a convenient place, and the middle filled up with earth taken from the sides of the foundation of the bank. This bank should be $2\frac{1}{2}$ feet wide at top, and regularly sloped on each side. After it has thus been completed, it ought to be trenched eighteen inches wide and two feet deep; or, a better way, is to trench the ground as the bank is formed, always leaving the best soil on the top. This fence will cost about two shillings per rod.

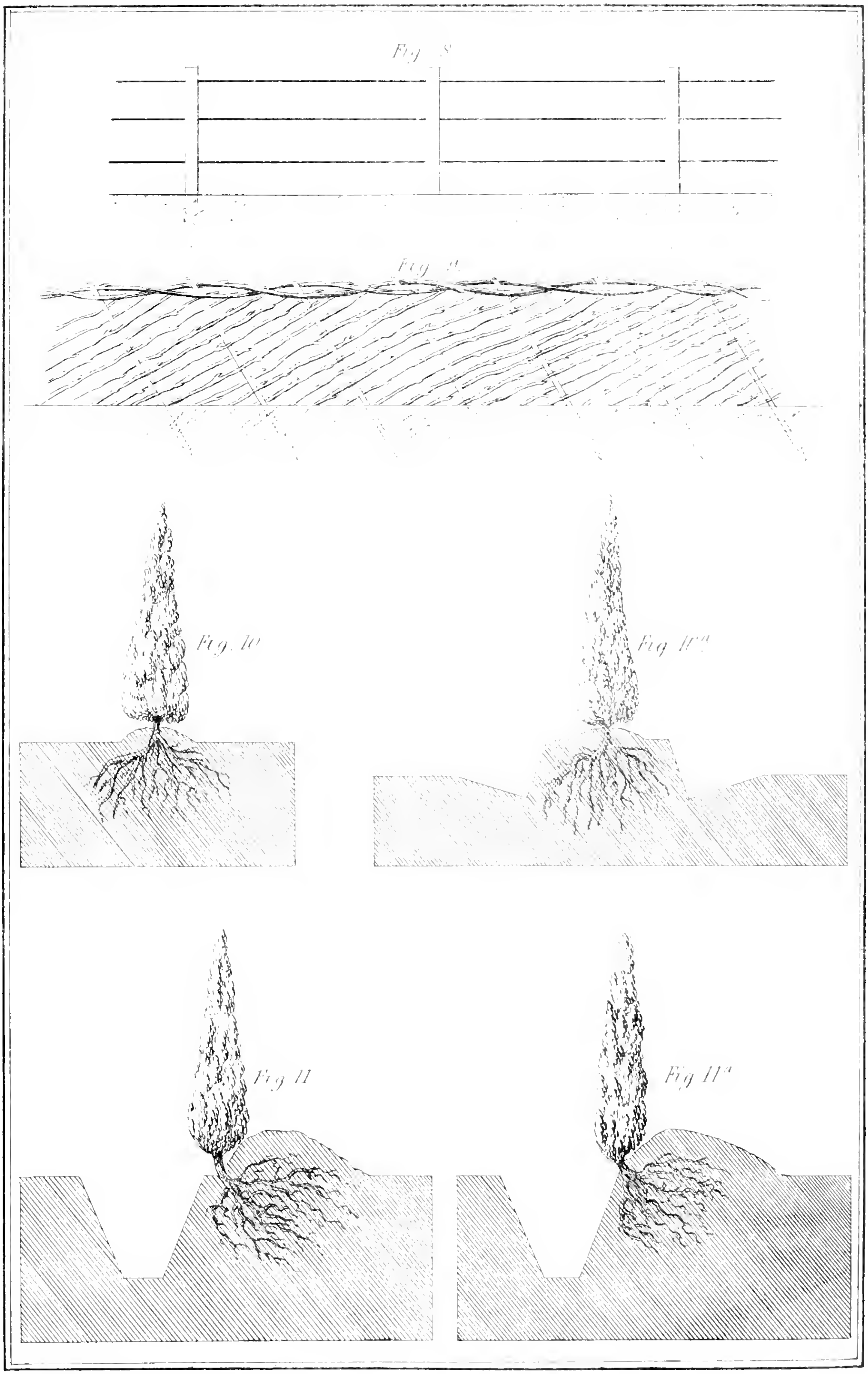
The formation of a bank on wet land may be made according to either of the two ways as shewn in the transverse sections, figures 3 and 4.

The only difference between these two methods is, that in Fig. 3, where the thorns are planted a scarcement of six inches is left between the brink of the ditch and the roots of the plants. The other bank, as shewn in figure 4, slopes regularly from the bottom of the ditch to the top of the bank, and differs only from figure 3 in not having any scarcement left. I have given sections of these (figures 3 and 4) merely to show the superiority of the one over the other. The expense of forming these banks differs little in either way. In cleaning the thorns it is necessary to loosen the earth, before the weeds can be effectually got out of it. In thus cleaning the ground at figure 4, the bank being sloped, the loose earth will, consequently, tumble down into the bottom of the ditch; and as this system of treatment must be resorted to at least twice in every year, it must follow that each succeeding year the roots of the thorn will be more and more exposed; such exposure assuredly hurting the growth of the plant, and eventually destroying it. Many fences, at the age of fifteen or twenty years, are by such means rendered useless.

In cleaning thorns that have been planted on a bank formed in the manner as shown at figure 3, any quantity of mould which may be taken from the top of the scarcement and roots of the plants by cleaning away the weeds, is more than made up by the quantity which falls from the sloping bank behind the thorns in cleaning it. The mould thus loosened falls down the slope on the scarcement, amongst the roots of the plant, and makes up that quantity taken therefrom in cleaning away the weeds. These two ways will cost about two shillings and sixpence per rod.

Having thus briefly described the different methods of forming a thorn bank, I shall, in the second place, describe the preparation of the land and the season of planting the thorns.

The best season of the year to prepare the bank will be in autumn or winter; when the land is, comparatively, clear of all crops. It may be observed that the proper formation of the bank, though of considerable importance, is not more so than the preparation of the land previous to the planting of the thorn. The first operation in preparing the land will be to trench it two feet wide and about eighteen inches deep, taking care to keep the best soil nearest the top. In this state it should remain during winter, exposed to the frost. Early in the following spring it should have a quantity of good manure spread upon the surface, and dug in with a fork, and be allowed to remain till the month of May; when a quantity of lime should be spread upon the top and hoed in. If any seeds should spring up during the summer, they should be immediately pulled out, so that the bank may be kept clean until the time of planting. About a week before the planting of the thorn is begun, the ground should be carefully dug over, and the dung, lime, and earth well and minutely blended together. When land has been thus prepared, it will be fit for the reception of the plants. The best season for planting thorns is in the autumn, after the leaf has fallen from the plant, which generally takes place about the latter end of October, or beginning of November. Thorns may,



lith. 24, Norfolk St. Strand

however, be planted any time from the end of October till the month of March, should the weather prove favourable.

In the third place, I shall take into account the preparation and planting of the thorns. Although the simple process of collecting and preserving the haws is by many so well understood, still, for the use of those who may wish to collect the seed and raise their own plants, and who may be unacquainted with the proper method, I shall briefly state the system generally in use. After the haws are ripe, which will be about the month of October, they may be collected from any hedgerows where they can conveniently be got, and of any quantity that may be required. After being gathered, they should be taken to some convenient place, and spread out, about a foot in thickness, and mixed with dry, light soil, or sand; in which state they should remain till the following autumn, when they will be fit to sow in beds. Some people allow them to remain in these heaps for eighteen months, and sow them out in beds in the spring. When lying in a heap the greatest care should be taken to prevent them heating or fermenting too much; as, by this means, their vegetative principle would be destroyed. If they appear to heat too much, they should be turned over occasionally; by which treatment they would be kept uninjured, and the decomposition of the fleshy matter which surrounds the seed considerably hastened. The seed, when ready, should be sown out in beds; or, a more improved method, in rows. The ground for the purpose should be a sharp soil, tolerably rich; or, if not, made so, dug deep, and finely pulverised. The seed should be sown where the ground is being dug, and this will prevent the treading of the ground as little as possible. The width of sixteen or eighteen inches may be dug; when the workman should get a rake, and, standing in the trench, make the surface of the dug ground as fine as possible: with a hoe let him then make a rut, six inches wide, in which he should sow the seed with his hand. The thickness of the seed will be best adjusted by reference to its quality. After the seed has been sown, the earth should be raked on to cover it, of an equal thickness. The workman may again commence digging, and proceed in this manner until he has finished. After the seeds have been sown about twelve months, let the largest plants be drawn out, and taken to a convenient place, and rowed out. In drawing up these plants the greatest attention must be given, so that the roots of the plants pull up no more earth with them than is absolutely necessary; as, even at that distant period, a great many of the seeds will not have germinated, and if the plants are not carefully drawn up, a portion of these seeds are raised to the surface of the ground, and thereby rendered useless. When the seedlings are sufficiently large to be rowed out, a piece of land should be selected and prepared for the purpose. A poor soil should be chosen for rowing out the plants upon. The farmer, or whoever has a large quantity of fences to plant, should endeavour, if possible, to raise his own plants; as they are, when properly attended to, generally stronger and better rooted than those purchased from nursery ground. The reason why the farmers' plants are, or ought to be, superior to those of the nurseryman is obvious. The nursery grounds are generally selected from good land in the vicinity of towns, and consequently valuable. It is therefore impossible, so to speak, for the plants in a nursery to be rowed out so far apart as those on a farmer's ground, where there are many odd corners, fit for no other purpose than being employed in such a way.

The nurseryman, like every other cultivator of the soil, is anxious to get as great a produce as possible, and, consequently, in rowing out his plants, to save room, crowds them too much in the rows. The effect of this is, that the plants, instead of growing strong and well rooted, run up to a great height and have the appearance of a large plant at an early age. Plants thus treated may appear a great length, and please the eye of many purchasers. A short, stiff plant, with a large root, is, however, decidedly superior to any plant so raised. The best manner of getting a good plant is for the farmer to grow them himself, or, which will answer his purpose equally as well and save him the greatest part of the trouble, will be for him to buy seedlings from the nurseryman (which will cost about two shillings, or two shillings and sixpence, per thousand), and row them out himself, always taking care to select some poor soil for the purpose. In rowing out plants on such ground, they will be close enough together if put four to the foot, and sixteen inches betwixt the rows. Plants thus put in will have plenty of room to grow, and not force one another up too much. From the slow growth of the plants the stems will be much stronger than if raised quickly; the ground being poor and deficient of nutritive matter, the plants will throw out more rootlets in search of food, than they would do on good and rich land. In cases where the plant grows too rapidly after being rowed out, they may be taken up and rerowed, which will check the rapidity of their growth, and make them grow stiffer and better rooted. Plants will seldom have attained sufficient stem and roots to be planted out, before they have stood three years in the rows. During the time they are in the rows the land should be kept clean, and well hoed and raked, to prevent the growth of weeds.

Having thus described the method of raising thorns, that which next claims attention is their planting in the hedgerows.

The land having been prepared as previously described, and the season for planting commenced, the first operation will be that of taking up the plants and assorting them. When the weather is fine and no appearance of frost, as many may be taken up at once as will serve the planter for two or three days. When, however, there is any appearance of frost, no more should be taken up than will be required for the day's planting. A careful person should be selected for taking up the plants, which will be best done by the common fork; that implement not damaging the roots so much as the spade. The best method of assorting the plants will be by making three qualities thereof, viz., large, middle-sized, and small. Having thus assorted them, the next operation will be that of trimming the roots. This can be easily done by grasping them firmly in the hand, and with a sharp knife cutting off the ends, the straggling roots, and those which may have been decayed or damaged in taking up. This operation having been completed, that which next falls to be done is the cutting away of part of the stem. This may be done by grasping the root and lower part of the stem and cutting it through, at, or as near an angle of 45° as possible; leaving only three or four inches of stem above the root. After having rooted and trimmed them, they should be put into bundles of 25 or 50 each, and the three different sizes kept separate. If the plants are wanted immediately, they may be taken direct to the field, and planted. Those not used that day should be laid into the ground by the heels, as it is termed, to prevent their receiving any injury from too much exposure. Before the workman begins planting, he should carefully examine the ground to be planted, so as to ascertain the different qualities of the soil. This, for convenience, he may divide into three sorts; on the best of which the smallest thorns ought to be planted, on the second quality of ground the middle-sized thorns, and on the worst portion of the land the strongest thorns. For the formation of a good hedgerow it is absolutely necessary to have the thorns sorted and prepared in the manner above recommended, before planting. When the thorns are planted without sorting the smallest plants run a great risk of being overgrown and choked by the larger ones. This indiscriminate planting is one of the reasons why we see so many blanks in young hedgerows. Immediately before the plants are put into the ground it may not be amiss to dip their roots into some urine taken from the liquid manure tank, and mixed with a little fine earth, to that consistency which will cause a quantity of the liquid to adhere to their roots.

In figures 5 I have given transverse sections of the different banks or line of fence, made ready for the reception of the plants.

In planting the thorns they should be put so deep into the ground that, when finished, only about an inch of the top of the stem should be visible above ground.

Figures 6 are transverse sections of each fence when completed, and showing the situation of the plant.

I shall now, in the fourth place, take into consideration the protection and management of the thorn after planting, until it attain sufficient size to become a permanent fence.

The formation of the bank, the preparation of the ground, and planting of the thorn, would, if left to themselves, form but a very poor fence: hence the necessity of protecting and managing them in a proper manner. To keep the young fence from the bite or tread of animals, it will be expedient to have a temporary protection along each side of it. In other situations it will only be necessary to defend one side, and in situations where there is nothing to injure the plant, it will be unnecessary to shield it at all.

The materials used for the formation of a temporary fence will, of course, vary in different localities. Where wood is plentiful a very good protecting fence may be formed in the following manner; any description of timber being used. Let stakes be cut out 4½ feet in length, and when the timber is so large as to require sawing, the stakes may be made by quartering the tree. Where the wood is small enough, they may be cut the requisite length from the end of the tree Stakes formed in either way must be sharpened in the one end, for being driven into the ground. When the stakes are completed, rails must be cut out about four inches wide and one in thickness, and of any length suitable. In putting up this fence the stakes should be securely driven into the ground, at the distance of two yards apart from each other, and at a regular distance from the fence. When the stakes are thus set up, the first rail should be placed along the outside of the stake, about a foot from the ground; and at each stake let a nail, 3½ inches long, be driven through the rail into the stake. The nailing of the rail to the stake should thus be proceeded with, care being taken that the ends of the rails at joining are cut square off opposite the centre of the stakes. The second row of rails may be put on in the same way, leaving about a foot between the two. The third rail may be put on within a few inches of the top of the stakes. In some situations two rails will be sufficient. Where wood is plentiful, this fence will cost about one shilling and sixpence per rod. A side view of it is given at figure 7.

Where wood is not so plentiful, iron wire may be used instead of railing; the stakes being driven down as formerly described, and holes made therein, through which the wire ought to pass. The expense of executing this fence will ultimately be about the same as the other; the difference in the first outlay being fully compensated for in the value of the old materials. Figure 8 is a side view of this fence when finished.

Another description of temporary fence greatly in use in all parts of the country, and generally termed a "raddle fence," is made of stakes and binders. The stakes are driven into the ground in a slanting direction from two to three feet apart, and long boughs or withies bound between the stakes. This sort of fence, although deficient in durability when compared with the two others described, is nevertheless an excellent temporary division. Its cost will be from eighteen-pence to two shillings per rod. A side view of this fence is shown at fig 9.

The common iron hurdle is the best temporary fence we have at present got; and although the first outlay is considerable, still in the end it is the cheapest protection that can be erected.

When hurdles are used, and the field happens to be in corn, the fence needs no protection, and they may be removed to another place where needed. Their cost will be from four shillings to four shillings and sixpence each, and are 6 feet in length. The rearing of the fence I shall now consider.

During the first summer all that will be necessary is merely to keep the bank clear and free from weeds, which will cost about twopence per rod. Should any plants have died out, this will be the proper time to have the blanks filled up. The second year, in the month of February, or the previous autumn if preferred, let the shoots made by the thorns the preceding summer be cut off 6 inches from the ground; the bank must be kept as clear as possible of grass and weeds all the summer. This year's cutting and cleaning will cost twopence halfpenny per rod.

In the third year, at the proper season, let the tops of the last year's shoots be cut off, leaving only about a foot of that year's growth; thus the fence will be left about eighteen inches in height. Let the sides of the hedge also be dressed up a little, but not too near the stem of the thorn. This cutting and keeping clean of the bank will cost for the third year about the same as the preceding one (twopence halfpenny).

The fourth year the fence must be cut at the same time as preceding years, and in a similar manner, leaving about 1 foot of the previous year's shoot. The fence will now be $2\frac{1}{2}$ feet in height. This year's expense will be about threepence per rod.

The fifth year the fence will require similar treatment to the previous year, and when finished will stand about $3\frac{1}{2}$ feet high. Its cultivation will cost threepence halfpenny per rod.

The sixth year's treatment will be exactly similar to that of the two last, and will leave the fence high enough to need no more protection. The cost will be fourpence per rod for the season.

The protecting fences will by this time be nearly useless. So far as the hedge is concerned this will be a matter of no consequence; as it will be sufficiently large to protect itself, if it has been planted and managed in the manner described.

I shall now in the fifth place, describe the management of the thorn after it becomes a fence.

All that will be necessary for its future welfare will be to cultivate the bank properly, and keep the hedge-row free from weeds. It will be necessary to cut the twigs off (in some localities termed brushing) once in every year. In the switching or brushing the fence it may be kept low, or allowed to get to any height to suit local circumstances and the taste of the grower.

A fence round a field where only sheep are kept need not be more than four feet in height, if shelter is not an object of importance. In exposed situations it is of considerable importance to have the fence high to afford shelter to the stock. It may perhaps be desirable to have fences sufficiently high for every description of stock; the best height for this purpose is from 6 to 8 feet. It is an object of considerable importance to have the top of the fence narrow, and the bottom as broad as possible.

I have given, at figures 10, transverse sections of each of the fences at seven years' growth, which will show the appearance that they ought to have at that age.

Having thus briefly described the best manner of raising a thorn fence, I shall, before leaving the subject, point out a few of the greatest blunders committed in attempting to raise a thorn fence without giving it proper management.

A great many planters buy long, slender, bad-rooted plants, because they are a little less in price; and instead of cutting the stem of the plant off before planting, they plant them as they are, and very often upon land which has received no preparation whatever. I have known thorns to be planted on ground as full of couch-grass as it could hold, and, after being planted, left entirely to themselves, without any protection or looking after, and, at the end of three years, without ever having been cleaned. This sort of planter is astonished why he does not get a good fence. It would, however, be a much greater cause of astonishment if he with such mismanagement was to get one at all. I have seen many others, after having prepared the land tolerably well, plant the thorns without having the stem of the plant cut off. After thus allowing them to grow for two or three years they cut them half through, near the ground, and had stakes driven down amongst them; and with the half-cut thorn and some binders, a sort of temporary fence has been made—half alive and half dead. This system cannot be deprecated too much; it greatly injures the young thorn, and prevents its being a fence so soon as it would otherwise be. It is a common law of nature that two bodies, one of which is dead and the other alive, cannot long remain together without injuring the one which is alive. The young live thorns are so much injured by being thus worked up with dead wood, that they seldom thrive well for a long time afterwards.

Some parties, after planting the thorn without cutting the upper part of the stem off, allow it to reach a height of three or four feet without ever cutting it, and then, for the first time, cut a little off the top, which causes the plant to throw out lateral branches at a considerable height from the ground instead of near it. The fence by this treatment attains considerable height in a short time, but from not being cut off near the ground when planted, and afterwards cut annually, grows up thin at the bottom, and with a slender stem. It spreads out also by the twigs being cut off, and becomes heavy at the top, and standing on a long weak stem; consequently the hedge is blown about by high winds, and the roots very much injured.

It is really necessary to have a thorn-hedge strong at its roots, and, by judicious cutting, to make it as broad at the bottom as possible, and tapering to a top as shown at figure 10.

When thorn fences have been allowed to grow without being properly looked after, they will become, in the course of ten or twelve years, so thin and open at the bottom that they will be of no use for keeping sheep in the fields. The best treatment to which a hedge of this kind can be subjected, is, to have it cut down within a few inches of the ground, and the bank carefully dug and cleaned. Any blank which may be in the fence from thorns having died out should be filled up with young plants. Some people prefer, where these blanks occur, to have the nearest stem of live thorn cut half through, and laid down across the openings, and secured to the ground by means of small hooked pegs; the stem thus cut and laid down throws up shoots, and fills the blanks they were laid across. This system of stopping up gaps in hedge-rows, although cheaper, is not so good as with young plants; an old hedge, after being treated in the manner above described, will require the same treatment as recommended for the rearing and protection of young fences. In any description of live wood it is of the utmost importance that in cutting through the stem the blow should be made upwards, and in a slanting direction; by this means the force of the blow is directed against the portion of the stem cut off, which it splinters very much, and leaves the surface of the stem clean cut and free of splinters. If the blow be reversed the part cut off will be found uninjured, and the stub left with an uneven surface and much splintered. By this improper cutting the water gets into the splintered stub and causes premature decay; the old stems by being thus injured throw forth weak shoots, which are easily hurt by severe weather. Although this system of cutting hedges with a downward blow is so injurious to the after growth of the plant, it is, I regret to observe, in many districts the prevailing custom. Whether this is from ignorance of its consequences, or from the negligence of the workman and master, I cannot say; but whichever way it is, it cannot be doubted that the abolition of such a custom would materially improve the condition of many hedgerows.

The description of fence I shall now notice is the dry-stone wall.

In high situations and mountainous districts the thorn will be found not to grow well, and therefore makes but a poor fence. These situations, however, are happily supplied with abundance of material from which useful fences may be constructed. In exposed situations it is most important to have a fence which will afford shelter to the stock in rough weather; stone walls are admirably adapted for that purpose. In situations where soil and climate are not congenial to the growth of thorns, and where stones can be had, a cheap, durable, and efficient wall may be made of dry stone, without mortar. The best dimensions for a stone wall of this sort will be 6 feet high, 28 inches wide at bottom, and gradually sloped to 14 inches at the height of 5 feet 3 inches from the bottom or ground. On the top of this should be put a coping of thinnish stones of 9 inches high, set upon edge, and leaning back one against another; this cope should project about a couple of inches on each side. The wall when finished will be 6 feet high. A transverse section of the same when completed is shown at figure 11, and a side view at figure 12.

This fence, where stones are easily attainable, will cost about eight shillings per rod.

This species of fence, though not so ornamental to a district, possesses several advantages over the thorn, or any other live fence, in high situations. It can be put up in a very short time, and when finished is of itself a complete fence, and serves either for the separation of fields, or as shelter to the stock.

Before leaving this subject, I shall mention a few errors which some builders of dry-stone wall commit in the erection and execution of the work.

It is absolutely needful, for the stability of the wall, that the foundation should be twice the breadth of its top; this, by many builders, is totally disregarded, although one of the principal points to be attended to. I have seen in many instances the sides of dry-stone walls built perpendicular, and coped with heavy stones, which were made to project over each side from 6 to 9 inches; walls thus built cannot stand so well as in the manner previously recommended. The instances in my observation are not few, where walls built with perpendicular sides have actually fallen asunder. The system of building dry-stone walls I have heard condemned altogether as bad, merely through the ignorance of the operator, in having it disproportionately constructed.

Another description of fence greatly in use in many parts of England is what is termed the "post and rail" fence, and is constructed in the following manner:—

Posts are either used round or square, to suit circumstances. Round posts should be not less than 6 inches in diameter, and if used square the side of the stake should be about 5 or 6 inches; some people use rectangular shaped posts in preference to either round or square. The length of the posts will differ with the number of rails used: where three are used, the posts will require to be 4½ feet in length; and where only two are used, so great a length will not be required.

The posts are generally set about eight or nine feet apart. The rails are formed by sawing a tree of only sufficient size down the middle; and where the trees are large, a greater number of rails may be cut out of them. These rails are dressed a little at each end, and morticed into the posts. The wood generally used for making this description of fence is oak or chesnut. The expense of making this description of fence will no doubt vary very much in different localities; the average cost per rod may, however, be stated at about ten shillings, and will last, with the addition of an occasional new post and rail, for nearly fifteen years.

A side view, and also a transverse section of this fence, are given at figures 13 and 14.

Another description of fence, used in districts where thorn would not grow, and were stones are not procurable, except at an enormous expense, is the furze or gorse (*ulex Europæus*), and is executed in the following manner. A bank is formed the same as a turf wall, four feet in height, six feet wide at bottom, and regularly sloped on each side to two feet wide at top. In forming the fence, let the site be marked out on the ground, six feet wide, and let an allowance of six inches more be added to each side as a scarcement. At the outside of this scarcement let the turf be cut off on each side, till a sufficient quantity is obtained to build the sides of the bank to their respective height. When the turf is thus cut off, let the best soil be carefully laid aside to finish the top of the bank with. The building up of the sides, and filling up of the middle of the bank, should be all proceeded with at the same time. The earth for filling up the middle should be dug out of the trenches at each side. The top should be finished with the best soil, previously laid aside for that purpose. The best season for making these banks will be early in the spring; the furze should be sown about the month of March or April. The seed costs from 1s. 6d. to 2s. per pound. The top of the bank should be made as fine as possible before sowing. The best

Fig. 12.

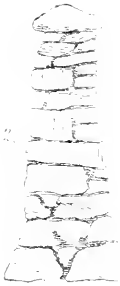


Fig. 13.

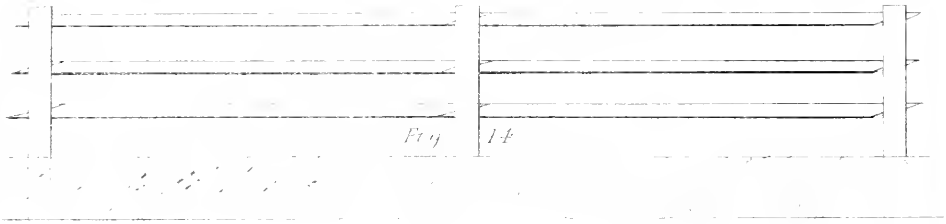


Fig. 14.

Fig. 15.

Fig. 16.

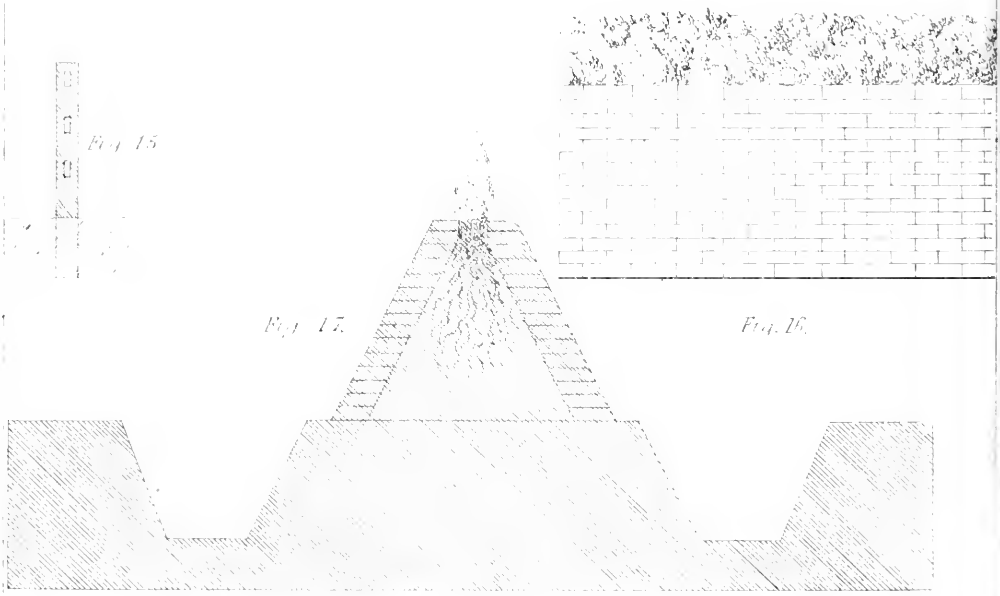


Fig. 17.

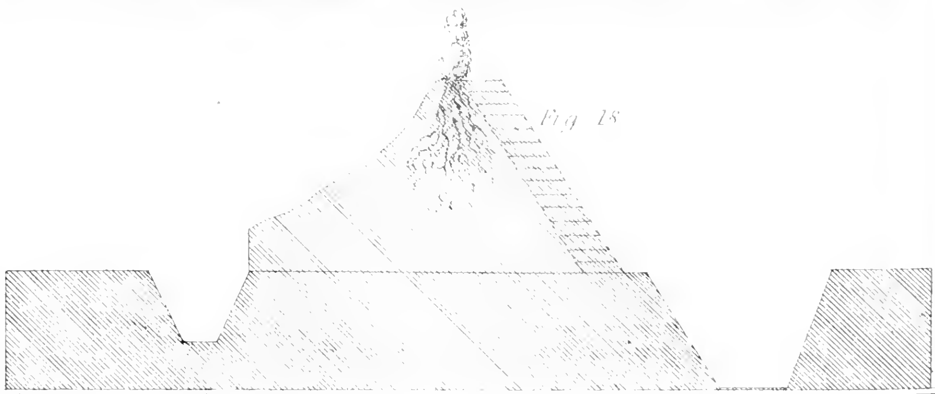


Fig. 18.

24, Norfolk St Strand

mode of sowing the furze will be to make a small trench or rut, at least six inches wide, along the top of the bank, in which let the seed be sown and covered in by the earth being raked over it. When finished, the seed should not be more than an inch from the surface.

Figures 15 and 16 give a side view and transverse section of the fence, with the furze about a foot high.

This fence will cost about 3s. per rod.

The furze, like the young thorns, will in some situations require protecting for a year or two after sowing. The after treatment of this furze fence will be nearly the same as that recommended for thorn fences. They will, by being kept properly clean and brushed, or switched, form an excellent fence in a few years; the proper season for switching or brushing furze is in the month of June. In plantation fences, and such places as only require fencing from one side, the formation of the bank may be somewhat altered, and the cost of its formation a little lessened.

Figure 17 is a transverse section of this fence.

The greatest evil attending this description of fence is, that the furze is very apt to be killed by frost in a severe winter. After they attain two or three years' growth, they however are not so liable to be injured as when young. After the roots get sufficient hold of the ground, although the tops should be blighted by frost, the roots will generally remain alive, and throw out new shoots.

Having now described the different things more immediately connected with fences, I shall proceed to point out how far, in various parts of England, they are injurious to the farmer. First, by their size; second, by their excess in number; and third, by the over-abundance of timber which they contain.

First, with relation to the extent of injury produced by the size of the fences.

It is the tenant's interest, after he takes a lease (of whatever duration), to get, by proper management, as great a return for his capital as possible. To enable him to do so, it is requisite that no more ground shall be taken up in the formation of hedgerows than is absolutely necessary for the subdivision of his farm. This saving of land seems, from present appearances, to have shared but little of that small attention bestowed upon the laying out and forming of the fences. The result of this inattention is shown by the fences being run crooked and uneven in all directions, and occupying a greater portion of ground than is at all necessary. The land lost to a farm from being unnecessarily taken up by these crooked hedges, is greatly increased by the acute angles found in the winding of the fence, which prevents the plough from reaching near the side of the already too wide fence, and thus adds a quantity of land to the useless waste. It is no unusual occurrence in many districts to see fences averaging six yards in width. These, by their serpentine form, have their length extended fully a fourth more than is necessary. For example's sake, say that a fence of this description was four hundred yards in length, and six yards wide. This, allowing it to be increased one-fourth by its winding would make two thousand four hundred square yards. A proper fence would only be three hundred yards in length, and need not exceed more than two yards in width; thus occupying six hundred square yards in all. This sum deducted from the number taken up by the old fence would leave a difference of one thousand eight hundred square yards, or more than the third part of an acre. If the third, or even fourth-part of an acre could thus be saved on every four hundred yards of fence throughout England, the number of acres clearly gained would exceed all belief.

In the second place, I shall endeavour to show the amount of evil sustained from fences by their excess in number.

In a farm of, say two hundred acres, it is no unusual thing to see it divided into upwards of thirty fields, the largest of which will not exceed ten or twelve acres. From that extent we have them dwindling down to so small a size that they would not form a garden of sufficient size for a poor cottager. This minute subdivision of the farm is not at all wanted for its proper cultivation, but on the other hand is ruinously unnecessary. A farm of the extent above stated does not require to be put into smaller divisions than fourteen or fifteen acres each; a farm of two hundred acres might thus be divided into about fifteen fields. In many parts of England it is a general practice, in calculating the value of a farm, to allow a tenth part of it to be taken up in fences and roads, and from my own experience in the management of an extensive estate in the county of Kent, I find that this sum is by no means exaggerated. Now, allowing this calculation to be correct, which from experience I know it to be, there will be, in a farm of two hundred acres, twenty acres taken up in fences and waste alone. A farm of this size would in many districts be divided into thirty fields or paddocks; this number, as I have before stated, is double the quantity required on a farm of this extent. Thus, by properly dividing the fields, one half of the fences might be abolished, and two-thirds of the remaining half, from their great width and unnecessary windings, might be safely done away with, and the quantity left would be about sufficient for fences and roads.

On a farm of two hundred acres, where the fields are properly laid off, and containing about fifteen acres each, proper roads may be made, and all necessary fences erected, and not occupy more than 3½ acres of land, and for the site of the farm buildings, adding another half-acre, we have four acres occupied in all; this deducted from the original number would leave *sixteen acres* to be added to the farm—no very small addition to a farm of that size.

In the third place, I shall take into account the injury which the farmer sustains by an over-abundant quantity of timber being left in the fences.

They are in many districts studded with trees, and the fields being generally small, I may safely state that, upon an average, they do not contain more than six acres each. Now, in a square field containing six acres, there will be six hundred and eighty lineal yards of fence; half of this, however, which is all that belongs to the field, will be three hundred and forty yards. Now, any person at all acquainted with the rural districts of England, must allow that on three hundred and forty yards of fence we shall have an average of nine trees; this being about one tree to about every thirty-eight yards of fence.

Taking this calculation as correct, which I think no one will dispute, we have $1\frac{1}{2}$ trees to every acre of land. These trees, I am sorry to say, are not always confined to the hedgerows, but repeated instances are to be found where they are allowed to grow in the open fields; those trees thus situated are even more injurious to the tenant than such as are left in the hedgerows.

I shall not be overshooting the mark when I say that the average size of an English tree will cover at least one hundred square yards, and with a tree-and-a-half for every acre, we shall have one hundred and fifty square yards overhung by the branches of the tree, and occupied by its roots. To this sum we may safely add other fifty yards as damaged by being shaded; this will make the total sum two hundred yards, or nearly the twentyfifth part of an acre. To this may be added the great inconvenience in working the land, occasioned by the agricultural implements coming in contact with the roots of the trees and the trees themselves, where situated in the open fields; which will make the deterioration of the land in value, by the over-abundance of timber alone, not less than five per cent.

It would be much better to set aside a portion of land for the purpose of growing timber, and in this way it would also be more profitable for the landlord, the tenant, and the labourer.

We have thus, by the size of the fences, their excess in number, and the over-abundance of timber which they contain, the land depreciated in value fully thirteen per cent. Thus in a farm of two hundred acres, by merely having what ought to be, roads and fences properly planned and executed, we should do as much for the farmer as if we were to add twenty-six acres to his farm. The value of it would be increased thirteen per cent., and by proper management, such as a better rotation of cropping and proper working and manuring, the land might be increased in value fully twenty per cent. This proper working and manuring, however, cannot be effected by the means presently used in many districts. The proper cultivation of the land will never be economically performed with an instrument for a plough which, in the present age, may fairly be termed a monstrosity, drawn along at a snail's pace by four, five, six, and sometimes seven elephant-looking brutes, generally accompanied in their slow pace by a man, lad, and a boy of equally slow pretensions.

It seems to be the intention of the blacksmith and shoemaker, if we may be allowed to judge from appearances, to shoe the men and horses as nearly alike in weight as possible, so that the one may not outstrip the other in speed. Should the horse make an attempt to go faster than usual, his bridle rein is immediately tightened by one of his clodhopper attendants, so that he might not disturb the customs handed down, from twenty generations, to the present agriculturist.

The preparation and application of the manure in many districts too, deserves the most severe censure and condemnation.

It is not unusual to see dung half prepared carried out to the fields and laid out in small heaps; in which state it is frequently left for six weeks without any alteration. After remaining thus long in one way, exposed to the vicissitudes of the weather, I have seen the remains of this half prepared stuff spread over the surface of the ground, and allowed in hot weather to remain a few more days before being ploughed in. The effect of proper preparation and application are thereby rendered useless by the negligence of the operation. An immense stride must yet be made in agriculture before such farmers reach even the borders of chemistry. If the feudal notions and old customs still in existence, which are a disgrace to this present enlightened age, were abolished, agriculture would receive more improvement in one generation than it has done for the last thousand years. Before any tenant farmer would be justified in making landlords' improvements, however, he must have some security for the return of his capital in shape of a twenty-one years' lease; or if the landlord will not grant a lease, he ought to make the improvements himself, and let the farm "at its increased value."

If twenty-six acres were gained to a farm of 200 acres as before stated, by proper roads and fences, and rightly cultivated, it would raise a gross produce of at least £10 per acre, which makes the sum of £260. From this deduct £173 6s. 8d. for rent and tenants' skill and capital, and we would have a balance of £86 13s. 4d. left for labour. This would be sufficient to employ constantly two *extra* labourers on such a farm, and afford them good payment; or one labourer *extra* on every 100 acres. By carrying out this calculation a little further, in the same ratio, we will have, taking the county of Kent alone (which contains in round numbers 983,000 acres) employment for 9,830 of our starving workmen; and if this number were employed, the *idle* men would be few in the county. But if the county of Kent alone were to employ nearly 10,000 extra hands, by simply adopting *the best known means* in conducting the different operations of the farm, what would broad England employ? Why if each county were to employ the same number as that above mentioned, we should have employment for nearly 400,000 of our able-bodied workmen at remunerative wages. But allowing that only half the number of these men have wives, and say three children each; food and clothing would thus be given to 1,200,000 starving wretches, who, although willing to work, frequently cannot find any employment. This large number may at first sight appear startling, but is nevertheless perfectly true.

At the present moment the agricultural population is greater than the demand; hence the necessity of workhouses. For the support of the inmates of these dwellings the farmers and other holders must pay poor rates, although such a field of profitable labour stares them in the face, on which the ablebodied unemployed might be set to work. It is a curious thing that the farmer and other holders do not employ more labourers. Their favourite outcry is they have not the means. Such outcry is, however, to a great extent fallacious.

Will not the same money that they pay in shape of poor rates support a man at work as well as in idleness and ease in a workhouse?

If every farmer would only spend upon labour, in the improvement of his farm, the money which is paid to support ablebodied labourers in the workhouse, he would have the advantage of receiving good interest for his money, instead of throwing it away; as all money paid by the farmer for the support of ablebodied idle men is literally thrown away.

We richly merit the opinion of the witty American Sam Slick, when he says, "If there is any airthly clumsy fashion of doin' a thing, that's the way they are sure to get here. They are a benighted, obstinate, bull-headed people, the English, that's a fact, and always was."

The whole blame of not employing the labourer cannot, however, be laid to the charge of the poor farmer. Instances there are to be found, and those not a few, whose tenants have the means and the will to employ more hands in improving their farms, but are, for want of the proper security and the permission of the landlord, debarred from employing the poor starving labourer, and receiving for themselves that amount of remuneration for their skill and capital which they are so fully entitled to. The landlord is in these cases the means of creating and keeping unemployed half the ablebodied men which we have in our poor-houses, simply by not granting the tenant that which he himself claims—security of tenure.

Let the landlord grant to his tenant a lease for a term of years that would ensure him full time to be repaired for the improvements which he might make upon his farm. The form of that lease should be as simple as possible, and void of all old feudal notions and prejudicial customs, as well as the greater part of the legal phraseology which so greatly abound in some of our old leases. No more conditions or restrictions should be inserted in it than are absolutely necessary for the proper cultivation of the farm, in the locality in which it is situated. Landlords who will not grant such leases should by legislative enactment (to their own advantage, be it understood) be compelled to improve their own estates, or maintain the unemployed labourers.

There are to be found landowners who adhere to old customs with such pertinacity that nothing short of such interference will remove them. These occupiers of the soil might think this interference rather hard, but as acts of Parliament are daily passed for the formation of railways through every description of property, and for the benefit of the public, I cannot see that it would be a greater hardship if the legislature were to pass bills binding the landlord to improve his estates, and thus give employment to the working classes, which at the present time is so very much wanted. This act would not be prejudical to the landlords' interest. It would be the means of improving his estate and enhancing its value. It would no doubt meet with decided opposition from such as our game preserving landlords, but if passed, would benefit the community quite as much, if not more, than all the railways which have been, or ever will be made. If all the farmers were to join together for the purpose of obtaining such one act as above mentioned, they would receive more benefit therefrom than from all the nostrums of the anti-corn-law league, the protectionist societies, and malt-tax repealers in the world.

In conclusion, and in order to strengthen the supposition, contained in the preliminary remarks of this essay, as to the fields being grubbed out of a wilderness covered with wood, I have attached hereto the plan of a farm which is really in existence, and which is situated in the weald of Kent, and "Garden of England."

The following are its proportions, viz.:—

	Acres.
Of arable land	104
Of meadow	17
Of orchard	3
Of hops	5
Of "fences and waste"	45
	174

The farm, as will be seen, contains one hundred and seventy-four acres, and possesses the advantage over many others of being situated in a hop growing district, which greatly enhances the value of the underwood grown in the fences, otherwise the land thus occupied would be comparatively valueless.

ON THE INDICATIONS WHICH ARE PRACTICAL GUIDES IN JUDGING OF THE FERTILITY OR BARRENNESS OF THE SOIL.

By James Anderson, Esq., late of Gorthleck, author of various Prize Essays, &c., &c.

It shall be our object in the following pages to describe in plain, familiar, and perspicuous language, the indications which are practical guides in judging of the fertility and barrenness of the soil.

The first and most obvious indication is afforded by the character of the natural vegetation. The luxuriance and variety of the native vegetation must ever be a safe and unfailing *index*, and unerring guide in estimating the average fertility of the surface, and may, in some measure, be held to indicate the nature of the subsoil, whether favourable or unfavourable; as the productiveness of the superficial portion is materially and sensibly influenced by the constitution and general character of the subsoil. The deeper rooted plants must also descend into the subsoil; and their habit, whether healthy or sickly, must be a pretty sure test of its quality and present condition, whether friendly or unfriendly to vegetable development.

It is rare to find an individual, who has been engaged in agriculture, and whose eye has been accustomed to country objects, who would find much difficulty in discriminating with tolerable certainty between the probable productive powers of soils, as distinguished by the vegetation with which their surface was overspread, at least to the extent of pronouncing whether these soils deserved to be classed, in a general sense, among the fertile or infertile.

This is, no doubt, more difficult and uncertain in lands that are subject to cultivation. Such lands may have been materially altered by draining, and artificial mixture with manures, and the various native earths, and any noxious particles which they originally contained, neutralized by oxidation, from exposure to the atmosphere, and pulverized, quickened, and mellowed by the sanatory and ameliorating agency of the exterior elementary influences. But there *are* speaking and tell-tale indications which must ever certainly reveal the secret and original character and unaided capability of a soil to the experienced inquirer; and we shall endeavour to give rules, at once intelligible, comprehensive, and sufficiently easy of application, which will be found materially useful to the agriculturist who would wish to be instructed as to the particular and specific indications which are practical guides in judging of the fertility or barrenness of the soil.

We have said, that there are few individuals, accustomed to country objects, who would find much difficulty in pronouncing, generally, as to the fertility or barrenness of a surface. An intelligent agriculturist, even without being able to name or discriminate botanically, can judge whether a tract be fertile or infertile, from the general appearance and character of its products, from the vigour of the vegetation, the luxuriance of the herbage, the absence of the heaths and coarser plants, the richness of the foliage, the clearness and cleanliness of the bark, the straightness of the stems, and the length and robustness of the annual shoots of the tress, the regularity, beauty, and free growth of the hedge fences, the richness of the natural meadows, and various other less striking indications. The prevalence or simple occurrence of heaths, mosses, or lichens is always suspicious; and the inferior grasses, and less nutritious plants generally, are always found upon the inferior soils; and as a general rule, the herbage and other productions are found to improve with the quality of the soil—the herbage as to quality, the variety of the species of the constituent individuals, and the closeness, and of course the number, of individuals composing a given extent of sward.

There are few who do not know, although they may not be able to give the botanical names, that a *light sandy soil* is known by the presence of the purple archangel (*lamium purpurium*), the shepherd's purse (*capsilla bursa pastoris*); that a barren *unfertile soil* is often productive of bedstraw (*gallium*), or the air grasses (*aria*), &c., and also the parsley piers (*alchimilla aphanes*); *that a fertile loam* is favourable to the growth of common ragwort (*senecio Jacobæa*), and the corn-field cirsium (*cirzium arvense*); *that pervading fertility* is denoted by the presence of the great nettle *urtica divica*), the chickweed (*stellaria media*), and the yarrow (*achillea millefolium*), &c.; that *a soil too finely pulverized* is readily covered with cornfield spurry (*spergula arvensis*). *Moist, strong, black loam, with dry subsoil,* often produces the corn-field pimpernel (*anagallis arvensis*), corn-field madder (*sheradia arveusis*), corn-field grommell (*lithospermum arvense*), salad lambs' lettuce (*valerianella olitoria*), &c., &c. *Alluvial and aquatic soils* are distinguished by the rush tribe (*juncus*), the meadow grasses (*poas*), various species of the reed family (*arundines*), and the amphibious poligonum (*polygonum amphibium*); and arundines mark the better classes of alluvial soil, and such as may become very productive by draining. A *calcareous soil* is favourable to sainfoin (*onobrychis sativa*). *Blue clay*, a marley soil, produces the common coltsfoot (*tussilago farfara*). A *cold and retentive subsoil* is often marked by the corn horsetail (*equisetum arvense*), and other species of *equisetum*. The *inferior clays, and tills, and, peat*, by the heaths (*ericæ*), and *peat* by various species of *sphagnum*, Lancashire bog asphodel (*narthecium assifragum*), &c., &c.

But for the benefit of those who may wish to inquire farther, it is necessary for us to be more particular and systematic in our details. The following plants may be generally held as indicative of the particular soils under which they are classed. We have thought it as well to please all tastes by giving the botanical names.

1. *Argillaceous, or clayey soils.*

Tussilago farfara—common coltsfoot
Juncus, or rush family—many species
Carices, do. do.
Lotus major—greater bird's-foot trefoil
,, corniculatus—horned do.
Crobus tuberosus—tuberous bitter vetch
Saponaria officinalis—officinal soapwort
Potentilla anserina—goose tansy
,, several species do.
Thobetrum Javum—yellow meadow rue
&c. &c. &c.

2. *Generally fertile soils.*

Poa trivialis—rough stalked meadow grass
Festuca pratensis—meadow fescue
Achillea millefolium—common yarrow
Arctium lappa—common burdock
Cnicus lanceolatus—spear plume thistle
Lolium perenne—rye grass
Dastylis glomerata—cocksfoot
Alopecurus pratensis—meadow foxtail
Urtrica divica—great nettle
Stettoria media—common chickweed
Lapsana comminis—nipple wort
&c. &c. &c.

3. *Siliceous soils.*

Spergula arvensis—corn-field spurry
Silene anglica—English catchfly
Arenaria rubra—red sandwort
Papaver hybridum—hybrid poppy
Veronica triphyllos—three-leaved speedwell
,, verna—vernal do.
Hermaria hursuta—hairy rupture wort
,, glabra—smooth do.
&c. &c. &c.

4. *Calcareous soils.*

Onobrychis sativa—cultivated sainfoin
Berberis vulgaris—common berberry
Campanula glomerata—clustered bellflower
Lithospermum officinalis—officinal grommell
,, purpura-cæruleum—purple blue do.
Prismatocarpus hybridus—hybrid prismatocarpus
Veronica spicata—spiked speedwell

Gallium pusellum—little bedstraw
Phyteuma orbiculare—round-headed rampion
Verbascum lychnitis—lychnitis mullein
Viburnum luntan—wayfaring tree
&c. &c. &c.

5. *Peaty soils.*

Calluna vulgaris—common ling
Erica cineria—fine-leaved heath (wet soil)
„ tetralix—cross-leaved do. (dry)
„ two other species less common and local
Spergula sublata—awl-shaped spurry
Termentilla officinalis—officinal septfoil
Oxycoceus palustris—cranberry
Vaccinium æliginosum—blackberry
„ myrtillus—bilberry
Sphagnum obtusifolium—blunt-leaved sphagnum
„ acutifolium—sharp-leaved do.
Eleocharis cespitosa—scaly-stalked spike-rush
Eriophorum vaginatum—hair's-tail cotton grass
„ augustifolium—common do.
„ polystœchion—broad-leaved do.
Polytrichum commune—common polytrichum
Narthecium assifragum—Lancashire bog asphodel
&c. &c. &c.

6. *Generally infertile soils.*

The following intermingled with heaths:—
Salix tusca—dwarf silk willow
Genista anglica—petty whin
Cladonia rangiferina—rein-deer moss
Cetraria islandica—Iceland do.
Lycopodium clavatum—common club do.
Empetrum nigrum—black crowberry
Nardus stricta—matgrass
Melica cærulea—purple melic grass
Agrostis alba—fine bentgrass
&c. &c. &c.

7. *Saline soils.*

Salicornia fruticosa—shrubby glasswort
„ radicous—rooting do.
„ herbacea—marsh do.
„ procumbens—procumbent do.
Pulmonaria maritima—sea lungwort
Ruppia maritima—sea ruppia
Calystegia soldanella—soldanella bearbind
Zostera marina—marine wrackgrass
Illecebrum vertecillatum—whorled knotgrass
Chenopodium Maritimum—see goosefoot
„ fruticosum—shrubby do.
Arenaria marina—marine sandwort
„ peploides—sea chickweed
Salsola kali—kali saltwort
Sison verticillatum—whorl-leaved honeywort
Atriplex pedunculata—pedunculated orach
Ammophila arundinacea—common sea matweed
Elymus arenarius—upright sea lime-grass
Slatice armeria—thrift
Carex arenaria—sea carex
Triticum junceum—bushy wheat grass
&c. &c. &c.

8. *Ferruginous soils.*

Rumex acetosa—common sorel
„ acetosella—sheep's do.

9. *Very dry soils.*

Arenaria rubra—purple sandwort
Aria præcox—early hair grass
„ cristatta—crested do.
„ caryophyllea—silvery do.
Gallium verum—yellow bedstraw
„ sexatile—smooth-heath do.
Linum catharticum—purging flax
Rumex acetosella—sheep's sorel
Campanula rotundifolia—round-headed harebell
Hieraceum pilasella—mouse-ear hawkweed
Thymus serpyllum—wild thyme
Æynos vulgaris—common æynos
Trifolium arvense—field trefoil
&c. &c. &c.

10. *Every soil not moist.*

Serratula arvensis—corn thistle
Curduno lanceolatus—bur do.
„ palustris—marsh do.
Souchus arvensis—large sow do.
„ oleraceus—annual do.
Avena elatior—pearl grass
Anonis arvensis—rest harrow
&c. &c. &c.

11. *Aquatic and alluvial soils.*

Great spearwort
Tongue-leaved crowfoot
Flammula, or lesser do.
Reptans, or least do.
Epilobium tetragonum—square-stalked epilobium
Lamolus valerandi—common buckweed
Lythrum salicaria—willow lythrum
Thysselinum palustro—marsh thysselinum
Viola palustris—marsh violet
Caltha palustris—marsh marigold
Hippurus vulgaris—common mare's-tail
Pinguicula vulgaris—common butterwort
Lycopus Europæus—European water horehound
Valeriana dioica—diœcious valerian
&c. &c. &c.

12. *Aquatic and infertile.*

Ranunculus flammula—lesser spearwort
Cardumine pratensis—meadow lady's smock
Pedicularis sylvatica—pasture lousewort
Juncus squarosus—heath rush
„ acutiflorus—sharp flowered do.
Cnicus palustris—marsh plume thistle
Lychnis floscuculi—ragged robin
Rhunanthus crista galli—yellow rattle
Pinguicula vulgaris—common butterwort
Tryglochin palustre—marsh arrow grass
Gallium palustre—white water bedstraw
&c. &c. &c.

13. *Aquatic, but not infertile.*

Junceus effusus—soft rush
„ conglomoratus—common do.
Veronica beccobunga—brooklime
Alopecurus geniculatus—floating foxtail
Poa aquatica—reed meadow-grass
„ fluitans—floating do.
Catabrosa aquatica—water-whirl
Equisetum arvens—corn horsetail
Arundo phrogmites—common reed
Stachys palustris—marsh woundwort
&c. &c. &c.

14. *Every soil.*

Rumex acutis—sharp dock
„ obtusifolium—broad-leaved do.
„ crispus—curled do.
„ acetosa—field sorrel
„ acetosella—sheep's sorrel

15. *Fences and neglected ground.*

Allium aparine—Robin run hedge
Urtica dioica—great nettle
&c. &c. &c.

16. *New pasture.*

Senecio jacobed—common rag wort
Chysanthemum leucanthemum—ox eye daisy
Anthenus arvensia—corn chamomile
&c. &c. &c.

We must not dwell any longer on this part of the subject, however interesting it may be to some of our readers, and however trust-worthy the indications it is calculated to afford, but at once proceed to consider the various further indications which are afforded by the general chemical constitution of soils, by their physical properties and mechanical relations, &c., &c.; but let it not be supposed that we are going to enter into any statement which may not be rendered practically available by the intelligent agriculturist, without putting himself to the trouble of scientific study or research; on the contrary, it is just to prevent the necessity for any such study on the part of the agriculturist, who does not desire it, that this practical essay has been begun; yet it is hoped there will be few who will not be tempted to pursue every branch of the subject much farther than an incidental notice or our legitimate limits will at all permit.

Next, then, let us consider the indications afforded by the general chemical constitution of soils.

Von Thaer has given the following table, the result of many years of patient and careful investigation. The first column shows the class and principal grain crops, and therefore, to an experienced practical agriculturist, the general management and rotation to which such a soil is suited; the next four figure columns, the proportions of the component parts; and the last comprises the comparative value of the different component parts forming the different soils, and is the result of many years' careful examination and attentive observation of the soils and their products, specially noting the proceeds of the crops best suited to the soils of which they (the component parts) form the constituents, deducting in each case seed and labour.

No		Clay per cent.	Sand per cent.	Carb. of lime per cent.	Humus per cent.	Value.
1	First class of strong wheat soils.	74	10	4½	11½	100
2		81	6	4	8½	98
3		79	20	4	6½	96
4		40	22	36	4	90
5	Rich barley land.	20	67	3	10	78
6	Good wheat land.	58	36	2	4	77
7		56	30	12	2	75
8	Ordinary ditto.	60	38	Small quantities in each.	2	70
9		48	50		2	65
10		68	30		2	60
11	Good barley land.	38	60		2	60
12	Ordinary ditto.	33	65		2	50
13		28	70		2	40
14	Oat and rye land.	23½	75		1½	30
15		18½	80		1½	20

"Nos. 1, 2, and 3, are alluvial soils of the richest quality, and, from the large portion which they contain of vegetative mould or humus, and the intimate state of mixture in which it is found, they are not so stiff as the quantity of clay which they contain would seem to indicate.

" No 4 is a fine clay loam, such as is found in many parts of the United Kingdom, and, although what may be called strong land, is yet of a texture which renders it easy to be worked, and consequently not difficult to be kept in heart, if properly managed.

" No. 5 contains such large proportions of sand and humus mixed with the clay as to peculiarly adapt it for the growth of barley and green crops; it is consequently evidently suitable to the alternate system of husbandry.

" Nos. 6 and 7 are both good soils, the quantity of carbonate of lime in No. 7 compensating, in a great degree, for the smaller portion of humus, but necessarily requiring the addition of a proportionate quantity of dung to supply that deficiency.

" Nos. 9 to 13, although soils of the fair average quality of common tillage land, yet, from the want of carbonate of lime, require the addition of lime or marl.

" Nos. 14 to 15 are evidently light lands, which, though sometimes brought into cultivation, and even rendered productive through the application of manure and judicious management, yet can rarely be kept in heart without the aid of a folding flock; the land of a poorer quality should invariably be kept in sheep pasture.

" Throughout the entire kingdom there are but few districts the soil of which contains more than perhaps 5 per cent. of humus; but, if the staple of the land be loamy, even 2 per cent. will render it fit for the production of grain. The friability of its texture is, indeed, an object of the first importance, for it occasions a great saving of labour and expense; and, if the ground be tolerably well managed and dunged, it can be always maintained in good heart.

" The analysis which has been thus made of these various soils, it should, however, be observed, extends only through the surface to the depth of six inches, without noticing the subsoil, which may greatly affect their value, for, however rich they may be, if that be either too porous or too retentive, they may be rendered in certain seasons unproductive. If, however, they contain a layer of nine inches to a foot of good earth, the subsoil may then be considered of little consequence, though a limestone bottom will always command a preference. The exposure, with regard to the sun, and the situation of the land, in respect to its shelter from cold winds, are also objects of such extreme importance that they may make a difference in point of climate equal to several degrees of latitude; they should, therefore, never be lost sight of in estimating the value of the ground." Many of these points will be noticed more at length hereafter.

We have said that the above analysis has only been made to extend through the surface to the depth of six inches; but we shall presently see that depth and uniformity, and a favourable subsoil, are of infinite importance in judging of the probable fertility of a soil.

Yet this table would be comparatively valueless for practical purposes, unless to the pre-educated and scientific agriculturist, did we not put along with it into the hands of the inquirer a few simple rules for determining the presence and relative proportions of each of the constituents mentioned in the table, in any soil that might hereafter come under his notice, and of which he might be disposed to make a rough general analysis for the purpose of classification, and with the view of thus making one step towards arriving at its probable money value, by determining the crops and rotation most suitable for it in its actual present condition, with the cost of cultivation, produce, and probable balance of profit on such rotation, or the extent of amelioration and improvement prudent and desirable, the probable cost of such amelioration or improvement, and the consequent improved value of the soil which ought to be the result.

In a careful selection of specimens to be subjected to analysis, a separate portion must be taken from every part of the upper stratum, which, from the character of its surface vegetation, from the texture, colour, or other indication, would seem to betray a material difference or specific variety; great care being taken, on each occasion of selection, to ascertain correctly the depth of upper stratum, and character of subsoil, and the general condition of the surface and subsoil, as regards moisture. We shall show afterwards, that depth, and the relation of soil as to moisture, are considerations of material importance in judging of the probable fertility of a soil. The portions, as they are selected, should be immediately placed in phials, with ground-glass stoppers, and the phials made quite full, and thus preserved until the analysis is about to be performed.

The first preliminary step to be taken in proceeding to the *rough* chemical analysis of a soil, with a view to classification, is the following:—After carefully weighing out a known portion of soil, and spreading it thinly over clean white paper; place this portion in an oven, or on a metal plate, over a fire, and let it remain to dry, till the paper, from heat, begins to show symptoms of discoloration. Weigh *now again*, and the loss will correspond with the quantity, or proportion, of the water of absorption, or contained water, in the soil. It is important to ascertain this for many considerations.

The *first* step, *after* this preliminary process, is to weigh out 100 grains from the identical portion of soil on which we have just been operating, and to place these 100 grains in a small vessel, composed of fire-clay, or platinum, and subject it to a dull red heat over a common fire, or spirit-lamp. Then weight it and the loss may be set down as the quantity or proportion of *humus*, or organic matter, present (say $11\frac{1}{2}$).

The *second*. Still retaining the same portion of soil, let it be mixed with a half pint of water, and to this mixture add half a wineglass-full of spirit of salt (muriatic acid), and stir it frequently. If lime be present, effervescence will take place; or, in other words, minute bubbles of air will rise to the surface, and escape. This air is the carbonic acid gas contained in the carbonate of lime present in the soil. Whenever these air bubbles cease to rise to the surface on stirring, the process may be considered at an end. Then leave the mixture to settle down, and pour off the water carefully. Dry the soil as directed in the preliminary step; and then weigh it carefully, and the loss may be set down as the quantity, or proportion, of lime present (say $4\frac{1}{2}$).

The *third*. We may *now* take a fresh portion of the soil, dry it thoroughly, and weigh out 100 grains, so dried; or take it without the preliminary drying, but making allowance for the proportion, or quantity, of the water of absorption already ascertained to be present previously, by the *preliminary* drying process, and let it be boiled, and thoroughly incorporated with the water. It may then be poured into a vessel (one of glass would be preferable), and allowed to settle, till all the large sandy particles shall have subsided. This point must be carefully watched; and while the lighter clayey particles are still suspended in the water, and before they have begun to subside, let the liquid be poured off and the sand in the bottom collected, and dried, as directed in the preliminary step, and second, and then weighed. This will give the quantity, or proportion, of sand in the moist soil, which by the *preliminary* step, was found to contain a certain quantity of water. Deducting, then, if the proportion of soil shall have been used moist, the ascertained proportion of the water of absorption, corresponding to the quantity examined at present, as instructed in the preliminary step to this analysis, let the quantity, or proportion, of sand remaining be found equal to 10 (say 10).

Then we have	Humus	$11\frac{1}{2}$	grains.
	Lime..............	$4\frac{1}{2}$	,,
	Sand	10	,,
	Remainder will be clay	74	,,
	Making together	100	grains.

exactly the proportions of a strong wheat soil.

1. *Clay*.—The presence of clay in the soil may be known by its softness to the touch, its tenacity, plasticity, and adhesiveness; and another general character of all aluminous or clay soils, is to give out a peculiar, or earthy, odour when breathed upon, which is supposed to arise from the combination of the clayey substance (alumine) with a portion of oxide of iron, which is present in most soils to such an extent at least as to influence or modify, in some degree, their colour, but in some rare instances in such quantity as to be prejudicial; though, in very small quantity, it is thought by scientific men to be rather favourable, if not necessary, to vegetation. Clay, at least the aluminous particles, are thought to act as absorbents of gaseous substances—as of ammonia, for instance; and they have a powerful attraction for organic matters, and the various salts, the produce of decomposition in the soil itself; and being very retentive of all such substances, the presence of a due admixture of clay must be ever necessary to a fertile soil.

2. *Sand*.—The presence of sand may be ascertained from soils containing it being capable of

scratching glass, and feeling rough to the touch. Sand has no apparent particular attraction for organic matters or gaseous substances, and seems principally valuable from the just and desirable mechanical division which it ensures, when present in regulated proportion in a well wrought soil; thus imparting to it the requisite friability and looseness of texture, that healthful moisture and fostering heat may be freely conducted to the root fibres, and that evaporation and absorption may proceed uninterruptedly.

3. *Lime.*—The presence of calcareous matter, we have seen, is easily detected by the test of spirit of salt. Calcareous matter assists in pulverizing clay, by attracting moisture at all times from the surrounding earth and air; and this moisture, in winter being congealed by frost, expands, and disturbs every neighbouring particle in the mass, and also operates in giving adhesiveness to sand, aids in reducing insoluble organic substances, combines with them in part, improves the soil in texture, and renders it (particularly sandy and gravelly) more retentive of enriching substances, thereby incalculably increasing their fertility, particularly if applied in combination with clay, in the form of marl. When applied as quicklime, it has a powerful effect in destroying many noxious weeds and their seeds, besides insects and their *larvæ*, particularly on clover leys, which are often infested by them. The lime is found chiefly in the form of an insoluble carbonate; but we may show, perhaps, under the head *salts* and *saline matters*, that some compounds of lime may be rendered in part soluble, and this with a view to ascertaining the gross quantity of saline matters present in the soil.

4. *Humus.*—The presence of *humus*, or organic matter, is detected by weighing the soil, after being thoroughly dried, exposing it to a red heat, and then weighing again. The loss is organic matter, or *humus*. Throughout the kingdom there are few tracts containing more than 8 per cent. of *humus*; but if the staple of the land be loamy, even 2 per cent. will render it capable of bearing grain crops, though a smaller quantity will not in any soil (unless accidentally or extraneously supplied by irrigation or otherwise, which is often the case with grass lands) support the more valuable agricultural crops, favour their perfect development, and carry them on to productive maturity. The true nourishment of plants is decomposing organic matter; at least, such substances contain the elements of their nourishment. In the more minute analysis, the organic substances are chiefly included under the varieties humic acid, insoluble humus, and organic substances containing nitrogen. Ulmic, and humic acid, carbonic acid, and ammonia, are likewise produced during the decay of organic substances.

5. *Metallic Oxides.*—The presence of metallic oxides in the soil, such as oxide of iron and oxide of manganese, may be known by the colour—ferruginous, red, or yellow; cupreous, with greenish streaks; but cupreous impregnations are rare, the green colour being frequently and generally communicated by iron. Indeed, ferruginous impregnations are the only metallic impregnations which occur to any extent in soils. Ferruginous impregnations in excess are injurious to vegetation; although, in due proportion, they are believed to be friendly to fertility.

A few other substances will sometimes be met with by the agriculturist, such as salt, sulphur, coal, &c., in particular localities.

6. *Salt or Saline Impregnations.*—The presence of salt or saline impregnations in soils may be distinguished easily by the taste on the palate. These, in due proportion, are friendly to fertility. The saline, or soluble portion of the soil, in this quantity, is in small proportions, and may be tolerably ascertained by pouring a pint, or a pint and a half of boiling rain or distilled water over a pound weight of soil, previously well dried in an oven; and after stirring sufficiently, and time being given to settle, let the pure liquid be poured completely off, and then evaporated or boiled to dryness over a fire; and the quantity of solid saline matter left will give the number of grains of saline matter present. This will generally consist of common salt, (chloride of sodium), a substance composed of one part of a gas called chlorine, and another of a metal called sodium; gypsum; Glauber's salts, or sulphate of soda, composed of one part of a gas (sulphuric acid), and one part soda, itself a compound substance, and composed of one part of a gas called oxygen, and one part of the metal sodium, which we have already mentioned; Epsom salts, sulphate of magnesia, composed of one part of a gas (sulphuric acid), and one part magnesia, itself a compound, and composed of one part of a gas called oxygen, and one part of the metal magnesium; also of the nitrates of potash, soda, and lime, or compounds of one part nitric acid, and one part of potash, soda, or lime, severally. And these are the soluble saline substances of the soil, which supply to the growing herbage the portion they require of this description of nourishment. Magnesia, potash, and soda, then, occur in soils, but generally combined with other matters. Magnesia often occurs in great quantity as a carbonate, or combined with carbonic acid gas. If it should remain uncombined in a soil in any quantity, it is uniformly prejudicial; and some soils are found unfavourable to vegetation in consequence, and it becomes difficult to apply a remedy. They are included then under this head without any separate notice. Magnesia, potash, soda, and lime, when combined with the gases, such as phosphoric acid gas, chlorine gas, sulphuric acid gas, or carbonic acid gas, are severally phosphates, chlorides, sulphates, and carbonates of magnesia, potash, soda, or lime, and are here included under the head "salts, or saline impregnations."

The presence of *sulphur* may be detected by the unpleasant odour soils containing it will give out on being thrown on a hot iron. Sulphureous impregnations abound in some localities, and often, where they occur in nature, seem to be connected with fertility; and a portion is desirable.

The presence of *coal* is detected by the appearance of its fragments after the soluble portions of a soil have been removed by water and spirit of salt. The soils on coal are generally infertile; though they are very often composed of *alluvium*, or transported materials, and they are by no means in such cases necessarily infertile.

Such are the simple rules for detecting the presence of the elementary substances of which soils are generally composed, as also the proportions of those which occur in largest quantity, and most frequently. It was absolutely necessary to say this much, to enable the uninformed to comprehend us. But we must say no more of the chemical constitution of soils, but proceed to consider the indications afford by their physical properties. To go into any exact analysis of the minute chemical constitution of soils, would be either to take it for granted that our readers were one and all familiar with the principles upon which any nice chemical analysis must necessarily proceed; and granting this, in the first instance, we would have yet farther to admit that it was within the range of possibility to make ourselves intelligible, in briefly treating of such a very difficult and extensive subject, in any incidental notice which would be here admissible, as illustrative, or explanatory, of the subject before us. But those who are at all acquainted with this beautiful science, will readily join us in proclaiming, that any such attempt must unfallibly prove unprofitable and fruitless. Besides, it is not to be expected that every practical agriculturist can thus be possessed of either the knowledge or adroitness necessary to complete a minute. satisfactory, chemical analysis; and assuredly he has an ample sufficiency of other points of more immediate necessity, and a variety of knowledge of more indispensable practical utility, to awaken and occupy his constant and daily attention.

The indications afforded by the physical and mechanical properties of soils.

1. *Depth and uniformity of soil* are of great importance. Although the surface to the depth of six inches be fertile, yet, if the subsoil be either too retentive or too porous, the value of the superincumbent soil may be seriously affected; for, in certain seasons, an unfavourable subsoil may render the true soil lamentably unproductive. Every inquirer should carefully examine the subsoil, as well as the true soil, particularly if the true soil should not exceed six inches in depth, or so; as such shallow soils are seldom productive, unless incumbent on limestone rock; and when occurring on till, or sand, are invariably unfruitful. If, however, the upper stratum should extend to the depth of from nine inches to a foot, or upwards, of good loam, the consideration of the texture of the subsoil is of much less practical importance. However, a base, or subsoil of limestone is ever most friendly to the crops of agriculture. It is an unfavourable indication when the plough is constantly turning up a subsoil of very different colour and texture from the upper stratum, or true soil. Wherever the rain water stands long in the furrow, and does not sink readily down into the soil, and become absorbed by it, but remains on the surface in puddles, till it disappears from atmospheric evaporation, it is also an unfavourable indication. In some rare instances of unusual fertility, it does happen that the subsoil is of nearly uniform texture and composition with the surface soil; and such soils may be considered of almost inexhaustible fertility. However, these instances are seldom to be met with in old countries.

2. *Density, adhesiveness, and state of division of the constituent parts of soils:—*

The absolute weight of a siliceous or calcareous sand has been found to be	110	lbs.
Half sand and half clay	95	,,
Common arable land . . . . from 80 to	90	,,
Pure agricultural clay	75	,,
Rich garden mould	70	,,
Peaty soil . . . . from 30 to	50	,,

We may remark, under this head, that soils retain the warmth imparted to them by the rays of the sun in a ratio corresponding to their density; but at the same time it must be admitted that dense soils are less easily and readily heated by the solar influences than lighter soils; and many other considerations of intricate and difficult explanation, which we cannot pause to detail here, are for most practical purposes nearly valueless.

However, as feeding ground for stock, particularly in winter and in moist weather, and for the performance of the ordinary operations of husbandry with facility on the surface, a certain measure of density is of importance. When a practical man finds a close-eaten pasture, after moderately moist weather, indented with the hoof-prints of the stock, cattle, and sheep, and these indentations remaining brim-full of water, till it gradually disappears by evaporation, his mind is at once made up as to the general character of the soil, and the class to which it belongs.

The consideration of the adhesiveness of soils is of great practical importance, particularly as respects the expense of labour, their adapture for pasture or culture lands, and their probable fertility and value.

Siliceous and sandy soils have no adhesiveness or drying; while clays, according to their purity, become proportionably adhesive, compact, and hard or drying; but a mixture of sand, in proportion to its quantity, corrects this adhesiveness.

In a practical and economical point of view, the additional expense of working such adhesive soils must be deducted from their probable comparative fruitfulness, in estimating, in a practical sense, their fertility, or money value. According to the adhesiveness of clays, when wet, they are found to offer a resistance to the plough in every square foot of its surface passing through them of from 8 to 25 lbs.; a rich vegetable soil, when wet, &c., about 6 lbs.; a sandy soil, when wet, &c., about 4 lbs. So that the absolute weight or density of a sandy soil exceeds that of a clayey soil; yet, in an agricultural or practical sense, clayey soils are weightier, that is to say, require much more physical power to turn them over and reduce them to the perfection of tilth required, than sandy soils.

The state of division of the constituent parts of a soil is of importance in judging of its probable fertility. On this head we may just remark, that the more friable a clay becomes from draining and judicious tillage and intermixture with organic and calcareous matter—in fact, the more it is made to resemble and approach a loam in consistence and general character, the more fertile and valuable, as tillage soil, does it become. A poor clay soil is equally injured by excessive moisture and excessive succeeding heat and dryness, and thus resembles a poor sand as to the results produced by such sudden changes; for in either case the extremes of wet and drought are almost always, though in different ways in each case, lamentably prejudicial.

The general character of clay-tillage land is, that though the crops are abundant, the expense of culture is greater; the fallow recurring so often, and great strength of teams and implements being required. These lands are easily distinguished from their natural tenacity, and the consequences must be duly considered in estimating their fertility. There are descriptions of heavy lands running into loam where a bare fallow may be safely dispensed with, and where wheat, beans, and other corn, and clover, succeed each other alternately. Here there is no interruption of productiveness by the fallow, which must be steadily borne in mind while estimating their comparative fertility.

There is yet a description of heavy land or clay soil which is well described as a hungry clay, and which will be very generally found mixed up with gravel, and with a strong impregnation of ferruginous matter. No crops will thrive well on such soils without expensive improvement; as, for instance, draining, to be followed by heavy liming, very perfect exposure to the atmospheric influences for the purpose of promoting thorough oxidation of the ferruginous particles, and an abundant application of manure. Such soils, from what we have said already of the plants that mark ferruginous soils, and the general appearance of such soils just given, will not readily be mistaken; and it is clear that in estimating their fertility, or probable fertility, by improvement, a great outlay must be taken into account, and deducted from the prospective produce.

Such lands are frequent in the neighbourhood of the chalk formation, and in such cases are capable of ready and profitable improvement, by sinking pits and obtaining for the surface a good coating of chalk from underneath. We may remark that the more a sand is improved in the adhesiveness of its particles from the presence of clay and lime, or marl combining both, and organic matter, &c., the more fertile and valuable does it become. Such improved soils are always early and kindly; but in poor sands the manure is wasted, and the vegetation droops and is burnt up.

Thus gravels and the coarser sands, mixed with fragments of rock entirely siliceous or sandy, are infertile; but when the stony part and the intervening comminuted portion are in part calcareous or limy or marly, and a proportion of organic matter present, they go on improving in quality and fertility like sandy soils. Poor gravels are similarly, and often in a greater degree affected, than sands, as regards dryness and moisture.

The finely divided matter of a soil gives tenacity and cohesiveness, and this in the greatest degree when it contains much aluminia, or earth of clay. The quality of the highly commimuted portion of a gravelly soil must be particularly examined, as well as its quality.

The state of division of the component parts of a soil is intimately connected with its powers of absorbing and retaining moisture.

The powers of a soil to absorb water by capillary attraction increases with its minuteness of division. This is no doubt to be considered in estimating its probable fertility. The powers of a soil in this way may be tested by placing a portion of it in a flower pot, and the pot upon a sole, and filling the sole with water. The capillary power of the soil will be shown by the rapidity with which it sucks up the water, and the quantity it is capable of absorbing. A good soil, with considerable capillary power, is not likely to suffer so much, comparatively, in dry weather and seasons.

The absorbent powers of soils, as regards the quantity of water they are capable of retaining, when poured upon them before saturation, is intimately connected with their fertility.

Thus 100 lbs. of well dried quartz sand will be saturated when it has absorbed of water	25 lbs.
Calcareous sand	29 "
Loamy soil	40 "
Clay loam	50 "
Pure clay	70 "

And Schübler found that peaty soils (which we shall notice separately, but very briefly afterwards) absorbed a much greater portion of water.

Useful soils for aration are found to contain from 40 to 70 per cent. of their whole weight of water; and if less, they are only suited for pine forests; and if more, for pasture lands.

But the power of soils to absorb water from the atmosphere is also of great importance in considering the probable measure of fertility they may possess—Schübler found that

100 lbs. of quartz sand, previously well dried in an oven, when exposed to the atmosphere of a moist night for 12 hours, gained	0 lbs.
Calcareous sand	2 "
Loamy soil	21 "
Clay loam	25 "
Pure agricultural clay	37 "

And peaty soils, from the organic matter of which they are chiefly composed, much more.

Sir Humphrey Davy found, that fertile soils were the most absorbent.—Thus,—

1000 lbs. of a perfectly dry and very fertile soil, from East Lothian, gained in an hour	18 lbs.
Very fertile soil from Somersetshire ...	16 "
Soil, worth 45s. per acre, from Mersea, in Essex	11 "
Coarse sand, worth only 15s.	8 "
Soil of Bagshot Heath	3 "

This is a test to be applied to sandy, loamy, and arable lands generally; and when applied to such, as Sir Humphrey Davy asserts, does undoubtedly afford one means of judging of their agricultural value, and probable fertility and productiveness.

We may remark, under the general head of the powers of absorption and retention of water by soils, that it is desirable that soils should be more absorbent in warm and dry, than in moist climates. But we must again remark, to prevent any chance of misconception, in connection with Sir H. Davy's assertion, that pure clays, approaching to pipe clays in nature, which take up the greatest quantity of moisture, when poured upon them in the form of water, are nevertheless not the soils which absorb most moisture from the atmosphere in dry weather. The surfaces of such stiff clay soils contract with heat and drought, and become injuriously indurated and almost like a brick; and thus, upon contraction, present a diminished surface to the atmosphere, preventing free evaporation and absorption, and compressing the root fibre of the growing crops; so that, on such soils, the herbage droops, yellows, and withers away, nearly as quickly as on soils containing an injurious proportion of siliceous sand.

Sir H. Davy merely alludes, no doubt, to soils tolerably well suited to the general purposes of aration.

It is always desirable that soils on declivities should be more absorbent than on plains in the same locality, in order that they may the more certainly retain a sufficiency of moisture, and the enriching portions of the manures applied to their surface. When a soil is immediately incumbent on a rock, it will be drier than if situated on a subsoil of clay or marl. A sandy soil should have a clay subsoil to supply it with moisture in dry weather, by capillary attraction. And it follows that a clayey upper stratum or true soil is much improved by a sandy or gravelly subsoil, which tends to correct the excess of absorption in the superincumbent true soil.

A soil of calcareous marl, a few inches in depth, immediately incumbent on limestone rock, is not found to be infertile, as might be apprehended from the near approximation of the rock to the surface; and such soils have been pared and burnt at intervals, for generations, without deterioration. Such soils are met with in North Wales and Derbyshire. This is accounted for from the highly absorbent nature of such soils, and the gradual decomposition and disintegration of the subjacent limestone rock, which is perhaps considerably assisted and facilitated by the heat to which it is exposed at each recurrence of the paring and burning process, and the subsequent absorption of moisture, causing the outer crust to swell, and scale or shell off gradually.

In a moist climate, even a siliceous sandy soil may be comparatively productive; while the same quality of soil in a dry climate would be comparatively useless.

The power of retention possessed by soils when exposed to the influence of atmospheric absorption is found to be pretty much in proportion to their capacity for absorbing and retaining or holding water when poured upon them. That is to say, if peat will take four hours to dry, a pure clay will take three hours, and a sand one. This shews most satisfactorily the necessity for draining peat and adhesive clay soils.

The condition of the soil and subsoil with respect to moisture very much influences the temperature of soils. In a perfect soil, the moisture should be suspended and divided among the contained cells and interstices, as in a sponge, *and never in a state of aggregation*, but rather of very minute division, so that the mass shall be thoroughly moist, *but not saturated*. Peat bogs and saturated soils generally can never attain to great degrees of heat or cold, *and on this depends the existence and growth of peat. The temperature of all soils will be increased by thorough and perfect draining;* and in wet soils much of the solar heat is consumed in causing the evaporation of the contained moisture. Does this not account for the judicious draining of wet soils, along with many other advantages ensuring earlier maturity for the crops, besides increasing incalculably their general fertility and money value.

All that we have said here should be very carefully studied by the enlightened inquirer, who would fain avoid error, if called on to give advice, and to act beyond his own immediate locality; and who should thereafter be capable of pronouncing a clear and deliberate judgment, founded on sound and recognizable data of general application, well matured and considered, on broad and comprehensive principles of almost universal application.

Arthur Young (to whom agriculture owes so much) observed that if equal weights of different soils were taken, thoroughly dried, and reduced to powder, they produced, by distillation, volumes of air corresponding in some degree to the ratio of their fertility and money value; and that these gaseous volumes so produced were partly inflammable. But although we have, by frequent trial, satisfied ourselves of the general truth of this statement, so far at least as to serve as a subsidiary guide in assisting to decide between the comparative values of two arable soils of tolerable similar apparent fertility, yet it is quite impossible within our limits to attempt, with any reasonable chance of success, such a clear and intelligible exposition of the process as will enable any practical man, without previous knowledge, for the first time to undertake, unaided, this investigation for himself, at least with a prospect of arriving at any trustworthy or valuable result. It must be evident in such an investigation, that without frequent practice and great nicety of precision no trustworthy result whatever can be attained.

Many soils are more heated by the rays of the sun, cæteris paribus, than others, and are familiarly called hot, in contradistinction to others familiarly called cold; and this much depends, as we have already remarked, on their condition as to moisture.

Soils composed of a stiff white clay are heated with difficulty, and retain the heat but a very short time; and this difficulty is increased from their being generally saturated with water, and much heat is consumed in evaporating the moisture.

White chalks are heated with difficulty, but, being generally drier, they retain the warmth longer, as the heat is not consumed in the evaporation of the contained moisture.

A black or dark coloured soil containing much vegetable matter is most easily heated; and dark coloured soils generally containing much carbonaceous or ferruginous colouring matter are more easily heated by the solar influences than pale soils, and acquire, in some instances, as much as 8°

higher temperature. The temperature of the soil often reaches 100°, and sometimes 150°, while the air, in the shade, makes only 70° to 80°. And in cold climates, such as Great Britain, this is no doubt of some practical advantage, and, as calculated to induce early maturity in the crops, in some degree. in uncertain localities, and in forwarding spring herbage, is well worthy some consideration when judging of the general fertility of a soil in a particular situation, and on an average of seasons.

There is one caution which we have reserved to the last, in order that we might give it distinctly by itself, so as to prevent all possible chance of misconception. *Beware of a peaty soil*, and particularly of mistaking it for a rich black loam; and remember that *rich black* or *hazel loam* is *the trustiest and perhaps the best of soils.* These peaty soils are chiefly composed of imperfectly decomposed vegetable substances—chiefly vegetable fibre. In their natural and unimproved state they are spongy, tough, elastic, and inflammable when dried, and easily distinguishable; but when improved and under high cultivation, and well wrought up with suitable manures and the earths, they are less easy of detection. But we shall endeavour, in a few words, to explain some indications which will still betray their original character even when reduced to the appearance of loam by cultivation; and though capable of deceiving the inexperienced inquirer, it is scarcely possible, without incurring a ruinous and perfectly unjustifiable expense in laying on lime and the earths in profusion, so to correct the texture of peat as to deprive it of its loose and porous character; and though it may certainly be brought to produce bulky crops of straw and large crops of grasses as meadow land (particularly by irrigation, as in the case of the Orcheston Meadows with their calcareous matter), yet the quantity, quality, and weight of the grain produced will seldom be found to be at all in proportion. These soils, too, very often lying on a retentive subsoil, oppose a further serious difficulty to their successful improvement and advancement to fertility.

But they may still be detected, even after improvement, from their dull, dark colour, contrasted with the brighter hazel of the loam, from their comparative loose and spongy texture, compared with the earthy and more solid consistence of the hazel loams; sometimes from the characteristic poverty and sterility of the vegetation on the surface, both as respects number of species and of individuals, and luxuriance of development; the herbage of peat soils generally being marked by a very peculiar and slightly dusky brownish, reddish, or yellowish green tint, particularly about the lower parts of the stems, and altogether strikingly opposite to the free and vigorous growth which ever hastens, magically and unbidden, to weave the rich, bright, glossy, verdant, and glowing mantle which so closely wraps a rich brown hazel loam.

Loams are found in all situations on elevated table lands, where they are very often of a red colour; on slopes, or declivities, where they are yellow, or hazel; and in the hollows of valleys, where they are almost black, and of alluvial origin. The two last are the varieties with which the inexperienced may possibly, without caution, be led to confound a highly improved peat.

The consistence of a rich loam is friable; readily permeable by air and moisture, and discharging with facility an excess of the latter; sufficiently absorbent and retentive of moisture in dry weather; having a powerful attraction for manures, and yielding them up in uniform and abundant supply to the growing crops in every stage of their progress to maturity; neither easily parched by summer heat, nor drenched and chilled by the rains of winter. Except in the hardest frost and heaviest rain, it may be tilled at any time with equal success. From the fineness of its texture, root weeds are easily shaken out and extirpated, and the expense of labour is small, and the cost of manures (from its natural fertility, and the intimate intermixture which its friability permits, and its retentiveness of fructifying particles) comparatively inconsiderable, under proper management. It is therefore the most profitable of soils; and on an average of seasons, and taking the clay fallow into view, with the consequent loss of a crop, and the cost of labour on a bare unproductive fallow—from all these considerations, we must regard such a soil as the most productive in clear profit, and therefore in practical fertility. We have shown how it is to be distinguished from the soil which it most resembles, a highly improved peat, and in drawing this distinction, have clearly explained the indications, properties, and peculiarities, both of consistence, colour in different situations, vegetation, &c., &c., by which it is characterised, and which, if carefully studied, will serve sufficiently to guide the inquirer to distinguish a good loam from a peat, or indeed any other distinct variety of soil whatever.

But they may be still detected, even after improvement. There is yet another tell-tale character, and visible witness.

Glance over the suspected tract, and mark well the colour of any stones that may appear on the surface. If they should present an uniform white and bleached appearance, and other corroborative indications had raised your suspicions, your doubts may have an end. This appearance is peculiar to peaty soils, and when your attention has once been directed to this infallible characteristic, you can never afterwards be mistaken, where stones occur. This whitening, or bleaching, is produced by the action of the acid properties peculiar to peat. If your suspicions should be aroused, and the stones are not present in any quantity, but perhaps carefully removed, very probably to build the enclosures and fences, &c., still make a point of inspecting their appearance, and at the twelfth hour you may be saved from the lamentable blunder of classing an improved peat soil side by side with the most valuable variety of soil, a rich sound, hazel loam.

Where there is a growing agricultural crop, it no doubt affords very good *data* from which to make an approximate estimate of the general productiveness and economical fertility of a soil. The rules for forming such an estimate are in every day use, and sufficiently simple, intelligible, and easy of application. But the inexperienced eye may even here be deceived in forming a correct estimate of the *real, inherent productive energies of the soil.* The crop may be luxuriant, no doubt: yet it may have been produced by the *profuse and unprofitable application of expensive, stimulating manure,* a system which could not be continued with any prospect of reasonable remuneration, and which merely serves to veil and disguise the native poverty of the soil. However, the practised and experienced agriculturist is even here at little loss to form a correct and speedy judgment. He will look at the crop, cast his eye on the surrounding vegetation, for the sake of comparison, and by this test, detecting, if possible, any striking disparity; observe the consistence and general characters of the soil, aided by the general knowledge which we have already endeavoured to convey; and if, after these preliminaries, his suspicions should be aroused from any apparent disproportionate excess of luxuriance, let him then examine the crop itself narrowly, and he will probably find, if it should indeed be the rank and unprofitable growth induced by profusely applied and stimulating manures, that although the straw may be bulky, it will be soft, fragile, pliable, and succulent, and wanting in strength, body, firmness of substance and stiffness, in proportion to the size of its growth, when compared with the produce of sound fertile land; the ear will be light, chaffy, ill filled, unsubstantial, and wanting in weight and plumpness, and the crop altogether will have more of a rank grassy appearance, than of a productive, promising, well ripened grain crop. Such forced crops are very apt to lodge, or fall down to the ground, from the want of natural robustness, and desirable firmness and stiffness of culm, to which the stimulating manure, applied in unwholesome excess, by promoting a premature and unnatural development, had effectually prevented their ever attaining.

There can be no doubt that land in the same parallel of latitude, *cæteris paribus*, is always more valuable in proportion to the comparative lowness of its situation. In high districts, the herbage is less succulent and nourishing, and growth slower, and at all events later, and not so long sustained, and grain crops run more to straw, and the grain is less plump and heavy, and less perfectly ripened, and the harvest late. But all this, and the consequences, are so well understood, that we need not enlarge on the subject.

We may just remark, with regard to climate, that high elevations and thin soils are generally found together. The climate, as regards its influence on the crops at every season, and we must not forget the harvest time, must be carefully considered; for even if the soil should be rich, what matters it, if the crop is so late from an unfavourable climate, that it cannot be saved? This is certainly a most important consideration in estimating the economical fertility of a soil. We may state that Humboldt calculates, that in the temperate zone, an ascent of 110 yards diminishes the temperature as much as an additional degree of latitude; and it is stated by another authority, that, in round numbers, in determining the temperature of a country, 400 feet elevation is equal to a degree of Fahrenheit, and a degree of Fahrenheit nearly about equal to a degree of latitude. But this we state rather as curious, and of general application. In Great Britain alone, it has been calculated that an additional elevation of 60 yards is equal to a degree of latitude. In placing a value on land in our own country, the practical man can easily determine without this short and simple rule. The character of the vegetation, &c., will show at once its comparative state of advancement for the season.

We must not extend our remarks any further; and we have anxiously endeavoured to be as brief as was at all possible, consistently with perspicuity and our determination to give a tolerably comprehensive view of our subject.

ON REAPING AND HARVESTING GRAIN-CROPS.

BY THOMAS SULLIVAN.

(Continued.)

In my former article on this subject, I endeavoured to point out some of the numerous advantages secured by reaping wheat at that particular stage of its growth, between immaturity and full ripeness, in which it is said to be *raw*, by showing that an amount of loss much more considerable than is generally apprehended is actually sustained by the farmer, in the diminished quantity and the deteriorated quality of the produce both in grain and straw, in consequence of suffering the crop to remain uncut until it is considered to be thoroughly ripe. Several conclusive proofs have already been adduced to show, that grain, particularly wheat, is of the greatest value as an article of food about a fortnight before attaining full maturity, or what is commonly called *dead* ripeness; and that, consequently, it ought to be cut down at that period, in order to secure the maximum advantage from the crop. The grain is then thinner in the skin or husk, and therefore, when ground, yields a larger proportion of flour, and, of course, a smaller quantity of bran than at any more advanced stage of its growth. It then also contains the largest proportion of starch and gluten, both of which are its most valuable and essential constituents; and if reaped in the state of ripeness referred to, the sample will weigh heavier per bushel, have a finer appearance, and obtain a higher price in the market, than if allowed to attain a greater degree of maturity. It has likewise been shown that the loss arising from the shedding of the grain by high winds, or in performing the several processes of reaping, carrying, and stacking, which is often very considerable when the crop is allowed to become thoroughly ripe, is greatly diminished, if not altogether prevented, by adopting the practice of green or raw-cutting. The straw also, it has been ascertained, is heavier and contains more soluble or nutritive matter about a fortnight before fully ripening than at any subsequent stage of its growth, and consequently, it is then more valuable as an article of food for live stock. That all these important advantages are to a great extent secured by early reaping has been most conclusively demonstrated by the results of the experiments which have already been quoted; and the propriety of the practice has been further confirmed by the researches of scientific men, who have clearly and satisfactorily accounted for the deterioration or diminution of farinaceous matter which ensues after the grain has attained a certain stage of ripeness. Although these advantages may seem but of trivial moment. when considered separately and in reference to the produce of merely a single acre, yet when combined and applied to the extent of land under wheat-culture in these countries, the importance of reaping the crop in the state of ripeness referred to cannot fail of becoming strikingly apparent. It is estimated that there are in the United Kingdom about eight millions of statue acres of land under wheat, producing annually, on an average, three quarters per acre, or about 24,000,000 quarters of grain in the aggregate, of which more than three-fourths are allowed to become ripe; and when it is considered that by cutting this a fortnight before attaining thorough maturity, an increase of at least fifteen per cent. of flour would be produced, it is, I think, the imperative duty, as it is obviously the immediate interest, of every cultivator in the kingdom to give the practice of early reaping at least a fair and unprejudiced trial. Its utility is not of recent discovery, nor the result of any new theory, as many persons may suppose; for the advantages derived from cutting wheat from ten to fourteen days before attaining full ripeness have been known to some enlightened farmers in different parts of the kingdom for a considerable time back. This being a subject of great national as well as individual importance, it cannot, I conceive, be too frequently or prominently brought under the consideration of agriculturists; and therefore no apology is deemed necessary for again adverting to it in this article. But it may be proper to caution some readers against falling into the opposite error of reaping the crop too soon. It is obviously more injudicious to cut corn prematurely, than even to allow it to become ripe, as in the former case the grain always has a shrivelled appearance when dry, and is in every respect of an inferior quality; whilst the straw, from being cut while yet green and succulent, is difficult to get sufficiently dry for preserving in the stack, especially in moist harvests, which are of such frequent occurrence in the changeable climate of this country. The great object of study, then, with the farmer, is to guard against over-ripeness on the one hand, and immaturity on the other; but it is hardly necessary to observe, that the error of premature reaping is much less frequently committed than that of allowing the crop to remain too long uncut.

From what has already been remarked in reference to the implements employed in reaping, it is obvious that the sickle and the scythe are still the only instruments that can be generally or profitably used in cutting down grain crops. The Hainault or Flemish scythe was much in vogue at one period; and sanguine expectations were entertained of its becoming generally employed, and of its superseding the use of the existing reaping instruments; but, as has been already observed, it has fallen into almost universal disrepute and desuetude in those parts of North Britain in which the greatest efforts were made to introduce it in opposition to both the scythe and the sickle; and the reaping machines which have hitherto been invented have not been found of much practical utility, and they are consequently but rarely employed at harvest work. The following remarks shall, therefore, be confined exclusively to details of the most approved modes of reaping with the first-named instruments—viz., the sickle and the scythe; but before proceding further with our subject, it will be necessary, and I hope not uninteresting, to offer a few observations in reference to the persons who are engaged in conducting the various labours of the harvest with the usual modes of hiring them, &c.

As it is a point of the utmost importance to have the whole or as much as posssible of the crop cut down in the most proper state of ripeness, and secured in the stackyard as quickly as is consistent with sufficient dryness, despatch is peculiarly essential during harvest; and it is but rarely that the regular or constantly employed labourers of a farm are capable of themselves to perform the whole of the necessary work at that busy period. Hence it becomes indispensable for almost every farmer to employ several additional reapers, in order to expedite the different operations of the harvest. Reaping with the sickle is performed by both men and women, but the scythe can only be used by men; and hence the proportion of female reapers that may be employed is of little consequence in the former case, provided they be sufficiently active and experienced at the work. Their number will, however, be limited when the crop is to be cut by the scythe; and it is but rarely that women are employed either in binding or in stooking corn, when a sufficient number of men can be obtained for these purposes. The mode of hiring harvest labourers differs considerably in different districts. In the Lothians and in most of the southern counties of Scotland, where reaping with the sickle is still by far the most general method of cutting down grain crops, it becomes absolutely indispensable for every farmer to hire a considerable number of persons to aid those constantly employed upon the farm: viz.—the hinds and cottars, with their wives and adult children. The districts referred to are, however, abundantly supplied with reapers from Ireland and the Highlands, and also from the towns and villages in the neighbourhood. The number of auxiliary harvest labourers employed on particular farms varies from week to week according to the urgency of the farmer, or the quantity of corn just ready for cutting, the state of the weather, and other circumstances. Weekly hiring markets are held regularly at the principal towns in every district, at which the rate of wages is fixed, generally by mutual agreement between the farmers and reapers, but frequently also by the farmers themselves in private consultation. In most cases, the same rate of harvest wages is paid in all parts of every district or county; but it is liable to fluctuate from week to week according to circumstances. During the last few years, the rate of wages paid to reapers in the Lothians has varied from eight to twelve shillings a week, with victuals and lodging, though not very many years ago they received so much as from twelve to sixteen shillings per week. The hours of working during harvest in that locality are from six o'clock in the morning to half-past six in the evening, two hours being allowed for breakfast and dinner, which are always taken in the field, and a quarter of an hour both in the forenoon and afternoon for rest; but of course this arrangement must be departed from towards the conclusion of the harvest, when the days become shorter. When the corn is sufficiently dry for stacking, the carrying is proceeded with, in favourable weather, from break of day to twilight, during which time the horses are not unyoked, and get no rest except while the carter is taking his dinner. The food given to reapers in the Lothians generally consists of oatmeal porridge and milk for breakfast and supper, and bread and beer for dinner; a Scotch pint (about two quarts) of porridge is the customary allowance for a man at the morning and evening meals; and the quota of bread and beer is a pound of the former with a quart bottle of the latter. The average value of victuals amounts to about eightpence a day for each reaper, exclusive of the expense of providing and cooking, &c. Some hired reapers frequently remain on the same farm from the commencement to the conclusion of harvest; but in most instances they are engaged and paid by the week, and are at liberty to leave, or may be dismissed on any Saturday evening. Women always get the same rate of wages as men, provided they are equally capable of reaping; the hinds' wives, however, afford their services during harvest as payment for their house rent. The average number of days occupied in reaping are twenty-four full-work days, and the whole business is usually accomplished in thirty days; but the duration of the harvest is, of course, mainly dependent upon the state of the weather, and it will be long or short according as the weather proves unfavourable or propitious for carrying on the work. This is the general management of reapers in the southern counties of Scotland, but, of course, there are some slight peculiarities in the usages of different districts, even though the same instrument—the sickle—be employed. Reaping with the scythe has latterly been introduced to some extent into most part of the Lothians, and has necessarily occasioned a considerable difference in the mode of engaging harvest labourers. Although the mowing of grain-crops has been more or less resorted to in the Lothians from a remote period, yet it is only within the last few years that the practice has come into anything like general repute among the farmers. A considerable proportion of the oat crop was mown these last two harvests by scythesmen from Aberdeenshire—the county in which scythe reaping is confessedly practised in the most approved manner, the labourers there having acquired, from long experience, much dexterity at the work. The usual plan in this case is, for the farmer to contract with an intelligent man, for performing the several operations of mowing, gathering, binding, stooking, and raking, at a fixed sum per acre. The contracter, who undertakes to have all these executed to his employer's satisfaction, then engages in his own county (Aberdeenshire) a sufficient number of reapers to accomplish the whole of the work; and as he commonly has several bands of mowers, with their respective attendants, reaping simultaneously upon neighbouring farms, he usually succeeds in realizing for himself pretty considerable harvest-wages. The Lothian farmers generally are anxious to have the practice of mowing introduced and extended in that locality, for this among other reasons, that it obviates the trouble of superintending a large number of reapers, and of providing and cooking food for them. Those that cut the crop by the acre procure their own victuals, but are accommodated with lodging by the farmer for whom they work. The Lothian labourers have not as yet acquired great dexterity in taking up corn after the scythe, which explains the circumstance of the requisite attendants being, in most cases, procured from Aberdeenshire, in order to insure the accomplishment of good work.

In the more northern districts of Scotland, particularly in the counties of Banff and Aberdeen, where the scythe described in my former article is now, and has been for the last fifteen years, almost the only instrument employed in reaping, the mode of engaging auxiliary harvest-labourers differs considerably from that which is adopted in the southern parts of that country. Instead of being hired by the week, at a fluctuating rate of wages, as is the general custom south of the Forth, reapers in the former locality are engaged, for a stated sum, to attend when the crop is ready for cutting, and remain until the harvest is concluded, whatever number of days it may last. The ordinary duration of the harvest, including the reaping, carrying, stacking, and thatching of the corn, and the lifting and storing of the potato crop, is from five to six weeks, according to the state of the weather. Reaping with the scythe being much more expeditious than with the sickle, the number of persons required for the harvest, when the former instrument is used, is considerably fewer than is necessary when the latter is exclusively employed—a circumstance that certainly furnishes a strong argument in favour of scythe reaping; but, in either case, the farmer will, of course, consider, previous to the period of hiring, what number of additional reapers it will be requisite for him to provide, which is determined by the extent of the farm, or rather the proportion of it that is then under grain-crop.

When corn is reaped by the scythe, as is now almost invariably the case in the district referred to, every scythesman is attended by a woman, who gathers the corn from the swathe into small bundles, and places them upon bands; every woman is followed by a man, who binds the sheaves; another man sets up the sheaves into stooks, or shocks, as they are sometimes termed, which he can do to three binders, or bandsters, as they are indiscriminately named; and lastly follows the raker, who, if a man, and provided with a large corn-raker, furnished with curved iron teeth, can rake to four scythes, if the ground be even on the surface. The ploughmen constantly employed on the farm generally act in the capacity of scythesmen; but the gatherers, binders, and rakers have in most cases to be engaged some time previous to the harvest, at one of the neighbouring hiring markets. The average rate of wages paid to these parties, in

Aberdeenshire, has for some years past been as follows:—

	£	s.
To a man for mowing, stacking, &c. . .	2	10
To do. binding, &c.	2	2
To do. stooking, &c.	2	2
To a woman for gathering, &c.	1	15
To a man for raking to four scythes, &c.	2	2
To a lad do. three do.	1	12

This rate of wages, it may be proper to observe, is exclusive of victuals and lodging, which harvest labourers generally receive in all parts of the country. The food commonly given to reapers in the northern Scotch counties consists of oatmeal porridge and milk for breakfast and dinner, potatoes and milk for supper, with oat-meal bread *ad libitum* at every meal, and two quart bottles of beer a-day to every person. Bread and milk are also given as refreshments between breakfast and dinner, and again between dinner and supper: so that it will be perceived the reapers in that part of the country are very well attended to in regard to victuals, the motto of the farmers at that period being "to feed well and work well." It is hardly necessary to observe, that this species of food, however unpalatable it would probably be to southern labourers, is highly esteemed by Scotchmen; and a sufficient proof of its nourishing and strengthening properties is furnished by the fact, that the persons who subsist principally upon it go through at least as much severe work, from the commencement to the end of the year, as the labourers of any other part of the kingdom whatsoever. In the northern counties, the average expense of a man's food during harvest is estimated at about tenpence a day, which, it will be remembered, is twopence above the average daily value of the victuals given to individual reapers in the Lothians. The hours of working, when the corn is dry, is from break of day to twilight, with about an hour's interval during the day for meals; and while the carrying of the crop to the stackyard is in progress, all parties engaged have to work for several hours after night-fall, especially when the moon affords her valued light. Advantage is, as it should be, every where taken by the farmer of the "harvest moon," which so opportunely and providentially occurs at that busy period.

The modes of engaging harvest-labourers now adverted to, viz.—at a certain rate of wages per week, or at a fixed sum for the entire harvest, possess their respective advantages, and are most generally adopted in the districts referred to; but grain-crops are also occasionally cut down at a stipulated rate of wages per acre, by reapers who go about for harvest work. This latter method is most frequently resorted to, when portions of the crop are much laid and entangled, as it would obviously be impracticable to employ a large band at the reaping of corn that is so circumstanced. In such cases cutting by the acre is certainly of much convenience to the farmer; but considerable attention is requisite on his part to observe that the grain is cut and bound in a proper manner, and reaped only in suitable weather. The cost per acre varies according to the sort and luxuriance of the crops, the seasons, and other circumstances. Reapers of this class are also occasionally paid by the stook of twelve, or the *threave* of twenty-four sheaves. Threepence-halfpenny is the usual allowance per threave for cutting, binding, and stooking (setting up) barley and oats, and fourpence a threave for wheat, without food. When trustworthy persons can be secured for cutting corn by the acre or the threave, the system may be productive of considerable advantage to the farmer, as it in a great measure insures the speedy accomplishment of the work, besides obviating the trouble of providing and cooking food for a great number of reapers. It is, in fact, the direct interest of those that reap by the threave to work assiduously and to cut the straw as close to the surface of the ground as possible; for by low reaping, which is so much to be desired and attended to by the farmer, they more readily fill their sheaves to the requisite size. But with dishonest reapers, on the other hand, the disadvantages attending this mode of payment may be very considerable, it being their immediate interest to make the sheaves of two small a size in order to increase the cost of the work; besides there are many other ways in which unjust reapers are likely to be tempted to practice deception, when not under the direct superintendence of their employer.

Having thus adverted to the usual methods and conditions of hiring harvest-labourers to assist those constantly employed on the farm, I shall now proceed to describe the manner of conducting the process of reaping. As has been already remarked, grain crops are cut almost exclusively by either the scythe or the sickle, each of which instruments has its advantages and disadvantages, its advocates and opponents. The sickle has been used in reaping from the earliest times, and still continues to be the most popular and the most generally employed throughout the kingdom. It is admitted by all to accomplish the work for which it is intended in the most efficient manner, and to be equally well adapted to the reaping of all sorts of grain crops, in whatever state or position the corn may be placed, whether upright, laid, or entangled; but in a country like Britain, whose variable climate renders despatch in conducting harvest operations of paramount importance, and in which economy of labour requires to be studiously attended to by the farmer, there are some weighty and forcible objections against the exclusive employment of the sickle in reaping grain crops. Hence the great advantages that the scythe has over the sickle in point of economy and despatch. But, nevertheless, I am far from advocating the total suppression of the latter instrument (as some writers scruple not to do), for I am quite satisfied that, notwithstanding its being more tedious and toilsome than the scythe, there are many situations and circumstances in which it can be much more advantageously used. Although I am decidedly in favour of scythe reaping wherever it would be at all practicable to adopt it, yet I should not, upon several grounds, like to see the sickle banished altogether from our harvest fields; and therefore, in the course of this article, I shall advert to both systems of reaping, without prejudice to either, and describe the manner of conducting them in the districts in which each mode is considered to be most judiciously practised and is most generally carried on.

Reaping with the scythe has been partially practised from a remote period in many districts both in England and Scotland; but it is only within the last few years that this system has received any thing like general attention; and it is, in fact, still far from being universally approved of by farmers. The practice of scythe-reaping is, however, gaining ground, and there is every prospect of its becoming generally adopted at no very distant period, at least for standing corn. The sickle and the scythe have each their advantages and disadvantages, and each has also its respective advocates and opponents. It is admitted by all, that the sickle excels the scythe in the greater regularity with which the corn is laid in the sheaves, and in having the ears placed more in one direction, especially when the crop is heavy and happens to be much laid and entangled by the combined effects of wind, rain, and its own luxuriance; but in this case it is obvious that scythe-reaping should not be attempted at all. Another objection urged by the opponents of scythe cutting is, that a larger quantity of grain is shed during the operation of mowing than is done in reaping by the sickle, which is undoubtedly true when the crop is allowed to become over-ripe; but of course this objection vanishes when the corn is cut down at the most proper period; and the practice of suffering it to become so ripe as to endanger the shedding of much of the seed cannot be too strongly condemned, whatever mode of reaping may be adopted. A similar objection and answer apply to the breaking of the ears of barley in mowing with the scythe. It is further urged that as the ears of mown corn are not presented so regularly to the rollers of the threshing-machine as when the crop is cut by the sickle the grain cannot be so effectually separated from the straw, and that the labour of threshing by the flail is considerably increased in the former case. With regard to the latter part of this objection, it is admitted that wherever that rude, laborious, and everyway imperfect instrument, the flail, is still used the preference is always given to reaped sheaves, as the grain, from being mostly at one end, is more easily threshed out; but, it is to be observed, that when an efficient threshing-machine is employed, the loss, if any, sustained in this way is extremely unimportant. Another common ground of objection against mowing grain crops arises from the comparatively greater number of stalks left upon the ground to the rake; but if any material loss accrues from this cause, it must be owing to very negligent management. Most farmers carefully rake the ground after the scythe, but it is not unusual for some to allow the rakings to remain in the field until the principal part of the crop has been secured—until, in fact, what is so neglected becomes either altogether lost for any useful purpose by unfavourable weather setting in, or if put along with the rest of the crop, it materially injures the whole sample. No prudent farmer will, however, suffer any portion of his grain-crop to remain so long in the field, after it is ready for carrying, as to become either rotted or so much damaged that, if put with the rest of the crop, it would impair the quality of the whole; so that this objection against the practice of mowing is readily overcome. Besides, it is the general custom in those districts in which scythe-reaping is judiciously practised, to put the rakings into a separate stack by themselves, so that no injury can arise from their mixture with the rest of the crop. But perhaps the most common objection that is urged against reaping with the scythe is, that mown sheaves are rougher in appearance, and not so even at the stubble end as those reaped by the sickle; that in consequence it is more difficult to erect handsome stacks with them, and that the stacks have a rougher appearance, and expose more grain to the action of the weather and the depredation of birds. Any farmer, however, that has given an unprejudiced trial to scythe reaping will be able to testify that this admitted and almost unavoidable roughness of the sheaves and consequent openness of the exterior of the stack, instead of being detrimental to the corn, is highly beneficial to it, as allowing the admission of air into its interior much more freely than stacks whose outside is more even and compact. For this among other reasons mown sheaves can be stacked with safety in a state of dampness, which, in sheaves reaped by the sickle, would be ruinous to the grain. I may, however, observe that when the crop is mown by experienced scythesmen, and carefully gathered and bound up into sheaves, the quantity of grain that will be exposed on the exterior of the stack does not much exceed what is necessarily exposed in the case of sickle-reaping: but all that may appear can be secured in dressing the stack shortly after its erection, by spreading a cloth at the bottom, to receive the ears of corn as they are cut off. This dressing, which should not be omitted even when the crop has been reaped by the sickle, occupies but a short time after the stacks have been thatched and have subsided a little, as a man with a scythe-blade attached to a handle can dress a stack in an hour. This is always attended to where the practice of mowing has become general; and in regard to some parts of the north of Scotland, in which the scythe is exclusively used, I can say that neater or better finished stacks could hardly be desired than are there put up.

These are the principal objections that are urged against scythe-reaping by its opponents; but it will be seen that they are few and trivial compared with the many important advantages attending the practice. The scythe possesses a great superiority over the sickle as a reaping instrument, in being much more expeditious and economical, and in requiring comparatively fewer labourers, in addition to those constantly employed on the farm, to carry on and complete the harvest work, which of itself is a most important consideration. It is true that the difference in point of economy and despatch between the sickle and the scythe may appear unimportant in regard to the reaping of a single acre of crop, but when a large extent is to be cut down, the saving effected by the use of the former instrument becomes of considerable magnitude, as shall be shown in a subseqnent part of this article; and considering the great expense necessarily attending harvest-work, it is almost needless to say that every practicable means ought to be adopted by the farmer to diminish its amount. Another important advantage accruing from scythe reaping is, that the corn is cut much closer to the surface of the ground than can be done by the sickle; in fact, the straw can be cut by the scythe to any degree of closeness that may be desired, so that a larger quantity of straw is carried to the stack-yard, and less left upon the ground, which it will be admitted is a matter of no trivial moment. Another important consideration in favour of mowing grain crops arises from the circumstance of the straw requiring considerably less time or drought to render it sufficiently dry for the stack than in case of corn reaped by the sickle. This well known advantage of mowing arises from the stems being less compressed together in the sheaf, which of course renders it more pervious to the air. Oats commonly require a fortnight and upwards to become ready for carrying when reaped by the sickle; but when the crop is mown, it seldom requires to stand in the eld longer than ten days, which, it will be alowed, is a most important consideration in our variable climate.

Having thus briefly adverted to the principal advantages and disadvantages of scythe and sickle reaping, I shall now proceed to offer some remarks on the most approved method of conducting the mowing of grain crops. It may not be improper to observe, that I am enabled to furnish these details from personal observation in Aberdeenshire, in which county it is allowed that scythe reaping is practised in the most judicious manner. My remarks shall therefore be principally descriptive of the mode of reaping adopted by the best farmers in that locality.

When a considerable extent of grain-crop is to be cut down, as on large farms, the most economical arrangement of the reapers is in bands, each consisting of four scythesmen with their respective attendants. This number of scythes kept actively employed is sufficient to reap a very large quantity of corn during harvest: but should the size of individual farms render it necessary to have more than four scythesmen, they ought to be so arranged as to economise time as much as possible. In Aberdeenshire, the usual allowance of corn for each mower is twenty Scotch acres, or twenty-five acres imperial measure; so that on a farm of three hundred statute acres, cultivated according to the six course rotation of cropping, in which two-sixths of the whole are annually under grain crop, four scythers will suffice to perform the reaping. In this case the different parties required for the work are four scythesmen, four women for gathering up the corn into sheaves, four men who make bands and bind the sheaves, two men to set up the shvaves into stooks or shocks, and one man to rake the ground to four scythers, making in all eleven men and four women. This is allowed to be the most economical arrangement of the reapers on farms of such a size as to require this number of persons to carry on the harvest work. Another very common arrangement of the reapers is in bands of three scythesmen each, in which case one man is required to stook to three scythes, which will afford him ample employment, and a stout lad can rake to the same number. On farms growing less than sixty acres of corn annually, the band of reapers may consist of only two scythesmen, two gatherers, two binders or bandsters, and a woman or a boy to rake. The binders in this case have to set up the sheaves, and the gatherers to make their own bands.

When other circumstances admit of it, the reaping should be commenced at that side of the field which is on the left hand of the mowers when at work, in order that the swathes may be more easily cast *from* the standing corn. Grain was formerly, but is now rarely mown *towards* the uncut corn. When the crop is not laid and entangled, the scythesmen follow each other at a short distance apart, having the wind if possible on their right-hand so as to keep the corn a little from the scythe. In mowing grain-crops no regard is paid to the direction of the ridges, the particular inclination or *lie* of the corn being the only guide to the reapers. Land laid perfectly flat, without raised ridges or open furrows, is most convenient and favourable for scythe reaping; and when the ground is naturally dry or has been thorough drained, it should in every case be made level on the surface. When ridges are much elevated in the middle, the scythe makes the lowest and neatest reaping, by mowing right across them, and the corn growing in the open furrows can also be more closely cut in this way; but the operation of raking can hardly be performed so efficiently as is desirable; so that, all other things being favourable, a diagonal direction across the ridges is to be preferred. This, however, must altogether depend on the inclination of the corn and the direction of the wind, which must be followed in all cases of scythe reaping, irrespective of the position of the ridges. When the crop is laid and twisted in various directions, the mowers cannot advantageously work in company, as in the case of standing corn; every one must, therefore, take a separate ridge, to enable him to cut in the most suitable manner without being interrupted by any other. But here I must observe that the scythe, however dexterously it may be wielded, cannot be used with advantage in reaping corn that is much laid and entangled. The mowers must cut very slowly to perform anything like efficient work; and, however expert and careful they may be, the mowing of corn that is much contorted is a very fatiguing operation; besides, it is almost impossible, with all the attention that can be exercised, to lay the stems in the swathes, and afterwards into the sheaves, with any degree of regularity. The same number of persons with sickles could cut it down in as short a time, and in a much more efficient manner. It is advisable therefore, in all cases of laid and entangled corn, to reap it by the sickle, and to cut the standing portion of the crop by the scythe. Most farmers in Aberdeenshire mow all their corn indiscriminately, however twisted it may be; but this, in my opinion, is not a very judicious practice. The defective work unavoidably made by the scythe in reaping entangled corn has contributed more than any thing else to bring that instrument into disrepute among farmers; but it ought to be remembered that the scythe can be used with advantage only in reaping standing corn, or that which lies evenly in one direction; for quite erect corn is by no means the most easily mown. The scythe undoubtedly possesses many important advantages over the sickle, but it would be straining its superiority too far to say that it could be advantageously used in all cases, to the total exclusion of the other.

Reaping with the scythe consists of the following operations—viz., cutting, gathering, binding, stooking, and raking; on each of which I shall now offer a few observations.

Cutting.—The great art in mowing corn consists in cutting the crop as close to the surface of the ground as possible, in leaving a uniform stubble, and in laying the swathe at right angles to the line in which the operator proceeds, with the ears all in one direction, and the stems parallel to each other. Whatever method of reaping is practised, the corn should be cut close to the ground. Long stubble is justly regarded as a criterion of slovenly management, and is never tolerated by correct farmers, who are always anxious, and take much pains, to secure the greatest possible quantity of straw, with the two-fold view of increasing the supply of provender and litter for their cattle, and of enlarging their stock of farm-yard manure. It is obvious, therefore, that the farmer who suffers his corn to be cut otherwise than close to the ground is very negligent of these important considerations. It has been ascertained by experiment that for every inch of stubble, a half cwt. of straw is left per acre on the field; and when the value of straw is considered, the loss thus sustained over a large farm must be very great. In estimating the advantage of low reaping, it should also be remembered that the straw of corn is always most succulent and nutritious near the root, and that such a slight difference as an inch in the cutting makes an important one in the weight and value of the straw. When it is further considered that the straw is often upwards of two-thirds of the entire weight of the crop, we cannot but feel astonished at the mode of reaping which prevails in certain districts in England, where it is customary first to cut off the ears and upper portion of the stems, and afterwards at leisure to mow down the remainder of the straw. In many parts of the country it is not uncommon to see at least twelve inches of stubble left on the field; and although this practice undoubtedly effects a considerable saving in the cost of harvesting the crop, it is obvious that its utility in this respect is more than balanced by its disadvantages in many others. Not that the straw thus left upon the ground need be altogether lost, for if ploughed under immediately after the removal of the crop from the field, its decomposition would materially contribute to the fertility of the soil; but as, in agricultural matters, one improper practice is generally accompanied or followed by others of an equally injudicious character, it is well known that in those districts in which the method of reaping here referred to prevails, the advantages to be derived from ploughing the land early before winter are but little appreciated, it being the most general custom to defer the ploughing of the stuble ground until an advanced period in the spring. Not only is the subsequent pulverization of the soil for turnips or other green crops thus rendered more difficult and precarious, but it is also obvious that the advantage that might be derived from ploughing under the long stubble is thereby greatly diminished, as most of the valuable constituents of the straw are dissipated by exposure to the influence of the weather, and the action of rain, &c., during winter. But even if the land were ploughed, as it invariably ought to be, immediately after the removal of the crop to the stackyard, still the propriety of leaving high stubbles in corn fields, with the view either of diminishing the expense of harvesting the crop, or of more economically manuring the land than in the usual way, is exceedingly questionable. The farmer will in all cases find it to be more advantageous, and more conducive to his interest, to cut his grain-crops as close to the surface of the ground as possible, and thereby to secure the greatest available quantity of straw which he is enabled again to return to the soil after it has been converted into manure, and rendered every way better calculated to promote the productiveness of the land, than by leaving a considerable proportion of it upon the ground, to be wasted away by the action of the weather; besides, we not unfrequently hear complaints of a deficiency of straw for the purpose of littering cattle in the houses and yards in which they are fed, which would seldom be the case if the grain crops were cut close to the ground, instead of leaving several inches in height of stubble. There can be no doubt that the practice of low reaping is fast gaining ground, and that farmers even in the most backward parts of the country are becoming more and more alive to its utility; but it is indisputable that there are several localities in which the contrary practice still exists; many farmers being favourable to its continuance for the double purpose of lessening the cost of harvesting the crop (which, in my opinion, is a very mistaken economy) and of increasing the productiveness of the soil by the gradual decomposition of the stubble after being buried beneath the surface. The roots of the cereal grasses left in the soil after the stems have been removed, contribute in no small degree to restore the matters abstracted from it by the crop; but, as has been already observed, it is obvious that the straw itself can be applied with most advantage after it has been decomposed and combined with the excrements of the domestic animals. All these are, I think, conclusive arguments in favour of low reaping, the advantages of which are, in fact, so self-evident, that it would seem superfluous thus to dwell upon the subject, had not the neglect of it been so general in some quarters. After what has already been said, it is almost needless to observe, that not the least important of the advantages attending the practice of scythe-reaping arises from the circumstance, that the corn can be cut to any degree of closeness that may be desired.

It is obviously of much importance that the corn be laid as regulraly as possible in the swathe, with the ears in one direction, and the stems parallel to each other, as all the other operations, particularly the gathering of the corn into sheaves, are thereby materially facilitated; and inattention, or want of dexterity on the part of the scythesman in laying down the corn with regularity, necessarily occasions rough-looking sheaves and defective work, as the gatherer and binder have but little leisure to arrange the stems while the reaping is being proceeded with. To mow corn properly, therefore requires considerable dexterity, attention, and experience, on the part of the scythesman; but it is remarkable with what precision the swathes are laid by those who have been much accustomed to the use of the scythe in cutting grain crops. Reaping with the scythe is laborious work under any circumstances, but its severity may be considerably mitigated by the exercise of a little judgment and attention on the part of the operator. It is especially requisite, towards insuring efficient and agreeable mowing, that the scythesman should constantly endeavour to preserve a keen edge on his blade. The stoutest men find this to be a very fatiguing operation when they neglect or are unable to impart a good edge to the scythe, and they may be outdone by mowers much inferior to them in point of strength, but who are better aware of the advantage of preserving a uniformly keen edge, and better able to impart it. The scythe-stone, and its accompaniment, the *strike* or *stikle*, are therefore to be frequently put in requisition in sharpening the scythe; and the time so occupied will not be in any degree lost; in fact, when regularly attended to, a few skilfully applied strokes of the stikle suffice for a considerable time. A swathe of from thirty to forty yards in length is as much as a scythe can properly cut with one sharping; but much will obviously depend on the nature of the crop and of the ground, and something also on the quality of the blade itself. In mowing, the scythe makes a circular sweep amongst the standing corn, every successive cut clearing a space in the form of a crescent. The swathe should be laid at right angles to the line in which the mower proceeds, and be cut completely out a few inches from the standing corn, so that none of the stems be left uncut. In order to do this with facility, the mower should be careful not to swing his arms too far to the right in entering the scythe for every cut, as he may not be able to bring the implement far enough round to the left to cut the corn completely out. Too narrow sweeps should, however, be avoided, as less work would thus be performed in the same time; and the scythe should not be brought farther round to the left than is necessary to lay the swathe a few inches clear of the standing corn. In order to work with ease and despatch, the mower should keep his feet well forward towards the uncut corn, which enables him to maintain a more erect position than he otherwise could do, and gives him the greatest possible command over his instrument. He should likewise proceed as directly in a straight line as the inclination of the corn will allow, with a free and steady motion, making as uniform sweeps with the scythe as possible. It is esteemed good mowing to cut constantly a sweep seven and a half feet in length by eleven inches in breadth: some men will occasionally take more; but in strong corn this is as long a swathe as most persons can continue cutting for any considerable length of time. In case of wheat less must be taken, owing to the difficulty of cutting the stems; and the labour of reaping oats is increased when there is much grass amongst the crop.

Gathering.—The gathering of the dissevered corn into sheaves is a branch of the work that demands a great deal of care and attention; for this part being imperfectly accomplished considerably increases the labour of the binder and the stooker, and retards all the subsequent operations; besides, the grain is apt to sprout in unfavourable weather, when the sheaves are rough and uneven at the ends. It requires very considerable practice, however, to be able to gather up the corn after the scythe, and place it upon the bands, in as expeditious and regular a manner as could be desired. This difficulty is, in fact, a great, though certainly not an unsurmountable, obstacle to the extension of scythe reaping. Good mowers of grass crops may be found in all parts of the country, and a little practice renders the cutting of corn quite easy to such; but it is hardly possible to find either women or men who could gather it up in a proper manner and with sufficient despatch without considerable practice. A good illustration of this remark was witnessed a few years ago by the writer, on a large farm in the Lothians. Two scythesmen from Aberdeenshire were employed to mow part of a field of oats as a trial. The men were excellent mowers, and set to work very briskly; but the attendants were so awkward and slow at the business, that, though several more than the usual number were allowed, yet in their attempt to keep up with the mowers, which they were far from being able to do, the work was so imperfectly done, particularly the gathering and binding, and so much was left upon the ground to the rake, that the farmer was obliged immediately to stop the mowers and to abandon the attempt, as being impracticable without more expert gatherers, though at the same time highly approving of the manner in which the corn was cut, particularly in being so close to the ground. Those who have always been accustomed to reaping with the sickle, require considerable practice to make them sufficiently expert in attending the scythe, as the work in both cases is somewhat dissimilar. The Aberdeenshire mowers now generally engage the necessary attendants in their own neighbourhood, to accompany them to the Lothian harvest, and thus provide against the work being improperly performed.

Women are much better adapted than men for gathering corn, and in Aberdeenshire they are exclusively employed for this purpose. But, as the labour is severe, it requires young, active women, who have been well accustomed to harvest work. In lifting the corn, the gatherer stands at the stubble end of the swathe, and collects it mostly with her left hand, until she has as much as will form a sheaf, when she lifts it in her arms, keeping the stems as even at the but-end as possible, and deposits it carefully upon a band made of the straw, and previously laid upon the ridge for that purpose. When men are employed for gathering corn, they wear a long apron which reaches to their ankles, and is an important auxiliary in keeping the ends of the sheaves even. When the binders are not obliged to set up the sheaves into stooks, as in the case of three or four scythesmen working in company, they make bands for their respective gatherers; and this they can do so readily that it imposes scarcely any trouble upon them. In fact, expert binders almost invariably prefer making the bands, than to be exempted from the duty. After binding a sheaf, the bandster draws the straggling stalks from the corn end, of which, in stepping forward, he makes a band, by twisting them at the ear ends, and lays it upon the ground ready for the gatherer to place the next sheaf upon it. The binder is thus required to keep close to the gatherer, and the latter must closely follow the mower; so that the entire band are obliged to keep up with one another in order that the work may proceed without interruption. It may not be unimportant to observe here, that it is a common practice, in reaping with the scythe, to bind the sheaves with a single length of the straw, unless where it happens to be too short for that purpose, This cannot, however, in any case be recommended, as the grain at the corn end of the band is generally lost in tying the sheaf. In making bands, two lengths of the straw should therefore be joined together by twisting them at the ends next the ears.

Binding.—Although the binding of corn into sheaves is apparently a very simple operation, and one that may easily be performed by most persons, it nevertheless requires much care and expertness to do it in an efficient and expeditious manner. In binding mown sheaves, it is to be observed, that it would be improper to tie the corn so near the stubble end as is necessary in the case of sheaves reaped by the sickle. The reason of making this difference is, that in reaped sheaves the stems are mostly even at the stubble end, and hence, in order to include the short stalks, the band must be passed round nearer the bottom of the sheaf than would otherwise be desirable; whereas in mown sheaves, on the other hand, the most of the stalks are even at the ear end, and they must therefore be bound somewhat nearer the top in order to include the short stalks. The winning process is materially facilitated by this mode of binding, as the lower end of the sheaves is expanded by tying them near the ears, which renders them more pervious to the sun and wind. It is of importance to have the sheaves of a uniform size, and not too large, and that the bands be no thicker than just sufficient to bind and keep the corn together until it comes to be threshed. Inattention to these minutiæ often occasions considerable delay and loss, at a period when economy of time is of so much importance and so necessary to be studied by the farmer.

Stooking.—The stooks, or shocks, as they are indiscriminately termed, should always be set up on the ground cleared by the raker; for this, among other reasons, that any stalks that may be underneath the stooks are likely to sprout in moist weather, and thus be rendered useless. They should also be set up on the middle of the ridges, and as nearly in a right line with one another as can conveniently be done, so that the carts may have a clear passage between them. It is of some importance also that the stooks be set up in a direction from north to south, or nearly so, in order that both sides may be equally dried by the sun. To enable the stookers to set up the sheaves upon the clean ground, it is necessary that the raker should keep as close to them as possible, and by doing so his own work will be considerably lessened, as otherwise he would be obliged to go round the stooks, which, of course, retards him considerably. The most general practice, even in Aberdeenshire where, it is allowed scythe-reaping is carried on in a more judicious manner than in any other part of the country, is to set up the stooks upon the most convenient part of the unraked ground ; and while the corn is in the course of being carried to the stack-yard, to rake the spaces upon which the stacks had been placed. But, in my opinion, this plan is not quite so judicious as that of raking the whole surface at first, and setting the stooks only upon the clean ground. Stooks of mown sheaves being narrower and more tapered at the top than those of corn reaped by the sickle, and for this and other reasons more easily dried, hood-sheaves are always dispensed with, though often resorted to as a protection to the corn in the case of sickle-reaping, the sheaves having to remain a longer time in the field to become ready for the stack.

Raking.—If the ground be smooth upon the surface, a man provided with an improved corn-rake can rake to four scythes, and a stout lad is able for three. There are various kinds of the corn-rake, some of which are drawn by horses and some worked by the hand, the former being the most expeditious, and the latter most generally employed. The land-rake commonly used has a wooden head seven feet in length ; the shaft is about the same length, and, like the head, made of tough ash, with a short moveable helve or handle projecting at right angles from the shaft. There is also a ring fixed in the shaft at about two feet from the head, to which a leathern belt is attached, which is passed over the shoulder and across the breast of the raker, by means of which, and the short handle attached to the shaft, the implement is dragged along the ground to be raked. This part of the work is most efficiently performed by drawing the rake backwards and forwards across the ridges, by which the furrows are better cleaned than by raking along the ridges. The teeth are of iron, about seven inches in length, and fixed to the head by a small screw-nut, in order that they may be easily removed in the event of being broken ; they are four inches apart, and so curved at their points that the weight of the rake may rest upon the curve, thus preventing the points of the teeth penetrating the ground, which would not only render the instrument more difficult to work, but would mix much earth and sand with the rakings. In using the rake, the operator works right across the ridges, if it can conveniently be done, and empties it of the gleanings close to the standing corn, which, when the gatherers and binders are returning to commence another swathe, are carefully collected into sheaves, bound up, and stooked apart from the rest of the crop. Four of these sheaves make a stook, three being placed upon the ground, and one on the top of the others. By thus gathering up and binding the rakings as the work is proceeded with, instead of allowing them to lie upon the ground till some future opportunity, as is sometimes done, no part of the crop is lost or impaired in quality ; but still there should be as little left to be raked as possible. Considerably more rakings are left upon the ground when the crop happens to be light and scanty than when it is of average luxuriance, as the straw in the latter case adheres better together, and can therefore be more cleanly taken up from the swathe; but much will obviously depend on the expertness of the gatherers. Instead of the hand-rakes above referred to, rakes drawn by horses are sometimes employed for raking stubble; but, notwithstanding their being more economical than hand-rakes, they are little used in those parts of the country in which scythe-reaping is most generally practised. Machinery can be most advantageously resorted to for raking corn-fields after the crop has been removed to the stack-yard, as then the instrument will not be interrupted in its progress by the stooks. The raking machines in general use are so well known that any description of them would, it is considered, be unnecessary in this place.

In a preceding part of this article it has been remarked that the great superiority of the scythe over the sickle in reaping grain crops consists in the work being much more expeditiously and economically performed; and I shall now give a comparative statement of the expenses of both methods, from which this will appear more evident. The actual cost of reaping, in either case, will of course depend in a great measure on the rate of wages paid to the harvesters, the nature and quality of the crop, and other obvious circumstances; but it is to be observed that, as the mowing of grain is much severer work than any other operation of the harvest, the men employed at it must have more than the rate of wages usually paid to reapers. The same remark applies to the wages of the parties required to attend the scythesmen, viz., the gatherers, binders, &c., all of whom are kept actively employed.

We shall first take the expense of reaping with the sickle. In Berwickshire it is allowed that a band of six reapers, with their binder, will reap, on an average, a Scotch acre and a half daily during harvest; strong wheat will perhaps require more time, but this is the usual allowance for wheat, oats, and barley overhead. The rate of wages is taken at 2s. a day for each reaper, and the value of the victuals at 8d. each per day: on these data the expense of sickle-reaping in the county referred to may be ascertained as follows:—

	£	s.	d.
Wages of six reapers, at 2s. per day	0	12	0
Do. one binder, do.	0	2	0
Cost of food for six reapers and one binder, at 8d. each per day	0	4	8
Cost of reaping 1½ acre........	0	18	8
Do. 1 do.	0	12	5½

In East Lothian, the usual cost of reaping with the sickle is estimated at from 12s. 6d. to 13s. 6d. per Scotch acre, including victuals.

In Aberdeenshire the ordinary work allotted to every mower is two Scotch acres of oats a-day during harvest, when the corn is not much laid and entangled; but in the subjoined calculation we shall take an acre and three roods only as the average work that can be done in a day by one scythesman and his attendants. As already observed, the expense of reaping with the scythe must be computed at a higher rate of daily wages than that paid to reapers with the sickle; but the cost of the victuals may remain the same as before, viz., eightpence each per day. The expense of a day's work of a band of four scythesmen and their respective attendants, will stand thus:—

	£	s.	d.
Wages of four scythesmen, at 3s. a day ..	0	12	0
Do. four gatherers, 2s.............	0	8	0
Do. four binders, 2s. 6d...........	0	10	0
Do. two stookers, 2s. 6d..........	0	5	0
Do. one raker, 2s. 6d.............	0	2	6
Food of fifteen reapers, at 8d. each	0	10	0
Total cost of cutting seven acres ..	£2	7	6
Do. of one acre......	0	6	9¾

This may be taken as the average cost per acre for mowing, binding, and stooking oats; wheat will, of course, be somewhat higher, and barley about a medium between both.

In Aberdeenshire, where, as has been already observed, reapers are engaged at a fixed sum for the entire harvest, whatever number of days it may last, the expense of mowing, &c., is something less than the above, and, as it may be interesting to the reader to know the cost of harvesting in that county, I subjoin a calculation for that purpose. The usual duration of the harvest, including reaping, carrying, thatching the stacks, and lifting the potatoes, is five weeks; but the principal part of the work is generally accomplished in four weeks, and even less in favourable weather. By referring to the rates of wages given in a previous page, in speaking of the hiring of reapers in Aberdeenshire, the wages of a band of four mowers and their attendants will be seen to be as follows:—

	£	s.	d.
Four mowers, at £2 10s. each	10	0	0
Four gatherers, at £1 15s..........	7	0	0
Four binders, at £2 2s. each........	8	8	0
Two stookers, do.	4	4	0
One raker do.	2	2	0
Total wages of a band of four scythes, &c............	£31	14	0

To this we must add the cost of food for fifteen reapers, estimated at 10d. a day for each, or 5s. 10d. per week, and amounting to 17*l*. 10s. in all, which brings the amount of wages and victuals together to 49*l*. 4s.; this divided by twenty-four, the number of work days, gives 2*l*. 1s. as the total expense of one day's work of four mowers and their respective attendants. As has been already observed, this number of reapers are expected to reap every full work-day eight Scotch acres: so that the expense of cutting, binding, stooking, and raking comes to only 5s. 1½d. per acre, on the assumption of the weather being at all times favourable for reaping, which, in our variable climate, is but very seldom the case; and as corn should not be mown when in any degree wet with rain or heavy dew, the reaping is often interrupted, whereby the ultimate expense is, of course, increased to some extent. The common calculation, however, in Aberdeenshire is that six shillings covers the whole expense of reaping per acre, which, it will be perceived, is no more than one-half of the cost of reaping with the sickle in the Lothians and several other parts of the country.

(To be continued.)

ECCLESFIELD FARMERS' CLUB.

On Economy in the Production of Farm-yard Manure.

BY MR. JEFFCOCK.

In taking into consideration the various expenses incurred by the agriculturist, in the production of his crops, I find the manures comprise a serious item in those expenses. It will be allowed that land cannot be cultivated to advantage, unless it be supplied with manure of proper qualities, and in sufficient quantities.

I am, therefore, induced to offer a few remarks upon farm-yard manures, it being a subject of considerable importance to the interest of the farmer, because the greater the quantity of good manure that he can produce or manufacture on his own farm, the less capital he will be required to expend in the purchase of artificial or other manures.

Good farm-yard manure contains nearly all the ingredients required by the plant in the process of its growth, almost from the first stage of vegetation, until it arrives at maturity; and every field of corn, is only an innumerable quantity of single plants, each of which, individually, has its proper functions to perform before the crop can arrive at perfection.

I propose, in the first place, to consider the construction and constitution of plants, and the kind of food or nourishment they require. And, secondly, the nature and composition of farm-yard manure, and the means by which the quantity may be considerably increased, by proper management, and a due regard to economy.

1st.—In the process of vegetation, the grain committed to the ground contains within itself sufficient nutriment, in the form of starch and gluten, to enable it, in the first stage, to push a small stem upwards, and to thrust a root downwards, which root throws out small fibrous shoots in every direction into the soil. The stem of a common tree is furnished with pith, consisting of a number of minute hollow tubes, laid horizontally one over the other; and the wood and inner bark are composed of long tubes, bound together in a vertical or upright position, capable of carrying liquids, up and down, between the roots and the leaves. The root, immediately on leaving the stem, has a similar structure, but gradually tapers away into fine tendrils, the extremities of which consist of a colourless spongy mass, full of pores; and it is by means of these spongy fibres, that the plant is enabled to take in, and send forward the liquid food, with the sap, to the upper parts of the plant, and to supply it incessantly with that nutriment which it requires. The leaves have also an important function to perform, by extracting from the atmosphere a large supply of carbon.

The food or nutriment of plants is supplied in a liquid or gaseous form, they being incapable of assimilating it in a perfectly dry state. Professor Johnston informs us, that the organic (or living) part of plants constitutes 85 to 99 per cent. of their whole weight, the remainder being inorganic. This organic part consists of carbon, nearly one-half; oxygen rather more than one third; hydrogen a little more than five per cent.; and nitrogen, two to four per cent. The whole of the carbon and hydrogen, and the greater part of the oxygen and nitrogen enter into plants in a state of chemical combination with other substances—the carbon chiefly in the state of carbonic acid, and of certain other soluble compounds which exist in the soil; the hydrogen and oxygen in the form of water, and the nitrogen chiefly, it is supposed, in that of ammonia and nitric acid. The inorganic matters are obtained by the roots directly from the soil.

By the scientific aid of chemistry, we are thus enabled to ascertain the constituent properties of living plants, and, being possessed of this knowledge, it becomes the duty of the agriculturist, in the management of his farm, to study the peculiar nature of the various plants that he wishes to produce, and to introduce to them that kind of nutriment best calculated to suit their necessities and capabilities.

And this leads us to the second part of our subject, viz., the nature and composition of farm-yard manure, and the means by which the quantity may be considerably increased, by proper management and a due regard to economy.

The quality of the dung depends, in a great measure, on the quality of the food consumed by the animal, and also on the peculiar construction of the digestive organs of that animal. The same kind of food given to animals of a different genus will produce excrements of very different quality. Thus the horse, the hog, the ox, or cow, although they may be fed nearly on the same kind of food, the excrementitious matter will vary very much in composition and quality. The dung of the horse affords ammonia in much greater quantity than that of oxen. The dung of swine is of a colder nature, and of a soapy mass, and forms a manure of great power and duration. The dung of oxen contains matter soluble in water, and produces, in fermentation, nearly the same products as vegetables.

The principal substances found in the animal secretions are gelatine, fibrin, mucus, fatty or oily matter, albumen, urea, and different saline, acid, and earthy matters. Most of their substances will easily undergo decomposition, liberating gaseous fluid in the form of carbon, oxygen, hydrogen, and nitrogen, which, as we have noticed before, constitute the organic part of plants.

Horse's dung is of a hot nature, fermenting much more rapidly than that of cattle, or hog's; and when allowed to remain in large heaps, near the entrance to the stable or sheds in the farm-yard, and the violent fermentation allowed to go on unchecked, great loss by evaporation takes place, and the fertilizing properties are greatly impaired; and this loss arises wholly from negligence or mismanagement; for if it was spread regularly and evenly over the farm-yard, and properly mixed with fæces of the cattle and swine, which are of a much colder nature, no such injury would take place, and the one would correct the other, and the general quality of the manure be improved. Straw, from wheat, oats, barley, peas, beans, &c., or any other vegetable matter, being mixed with the animal fæces, very much augment and materially affect the quality of farm-yard manure. The constituent parts of these substances, being principally earth and earthy soluble salts, and in different proportions, which, by entering into combination with the animal and more soluble matters in the dung, retard the too rapid putrefaction of them, and when in a proper state of preparation and amalgamation, form the most efficacious and durable manures that we have.

Notwithstanding the great advantage that accrues to the farmer in having a large stock of good manure upon his premises, how often do we witness the very essence of it, in the form of liquid manure, allowed to escape, either into an adjoining ditch, or purposely drained away into his pond, where it remains unapplied to any useful purpose, and to which his cattle are driven daily, and compelled to wash down their food with a strong solution of liquid manure!

This is by no means an overdrawn statement; for there exist at this present time, in our own village of Ecclesfield, similar instances of mismanagement where the drainage from several farm yards is purposely allowed first to run for a considerable distance along the side of the public street, entirely exposed to the exhalations of the atmosphere, and afterwards to empty itself into the two ponds in the centre of the village, and which are two public watering places for cattle, there to undergo putrefaction, and by that means to become injurious in the highest degree to the health of the inhabitants. I trust that, ere long, this public nuisance will be removed, and that the occupiers of these premises will become persuaded that they are themselves sustaining considerable loss by allowing the most valuable portion of their fertilizers thus to escape. Individuals of the highest scientific attainments, as well as the most intelligent practical men, all agree, that the liquid animal excretions are much superior to the dung of cattle.

Liebig says, "Liquid animal excretions, if suffered to undergo the process of putrefaction, contain the greatest quantity of ammonia; and in the form of salts which has lost its volubility, and when presented in this condition, they are the most valuable of all manures, and not the smallest portion is lost to the plants. It is all dissolved by water, and imbibed by the roots."

The loss of manure in a liquid state in the sewerage drainage, in the large towns in England, is enormous, and appears to be almost entirely overlooked; whilst in Paris, and in the principal towns on the Continent, the drainage from the sewers is applied to the land, and considered of the greatest importance, in furnishing a large supply of the best tillages for agricultural purposes.

Hannam, in his treatise on waste manures, informs us "That by applying a portion of the sewerage of Edinburgh, to 300 acres of grass land belonging to Earls Moray and Haddington and others, which was formerly let at 40s. to 50s. per acre, now lets at £20 to £30 per acre; and they produce crops of the richest grass, not to be equalled, and are cut from four to six times a year, and the grass given to milch cows."

Dr. Granville, in his report to the Thames Committee says, "that the sewerage waste of Strasburgh produces £12,000 sterling annually;" and could the sewerage drainage of Leeds be applied to agricultural purposes, it is calculated that it would amount in value to £50,000 per annum; and that of London the immense sum of £900,000 per annum.

We next proceed to consider the method of preparing the manure in the farm yard.

Let all the buildings and sheds around it be spouted; and the delivering spouts so arranged that the water may be made to flow into the yard, or not, at the option of the owner. In situations where it is practicable, let the floor or bottom of the yard be a little concave, in order that the straw, &c., may be well saturated with the liquid. Make drains from all the stables, cowsheds, piggeries, the dairy, and the kitchens into the manure yard. Make a spacious tank, in the most convenient part of the yard, to receive all the surplus liquid, which is not required for absorption by the litter in the yard.

Having thus prepared the yard, proceed to cover the bottom with any vegetable refuse that requires the longest time to decompose, such as stubble, tops of potatoes, &c., and cover these with the litter from the stables and cow-houses, and in so doing take care that the dung of the different animals be spread in equal layers, and well mixed. When cattle are fed in the yard, occasionally remove the cribs, that the dung may be more equally spread and trodden. In order to keep it in an equal state of moisture, occasionally return to it the surplus liquid manure from the tank, or apply water, the first opportunity that may occur, from the delivering spouts around the yard.

When the manure has accumulated in the yard as high as is convenient, it may then be removed, and formed into a manure heap in the field where it is intended to be applied.

The site may be covered with a layer of earth, or road scrapings, if they can be obtained, which will imbibe the moisture at the bottom.

The heap may be square or oblong, with sloping sides, and should not exceed six feet in height; and care should be taken that the litter be of an equal moisture, and spread regularly, thinly, and lightly over the heap, that an equal putrefaction may ensue; and care must be used that no lumps remain unbroken, but be well shaken out and mixed. A manure heap, treated in this manner, will be ready to apply to the land in about two months without turning. Should it be desirable to postpone the decomposition of the manure for a long period, it may be done by making the heap as sad as possible by treading and carting over it, and adding a layer or two of earth five or six inches in thickness, at equal distances, in forming the heap, and covering the whole over again with earth on the outside, so as to exclude the air; and in this state it may be kept uninjured for nearly twelve months, but requiring to be turned over and lightened up a month or so before it is applied to the land.

When a manure heap is thrown up, regularly and lightly, as first observed above, it is then that the violent fermentation takes place which causes the decomposition of the animal and vegetable matter which it contains, and by which process the ingredients so necessary to vegetation are liberated, and enter into a chemical combination with each other, and will pass off (if not prevented) in larg quantities, in the form of carbonic acid and ammonia; and if neglected, and thus allowed to escape the farmer sustains great loss both in the quantity and quality of his manure. This will appear pretty clearly, by the following statement of an experiment that I made some time ago—proving the loss in quantity.

In November I placed four tons of long fresh litter (lately thrown from the stables) into a manure heap, to itself, on a separate part of the premises; it was thrown up in the usual manner, and turned over once; and in the beginning of May following it was used for the growing of Swede turnips, being then in that state which farmers would pronounce to be excellent rotten manure. In this state it was again put over the weighing machine, and found to weigh only 58½ cwts., having lost 21½ cwts., or more than one-fourth of its original weight. Had there been 40 or 50 tons together in the heap, instead of only 4, the fermentation would have been carried on much more violently, and the evaporation more rapidly; consequently, I think it reasonable to suppose the proportionate loss would have been greater, and probably nearer one-third instead of one-fourth would have been abstracted from the original weight of the fresh litter, as no means were applied to prevent evaporation.

The loss in weight is attended also by the loss of a very valuable portion of the manure by evaporation, which is apparent from an experiment made by Sir Humphrey Davy, who says—"I filled a large retort, capable of containing three pints of water, with some hot fermenting manure, consisting principally of the litter and dung of cattle; and adapted a small receiver to the retort, and connected the whole with a mercurial pneumatic apparatus, so as to collect the condensible and elastic fluids which might rise from the dung. The receiver soon became lined with dew, and drops began in a few hours to trickle down the sides of it. Elastic fluid likewise was generated; in three days 35 cubical inches had been formed, which, when analysed, were found to contain 21 cubic inches of carbonic acid: the remainder was hydro-carbonate mixed with some azote, probably no more than existed in the common air in the receiver. The fluid matter collected in the receiver at the same time amounted to nearly half an ounce. It had a saline taste, and a disagreeable smell, and contained some acetate and carbonate of ammonia." "Finding such products given off from fermenting litter, I introduced the beak of another retort, filled with similar dung, very hot at the time, into the soil amongst the roots of some grass in the border of a garden. In less than a week a very distinct effect was produced on the grass; upon the spot exposed to the influence of the matter disengaged in fermentation, it grew with more luxuriance than the grass in any other part of the garden."

In order to prevent the loss of these gaseous fluids during the process of fermentation, the manure heap should be lightly covered over with a coating of ashes, peat, charcoal, or sawdust, or other absorbents; and this coating should be well saturated with a mixture of sulphuric acid and water, about ten gallons of water to one of acid. When enough of this acid mixture has been applied, there will be little smell; a great part of the ammonia being absorbed by the acid and the charcoal, and the charcoal absorbing also a considerable quantity of the carbonic acid from the heap. Gypsum (sulphate of lime) will answer the same purpose, in preventing the escape of the ammonia and carbonic acid from the manure heap, by means of the sulphuric acid contained in it separating from the lime and uniting with the ammonia, and thus forming sulphate of ammonia; and the carbonic acid uniting with the lime, and forming carbonate of lime, both compounds abounding in excellent fertilising properties.

I do not approve of the decomposition of the manure being carried on to too great an extent; a certain state of fermentation is necessary to liberate its various properties more rapidly; but it is *in* the soil to which the manure is to be applied that its strength should be developed, and not in the heap; a medium state of decomposition is, therefore, to be preferred.

During the dressing and cleaning of fallows, I would abolish the custom of burning the twitch, stubble, &c., as being an extravagant practice; for although the ashes and inorganic matter which remain after burning contain valuable properties, yet these are obtained by too great a sacrifice of vegetable matter.

Let every farmer consider how he can, by every possible means, accumulate the largest mass of vegetable and animal matter from around his farm and about his premises during the year: let him collect the stubble and twitch of the fields, the refuse of his garden, orchards, and stack-yards, the scourings of his ditches, ponds, and watercourses, and weeds of every description before their seeds are ripe, and form the mass into a heap, well mixed together, and saturate this occasionally with liquid manure from the tank, or, should that not be at hand, with some diluted acid; turn the heap once or twice, and this will form an additional quantity of excellent compost for his grass land.

Agriculture is greatly indebted to chemistry for many valuable discoveries made by the latter to promote and advance the interests of the former; amongst these we may mention the newly-introduced tillage, termed artificial manures: but how frequently do we hear of disappointment arising in the using of them, on account of the spurious and adulterated articles which are too often imposed upon the farmer in this form! He, therefore, ought never to purchase these manures to any great extent without first submitting the sample of the bulk to a strict chemical test.

In conclusion, I have endeavoured to show that the profits of the agriculturist in a great measure depend upon the proper management of his manures. He ought, therefore, to display the same care and anxiety to procure large heaps of manure in his fields that he does to obtain large stacks of hay and corn in and around the buildings upon his premises; for unless he possess the former, he will fail in producing the latter. Manure manufactured on the farmer's own premises, if well managed, possesses this great advantage—it is genuine, and (perhaps with the exception of bones) stands pre-eminent above all the rest for efficacy and durability. If the energies which England possesses were put forth vigorously and effectively in the thorough-draining of the wet lands of this country, and only one-half of the waste manures of our large towns and villages were applied usefully to the soil, an important source of additional employment to our labouring population would be opened; and instead of having to pay £500,000 to foreigners annually for bones and rape-dust alone, I think it reasonable to suppose that in a short time she would be able not only to furnish her own tillages, but also to produce corn sufficient for her population, independent of a foreign supply.

Several of the members, amongst whom were Mr. Thos. Turner, of Eastwood, Messrs. Dixon, Fisher, Maugham, and others, expressed their gratification at the paper which had been read, and an interesting discussion took place.

Thanks were voted to the Chairman for his valuable paper; after which the meeting broke up.

The next meeting was fixed for the 16th July, when Mr. Napier will give his promised paper on "The Value and Better Preservation of Liquid Manure."—*Sheffield Mercury.*

JOINT STOCK BANKS.

TO THE EDITOR OF THE FARMERS' MAGAZINE.

SIR,—Many months since, you kindly inserted my letter on Joint Stock Banks, and I had hoped that some of your intelligent correspondents would have given some sort of reply to my queries; although I have the vanity to believe, that an honest and true answer would be very awkward for the success of many "flourishing concerns." But probably the rail-road mania has absorbed every other species of madness: although even the mighty power of steam must succumb to the mightier power of money, and perhaps reluctantly admit her master hand, and acknowledge that but for the aid of the banking house, the list of subscribers to rail-roads would be wonderfully curtailed. But to my subject.

Entertaining a very suspicious opinion of banking, by the ruin I have witnessed among private bankers, who were considered men of ample means, until the bank affairs came to be investigated, and believing Joint Stock Banks to be conducted precisely similar, or rather worse, from a greater command of capital, I have been induced to bring a few matters together in the shape of Dr. and Cr., in order to form some idea of what may be the probable profit of a banking concern; thereby to account for the amazing *assumption of wealth* and *influence* displayed by all those concerned with that aristocratic trade, until the "wind up" comes, with all its withering consequences.

I will suppose the establishment to be formed thus:

Deposits, bearing interest at 2 per cent.	£50,000
10,000 £50 shares (all sold of course, as after a certain day they cannot be obtained but through the kindness(?) of some friend), half paid up -	250,000
Customers' balances, bearing no interest	100,000
	400,000
Capital sunk to build Banking House and three Branches, as it is derogatory to the system to pay rent - -	12,000
	388,000
Deduct one-eighth of £388,000 for what may be required as a rest for the parent establishment and three branches - - - -	48,500
Leaving a working capital of	£339,500

Outgoing.	Annually.
Interest on deposits of £50,000 at per cent. - - - - -	1000
Interest on the 10,000 shares, at £50 each, at *six* per cent., as it would be bad policy not to allow a good per centage - - - -	30,000
General manager - - - -	1000
Coals, candles, servants, and other domestic expenses, taxes, &c. -	200
Salaries of 4 clerks of different grades	800
1st Branch.—Sundry expenses as above - -	150
Manager - -	200
Clerk - - -	100
2nd Branch.—Sundry expenses as above - -	100
Manager and one clerk	300
3d Branch.—Sundry expenses as above- - -	80
Manager and one clerk	230
Four Licences - - -	120
Composition for stamps - -	200
Various contingencies and incidental expenses for travelling; managers meeting for consultation, hurrying on the lame ducks, &c., &c. -	120
	£34,600

Income.		
Interest on a working capital of £339,500 lent on discount, or to individuals, say at 5 per cent - -	19,500	
Commission on £200,000, supposing that sum to turn round six times a year at one eighth per cent -	1,500	
		21,000
Annual loss		£13,600

This tells a sad tale, but I do not think it far from the truth, nor am I aware of any other legitimate profit beyond what I have stated; there is now no stock jobbing as in "the piping times of war," no "sudden news from the Continent," no possible tricks to be resorted to; but there is a certainty of bad debts to be added to the loss here shown; however, the enormous capital would keep the "steam up" for many years even with this loss annually. If I am wrong, I trust some Gentleman more conversant with the subject will condescend to set me right. I am, Sir,

Your most obedient servant,

August 18, 1845. DANIEL DUBIOUS.

ALE AND BEER.

By James H. Fennell.

The Egyptians are said to have been the inventors of ale, their soil producing an abundance of corn.

In great Britain, malt liquor was used as early as the fifth century, and considerable breweries existed in London before the Norman conquest, supplying ales of different qualities and degrees of strength. Ale is mentioned in the laws of Ina, King of Wessex. It was the favourite drink of the Anglo-Saxons and Danes, as it was of their ancestors, the Germans. It very soon found a place at the table of royalty. We are told that it was one of the liquors provided at the banquet in the reign of Edward the Confessor. Chaucer, who lived in the reigns of Edward the Third, Richard the Second, and Henry the Fourth, has celebrated the Southwark ale of those days as the "nappy strong ale of Southwark."

It is probable, however, that the drinking of beer was not a general custom in England until the reign of Henry the Seventh, in whose time the breweries —which then stood on the banks of the Thames, at St. Catherine's, and distinguished in the map given in the "Civitates Orbis" by the name of beer-houses—were twice "spoiled" by the king's officers, either for sending too great a quantity abroad unlicensed, or for brewing it too weak for home consumption. During the whole reign of Elizabeth the foreign demand for English beer continued to increase, and the liberty of export was only occasionally checked by the occurrence of scarcity or dearth at home. What we call beer is of later origin than ale. Thus sings the poet:—

"Ale for antiquity may plead and stand,
Before the Conquest, conquering in this land;
Beere, that is younger brother of her age,
Was not then born, nor ripe to be her page."

(*The Philosopher's Banquet*, 1633.)

Taken regularly and moderately, ale is nourishing, wholesome, and conducive to longevity. The epitaph on Brawn, the famous Irish beggar, who died at a great age in Cornwall, is a testimony in favour of this beverage:—

"Here Brawn, the common beggar, lies,
Who counted by his tale
Some six score winters and above—
Such virtue there's in ale.
Ale was his meat, his drink, his cloth:
Ale did his death reprieve;
And could he still have drank his ale,
He had been still alive."

Ale is highly extolled by Shakspeare in his plays. In the "Winter's Tale" (act iv. scene 2), he prompts Autolycus to say, "A quart of ale is a dish for a king;" and in his "Henry the Fifth" (act iii. scene 5), the constable of France, trying to account for the dauntless bravery of the English, asks if our "barley broth," as he is pleased to call ale, can "decoct" our "cold blood to such valiant heat." In "Henry the Eighth" (act v. scene 3), mention is made of "ale and cakes," Anthony à Wood tells us that when Prynne studied, he seldom ate any dinner, but used every three hours to munch a roll of bread, and refresh his exhausted intellects with ale. Then his "ale-washed wits" were ready for duty again. It was, no doubt, from its power to cheer up the sinking spirits that, in ancient times, it was customary to present to malefactors, on their way to the gallows at St. Giles', a great bowl of ale, their last draught in this world. A similar custom prevailed at York, and gave rise to the saying, that "the saddler of Bawtry was hanged for leaving his liquor;" for had he condescended to stop a while and drink up this last offering of ale, his reprieve, which was then on the road, would have arrived in time to have saved him.

Such are the great merits of ale, that Dr. Westmacott could not avoid making a digression in praise of it even in his "Scripture Herball," (1695.). "Our old English ale," says he, "when without those vile commixtures and unwholesome additions which some use in order to increase its energy and for other compotating ends, is a most wholesome connatural drink. Beer (which only differs from ale by being well hopped for its purgation and preservation) was formerly more used by our old English gentry and housekeepers than in these days, being laid much aside, upon a vulgar and erroneous opinion that beer high-boiled with hops causeth stone and gout, which was an absurd mistake; for the temperate use of it doth not so. He that in his young days accustometh himself to drink his ale mixed or dashed with a little beer, shall never when he is old have occasion to repent; for beerish drink keeps the stomach clean, excites the appetite, and carries off ill-humours; whereas fat, new, ropy, sweet ale (too often none of the clearest), dulls the appetite, creates clam in the viscera, and lodges too long. For myself, ye may conclude that I am a toper at old beer, by my appearing such an advocate for it."

Every reader of romance knows that it was the custom of our Saxon ancestors to drink their ale out of skulls at their feasts. Such were the rude ale-bowls of antiquity. At Braintree and Bocking, in Essex, when topers partake of a pot of ale, the measure they have it in is a peg-tankard divided into three parts or draughts, the first of which is called *neckum*, the second *sinkum*, and the third *swankum*. For the origin of bottled ale, we suppose we must receive the quaint account given by Fuller in his "Worthies of Lancashire." He relates that the learned and pious Sir Henry Wotton, having one day left his usual piscatory companion —to wit, a bottle of ale—in the grass beside the river Thames, he found it some days after, when, lo and behold, it was no bottle, but a gun, such the sound at the opening thereof." This anecdote reminds us of an Indian, who, being at an Englishman's table at Surat, expressed his surprise by loud exclamations on seeing a vast quantity of froth ooze out of a bottle of porter as soon as the cork was drawn. Being asked what surprised him, he replied, "I don't wonder at all that the froth comes out of the bottle; but how the deuce did you ever contrive to squeeze it all in?"

For centuries past, *la bonne bierre d' Angleterre* has been spoken of in raptures by Frenchmen, Belgians, Germans, and other people. When the Persian ambassador and his suite left England, a few years since, many of them shed tears. One of them, struck with the quiet of an Englishman's life, compared with that of a Persian, declared that he could not desire a better Paradise than Chelsea Hospital, where, for the rest of his life, he could wish to sit under the trees, and do nothing but drink as much porter as he liked. Madame Malibran, like many other foreign *artistes* of both sexes, preferred bottled porter to any other beverage. Her favourite repast, at the conclusion of an evening's arduous performance, consisted of oysters and bottled porter, 'yclept stout; not a very pernicious indulgence, but her fondness for it gave rise to a very ludicrous mistake on her part. Malibran hearing the name of the Honourable Craven Berkeley announced in company, exclaimed, with great animation, as she seized his hand, "Ah, Mr. Barclay and Perkins, I do owe you so moch!" The Berkeley family pronounce their name Barclay—hence poor Malibran's mistake.

The last time Madame Pasta was in England, a literary lady of high distinction asked her whether she drank as much porter as usual. "No, mia cara, prendo half and half adessa," she replied. At Munich beer is regarded by the king and his people as indispensable to the health and comfort of the entire community. Within the last few months that capital was the scene of a riot arising out of popular indignation against the brewers for raising the price of beer. If a Bavarian peasant is not at work, he is sure to have a can in his hand. Beer is to him what it was to Boniface—meat, drink, sleep, and clothing; for, notwithstanding this *penchant* for beer, no signs of poverty are visible from one end of the Bavarian dominions to the other. Charles Lamb's fondness for beer is still in the recollection of his admiring friends.

Hogarth's print of Beer-street has the following lines appended to it:—

"Beer, happy produce of our isle!
Can sinewy strength impart,
And, wearied with fatigue and toil,
Can cheer each manly heart.
Labour and art, upheld by thee,
Successfully advance;
We quaff the balmy juice with glee,
And water leave to France.
Genius of health! thy grateful taste
Rivals the cup of Jove,
And warms each English generous breast
With liberty and love."

The celebrated Professor Liebig says that wine, spirits, and beer are *necessary* principles for the important process of respiration; and it would seem that the stomachs of all mankind, tee-totallers included, will secrete these articles from the food which is eaten. We see frequently an interesting evidence of this fact in the case of a horse, after a feed of corn, resuming his journey with readiness and energy, although quite knocked up and out of breath a few minutes before. The simple fact is, that the horse converts the corn into beer, which facilitates his powers of respiration, and gives him fresh vivacity. If any man is resolved to carry out total abstinence strictly, he must refuse every sort of vegetable food, even bread itself; for all such diet contains more or less of alcohol. In the *Geographical Society's Journal* (vol. ii., p. 286) it is recorded that, during a severe winter on the west coast of Africa, the crew of the *Ætna* suffered so much from scurvy, that the least scratch had a tendency to become a dangerous wound. Captain Belcher states that "fish diet was found to aggravate the complaint; and it is worthy of remark that, when our ships used to suffer so much from scurvy, stockfish was a portion of their allowance. The only thing which appeared materially to check the disease was beer made of the essence of malt and hops; and I feel satisfied that a general issue of this on the coast of Africa would be very salutary, and have the effect especially of keeping up the constitutions of men subjected to heavy labour in boats."—*From the Journal of Agriculture.*

ON THE ATMOSPHERE OF STABLES.

WITH A DEMONSTRATION OF THE NECESSITY THERE EXISTS FOR THE ADOPTION OF IMPROVED STRUCTURAL ARRANGEMENTS IN THE FORMATION OF THEIR FLOORS.

The frequent and violent exertions which man requires of the horse, render it a matter of the highest importance that the animal's physical condition be as perfect as skill and attention can secure; and, as there are no organs of this noble animal so severely taxed, during the performance of either fast or heavy work, as the organs of respiration, it is obvious that too much attention cannot be given to all circumstances tending to secure perfection in the condition of that delicate apparatus which plays so prominent a part. It is no matter whether the animal be of the high-bred order, whose legitimate profession is to skim over the turf with a speed that far outstrips the wind, or bound over hedge and ditch like the matchless "Blueskin," or whether he is exercising the more humble (but, it may be, quite as useful) calling, of inducing locomotion of the heavy drag—all require perfection in the condition of the thoracic viscera. A pure and uncontaminated atmosphere, in all respects suited to the process of respiration, is therefore a *sine qua non*. One cannot help, for these reasons, expressing surprise at the almost universal inattention to stable ventilation, which so lamentably prevails in even many of our first-class establishments. But there is no circumstance connected with domestic life that appears to me more extraordinary than the almost universal want of attention to scientific arrangements in the construction of modern buildings of every description, both public and private, from the largest theatre or assembly hall down to the cottage of the most humble peasant. It is not, therefore, wonderful that gross errors may be discovered in the tenements devoted to the accommodation of our domestic animals. That these occur to a much greater extent than many intelligent persons are aware of, I shall presently show. I hope I may confidently presume, that most educated persons are aware that air once breathed by an animal is, by the simple process of respiration, converted into a deadly poison, and therefore should be instantly removed from its presence, and replaced by a proper supply of pure and wholesome air. It is well known that the oxygen of the air is absorbed, and carbonic acid gas is thrown out at each expiration—a gas which neither supports life nor combustion : of the truth of this the unhappy fate of the unfortunate sufferers in the Black Hole of Calcutta but too painfully demonstrates. I could cite, were it necessary, numerous familiar illustrations of this subject, but I have no doubt the following sample will serve to inform such of your readers as may not hitherto have given especial consideration to theories of respiration, and who are therefore unaware of the importance which attaches to the subject:—

All have heard of the fatal accidents that occur in breweries, from persons incautiously descending vats while these are surcharged with the products of fermentation. It is the *carbonic acid gas* which kills the individual in this case ; and who is not aware of the danger of descending close, deep wells, where *foul air* has accumulated, and rendered the atmosphere obnoxious to human beings? Again, *carbonic acid gas* proves to be the baneful agent : few, perhaps, are cognizant of the fact that, if a bird be suspended from the roof of a closely-encompassed bed, the creature is speedily put to death —it is poisoned by exposure to the carbonic acid gas—the natural product of the respiration of the persons occupying the bed ! Although this gas is naturally heavier than common atmospheric air, it nevertheless, when heated by the process of respiration, becomes much lighter, ascends, and occupies the space nearest the roof of the chamber where it may have been produced, so that persons near the floor, having a plentiful supply of cold air, may suffer no inconvenience, although they most assuredly by each act of expiration, are slowly and silently contributing to the destruction of the ill-fated victim in the cage. But the products of respiration, poisonous although they be, are the result of vital phenomena, and therefore cannot be dispensed with nor prevented ; but the *grand source* of *vitiation* to which I am desirous to direct attention, is both removable and preventible, because it is dependent on the ammoniacal gas which is disengaged from the decomposing urine that is absorbed by the porous floors of stables. Now let me shortly describe the condition of stable floors as they are usually (I may say invariably) constructed—and suppose we take a stall in the Piershill Barracks as our text :—Nothing could be more unscientific than the arrangements which are here everywhere to be observed. All that seems to have been aimed at is to secure a *hard and resisting footing* for the animals, and that this may be effected at the *cheapest* rate, the following mode of procedure is practised : — Boulders, or irregular blocks of stone, are placed in a bed of *sand* or *small gravel* (I beg especial attention to this circumstance), and it is believed that when these are made to present a *fair surface* that the "job" has been creditably executed ; but what are the facts ? They are simply these : When the liquid manures of horses are dropped on such a floor as that which I have described, they rapidly percolate between the interstices of the irregular stones—decomposition immediately ensues — and deleterious gases are abundantly disengaged. I would, therefore, beg to press upon the attention of all whom it may concern, *that the principle of rendering stable floors impervious to moisture should never be lost sight of;* without attention to this *desideratum* the most ingenious schemes for ventilation must be stultified ! So rapidly do the component parts of urine assume the gaseous form, that it has surprised many to find, on examining an imperfect floor, that percolation has extended to so small a depth : but the true explanation of this circumstance no doubt is, that the recently-dropped urine comes in contact with materials in a high state of chemical action, which, like yeast to the wort, immediately induces a similar condition in the atoms of the recent materials, ammoniacal gas is formed, which ascends and pervades the entire apartment. The irritating ammoniacal gas I have frequently found, on going into a stable in the morning, so concentrated that I could not breath without coughing, and my eyes lachrymated as if a newly-cut onion had been hanging under my nose. Now, the products of respiration contributed but in an inferior degree to this state of vitiation. *I repeat again that it is impossible to preserve the purity of the atmosphere of a stable, while its floor continues pervious to moisture.* I therefore cannot too strongly urge this fact upon the attention of every one who may find his stables in an objectionable and unwholesome condition ; and it will be satisfactory to know that the means by which the desired improvement may be effected involves neither difficulty nor expense.

Let the centre of the causewayed stall be removed two feet in breadth and five feet in length, measuring from the croup end of the stall. Flags of sandstone pavement, of one foot in breadth, three inches thick, and of convenient length, having the inner of central edges bevelled to such an angle as that when the two are brought together there will be a space or central gutter formed like an inverted V, one inch and a half in breadth at the surface, and two inches deep at the apex of the inverted cone, which space must be filled with cement or pitch—a slight downward and backward inclination must be given to the paving stones, so that whatever liquid may be dropped upon them, shall be rapidly conducted towards the hind quarters, and from thence conveyed *on the surface* to the point in the exterior found most convenient for a tank or reservoir, where it may be stored till required as manure. I find the making such an arrangement as I have shortly described would cost for materials about 10s. per stall—10 feet for each stall, and 10 feet for that part of the floor immediately behind the animal opposite his stall. A most superior article I know could be furnished by Messrs. J. Paton and Sons, of Ayr. The excellent quality of their sandstone, and the great advantages their ingenious and powerful stone-cutting machinery, gives to their establishment a peculiar claim to preferment.

I shall conclude this perhaps already too extended communication by assuring gentlemen who may adopt such structural arrangements as I have proposed, that they will have no reason to regret their conduct; as to the pecuniary outlay which these improvements will require, you'll

> "Let me whisper in their lug,
> That's ablin's nae vexation;"

because all that is to be done is to give their noble animals (whose faithful servitude deserves so well at their hands) credit for one year, as the following statement will clearly demonstrate:—A horse voids more than 3lbs. of urine daily, or say 1,100lbs. per annum, = 21lbs. ammonia, = 180lbs. guano. 10s. So that he pays like a *gentleman* for the enjoyment of an unvitiated atmosphere.

The necessity there is for rendering stable floors impervious to urine appears to me so obvious and apparent, that I flatter myself no sensible man who may chance to cast his eye over this hurried and imperfect paper will hesitate for a moment in adopting *some plan* which shall have the effect of rendering his stable-floors impermeable to liquids. Until this be effected, it is idle to talk about any ventilating scheme whatever; therefore, I say, reform your stable-floors!!!—*W. Dyce Guthrie, Edinburgh, 1. Lothian Road, 9th June*, 1845.

P.S.—It will afford me great pleasure to communicate with parties who may desire more minute information on this most important, and I think highly interesting, subject.—W. D. G.—*Ayrshire Agriculturist.*

LANDLORD AND TENANT.

TO THE EDITOR OF THE MARK-LANE EXPRESS.

The subject of agricultural improvement has been much agitated of late, and various theories have been advanced in order to sound the feelings of those engaged in that important pursuit. A better acquaintance with chemistry, a more enlarged knowledge of science, a clearer understanding of mechanical power, and various other matters, have been recommended as means to enable the farmers to meet the increasing difficulties by which they are surrounded. Amidst such a variety of counsellors, the said difficulties remain not only unabated, but continually increasing. May we not, then, look for other helps, in the hope that the united aids to be drawn from every quarter may at last enable the farmer to hold up his head, and struggle with a better hope to overcome them?

The connexion of landlord and tenant will supply a fruitful theme for the inquiry whether any improvement can be obtained by a consideration of the tenure now in general operation between the said parties. Letting land from year to year can never yield sufficient security to a tenant for the purpose of improvement, the confidence required in such a case being inadequate for this end. Who, it may be asked, will invest capital where there is but little chance of seeing a return? And, though it must be allowed at the same time that the great bulk of land in this country is held under such a tenure, and great outlay is hazarded under it, yet it can scarcely be asserted by any one that such a mode of letting does not act as a restraint upon improvement. Leases, therefore, may be reckoned among the means.

The terms, however, of these contracts may be such as to counteract the whole benefit intended to accrue. It is to be feared that the superabundance of the demand over the supply in the land market is one of the causes why the conditions of agreements are become so exceedingly stringent as is too frequently the case. The natural desire of making the most of a disposable article will be sure to operate in the case of landletting, as in all other cases. The great demand for land induces the party having this article to dispose of to raise the terms; and the advanced terms suggest a doubt whether sufficient profit will be derived by the occupier to keep the landlord's mind free as to the ability of the cultivator to fulfil his bargain. Restrictions, therefore, as to the mode of cultivation and the supply of manure, are brought to bear upon the tenant, in order to secure the landlord from loss of rent or deterioration of land.

These conditions and restrictions it is now proposed to inquire into, in order to ascertain whether or not their tendency acts as a bar to improvement.

It will be necessary to refer to some of them, to show how well they are calculated to effect that end. Now, it is not to be supposed that the landlord is always equally informed with the other party as to what may be allowed, or what denied, in a bargain of this kind. He therefore seeks advice of some one in whose judgment he has confidence, and applies for information to his lawyer, who may be a very good agent for those who invest money in land for profit, but is often quite the reverse as respects the improvement of farms; or to his land-agent, who, if not a practical farmer, may be ranked in the same class. The lawyer or agent is, moreover, not exempt from human infirmity; and, knowing from whence he is likely to obtain the greatest share of patronage, his advice will, as a matter of course, tend to the side most likely to produce to him the greatest share of employment. The success of the landlord in obtaining an advanced rent by these means is among the reasons why improvement is held in check. A second bar to improvement is the great care on the part of the landlord lest the farm should suffer deterioration by what are termed exhausting crops; so that the tenant is bound up to such a course of cropping as shall be copied from some old deed, or devised by the lawyer or agent, and set forth in the terms of letting. The farmer is either presumed to be ignorant of the best mode of farming, or he is supposed to be so intent upon his immediate profit as to bereave himself of the power of looking forward to succeeding years. The landlord, therefore, instructs him by the covenants of his lease how he may be allowed to manage the farm, and how he conceives the land may be best cultivated. Surely, it is approaching very near to absurdity, to be continually reiterating the word "Improve, improve," in the very teeth of a set of covenants which say, "Do it, if you dare!"

It is not an uncommon subject of inquiry among landlords, how far they shall allow a tenant to follow his own judgment in cropping his farm. The tenant must ask permission to grow this or that. A question was agitated a few years back, at a meeting of the members of the Smithfield Club, at the York Hotel, if it was prudent to allow potatoes to be planted, and a negative vote obtained, because potatoes were considered to be of an exhausting nature; and in a conversation which took place in May last, in the house of the Royal Agricultural Society of England, No. 12, Hanover-square, after the business of the day was over, a landlord announced it as his intention to *allow* his tenants to grow flax. Surely, when such things exist, it must be concluded that all wisdom dwells with the landlords, or those bonds which restrain the tenant from exercising a free judgment are among the bars to agricultural improvement. A third instance may be adduced in the over-care for maintaining hedgerows and preserving timber, some of the latter of which is growing in the said hedgerows, and some in the midst of corn in the open fields. The great injury thus sustained in many farming districts by the immense hedgerows, dividing the farms into inclosures of from two to ten acres, has attracted the notice of many persons, and particularly that of Mr. Grant, surveyor and land-agent, in his remarks upon this subject in his "Survey of Devonshire," which are so much to the point that it will be needless to enlarge upon them. It is but to read his very judicious observations, and the truth of the injury sustained by their means will be obvious to every one who has not already made up his mind that no argument shall convince him of their injurious tendency.

The preservation of game must not be omitted in the list of hindrances to agricultural improvement. Where this is carried to an extreme, as is frequently the case, it is in vain to think of improvement. The continual vexation occasioned by seeing every effort rendered nugatory is sufficient to destroy the energy of any one; for improvement necessarily implies investment of capital: and for a farmer to see his property, after having (humanly speaking) secured a full return, capriciously wasted and consumed by hares, rabbits, pheasants, wild ducks, &c. (not one of which he is allowed to kill) is to some temperaments almost beyond endurance. A statement has been made of the destruction which took place on a farm in Hampshire, which amounted in one year to four hundred pounds; and an instance can be produced where the landlord requires the stubble to be left a certain height, considerably above what is customary or needful, and the plough prohibited from disturbing the land between harvest and Michaelmas, lest the game should be frightened away, or induced to withdraw from want of covert.

Surely, such things ought to be generally reprobated, if no law can be brought to bear upon them. It may be said, in reply, that the landlord allows in rent for such requirements, or will do with his own as he pleases. This may be very true; yet it is, nevertheless, a great bar to improvement.

Old pastures frequently present another difficulty. Heavy penalties are often attached to the breaking up of old pastures, where the only merit they possess is that they are *old;* whereas, were a tenant allowed to convert them into arable, a great increase of produce, such as roots and corn, would be obtained, and at the same time an equal, if not a greater, weight of beef and mutton, in addition to the said corn and roots. This, doubtless, much depends on locality of situation and nature of soil; but thousands of acres could be pointed out where the march of improvement is thus retarded, and the power of production limited.

The next bar to improvement, though last to be noticed, is not the least; and that is, the entire indifference which some landlords bear towards their tenants. There are, happily, in this branch of the subject *noble exceptions;* but, nevertheless, numerous instances can be shown where neither length of occupation or respectability of character avail. The amount of rent is the ruling principle. A tenant under such circumstances *will*, indeed is *compelled* to, act in self-defence: consequently, a cultivation that has reference only to immediate supply is practised, because the uncertain tenure, and the conviction in the mind that the holding may cease upon the first occasion of a higher offer, must so operate as to produce a sort of recklessness, which, so far from leading to improvement, will render the farm worse and worse, till at length it is left on the landlord's hands, and he reaps the due reward of his deeds.

There are, however, sundry causes operating to uphold the bad system. The demand for land has increased to such an extent, while the supply (as has been shown by Mr. Connor, and as every one must know) must always remain the same, that the fair result of the system is not immediately produced. The abundance of capital, and the desire of successful tradesmen to become farmers, acts as another stimulus to uphold the evil; but the consequence to improvement is fatal. Landlords have the means of setting a good example; and, as has been observed, "their privileges bring with them a train of duties," which, if attended to, may work a good work. Their enlightened minds are presumed to be less under the influence of prejudice than their dependents, and may be made of essential service if possessed of true liberality; not that spurious liberality which only shows itself in after-dinner speeches at agricultural meetings, but that which actuates noble minds. The principle adopted by the late Earl of Leicester (when Mr. Coke) was, to let his farms upon such terms as enabled him to *require* improvements; so that he has entitled himself to the honourable appellation of *Friend of his Country*, having not only obtained for his estate a tenantry of the highest respectability, but for the public a great benefit. If he who has caused two blades of grass to grow where one only grew before is entitled to praise, then it is eminently due to the late Lord Leicester. This enviable character stands out in fine contrast with that of another nobleman, who has signalized himself in an opposite direction by letting his farms by tender, without respect to qualification in the candidate, or any consideration but one—namely, the highest rent. The first, it is presumed, has added to the former value of his estate in a high degree, and obtained in addition a first-rate tenantry, with a fair prospect of progressing still further in improvement; while the latter has earned a fame indeed, but such a one as few will covet, while the estate must suffer deterioration, and decline rapidly toward the lowest stage, and be tenanted, in the course of a few years (if at all), by the lowest class of cultivators.

A pamphlet, from the pen of Viscount Torrington, has lately appeared, containing, among other things, "A few Observations on the State of Agriculture in the County of Kent," which is highly valuable as showing the energy of an active mind firmly set upon the grand object of improvement. It may not possess a panacea for every evil; but is chiefly valuable as opening a door for familiar discussion, and frankly inviting observations upon his opinions. His lordship may be reckoned upon as a true friend to agricultural improvement. While thus according a willing homage to the motives which appear to actuate the noble viscount, it may not, at the same time, be improper to canvass some of his propositions. The noble viscount, in common with many others, appears to lay the chief burden upon the shoulders of the farmers, who are surely not *more* responsible than the landlords for the improvement of agriculture.

"The rents" (says his lordship, pp. 95, 96) "now paid will be found, on examination, to form but a small portion of the difficulties of the tenant, or of those burdens which press upon him; but under the present system, with slight education, and consequent want of information, on the part of the farmers, with an inadequate capital and increasing population adding to their burdens, unless measures are taken for a better course of instruction, unless means are discovered to prove that vast tracts of land in this and other counties can be made to pay a good return on the money expended, it is too much to be feared that capital will be withdrawn: increased distress will follow; and the soil of Britain, which at present is the chief means of administering to all our wants and necessities, will run a risk of being thrown out of cultivation, and will be viewed as a fatal investment entailing ruin and misery on those who possess it." Farther: "Is it to be supposed, in the present times, that the mere knowledge of ploughing and sowing, that a slight insight into the course of cropping the land, making a stack or loading a cart, and the old-fashioned rules handed down from father to son, in addition to a moderate education in reading and writing, are all the requirements sufficient in the present age to fit a man for the duties of his undertaking as a farmer?"

If this idea be a correct one, it would naturally follow that the parties who have no rent to pay, who have been educated in the sciences, have read Liebig's "Agricultural Chemistry," and adopted Ransome's machines, would have approached very near to perfection in farming. The examples thus set would be followed by every unprejudiced farmer, and difficulties would in a short time disappear. But experience steps in with doubts, and looks abroad for proofs. The farming of the intuitive class, if examined, will be found not so far before the general average of others as to entitle them to particular notice. The practical farmer, though an ignoramus as to science, will be found not far behind those who enjoy the advantages of learning; and the sciences (as generally understood when speaking of farming) will be allowed to repose, or cautiously called forth to take the farming interest under the shadow of their wings. It is not, by thus speaking of science, in the least intended to deny its applicability and usefulness to agricultural objects; but there is a fashion abroad among writers on this subject which aspires to obtain for it everything. The sciences are by such persons thought to be omnipotent, instead of dividing with practice the glory of improvement. Instances of this are frequent. Even the Royal Agricultural Society of England is not exempt. The practice they adopt with ploughs appears to be in accordance with these views. Their stewards, it seems, are able to discriminate, in a collection of near two hundred implements, which of them are of no use in practice. About a score are selected, according to the received opinion, as according best with science (it might here be asked where the man is to be found who can decipher the properties of an implement at sight?), and the remainder are left behind as unworthy of notice. It is giving to science an undue preponderance, and to practice little but the name, that has drawn forth the above observations, and not a repugnance to science itself, or a desire to undervalue its powers.

One observation more on the work of the noble viscount shall suffice. Surely, rent is not quite so insignificant as his lordship appears to estimate it. It is probably about three times the amount of that paid fifty years ago; while the price of wheat (which generally regulates all other farm produce) is little, if at all, higher. How, then, can it be said to form a small item in the farmer's outgoings? There appears to be a tendeucy to maintain rents under all circumstances. If a tenant complains of it, "Oh," it is answered, "you must be ignorant of the improved mode of cultivation, or prejudiced against machinery. You have not considered, or are perhaps too old to learn, the value of the subsoil-plough, or the wonders wrought by liquid manure, which, if used as directed by scientific men, will give a double crop." It will avail little or nothing to the poor tenant to reply, his farm is composed of dry land, with chalky subsoil, and has been always ploughed six inches deep; and he thinks a little pressure would be quite as useful as a subsoil-plough; and as to liquid manure, he had tried it without success. He obtains no credit for knowing anything about farming, though his great-grandfather and his descendants, down to himself, had been tenants upon the same farm. The rent is maintained to be of small importance: it is not *that* which constitutes his chief difficulty. It would be far more profitable to a farmer to follow the energetic *example* of the noble viscount, both as a farmer and as a breeder, than be led by his *theory*. By the first he would be stimulated to give practice in addition to science and the full weight of experience, with close attention to the improvement of cattle and sheep, and also a right noble example of liberality. In the latter he would study *long* before he came to the same conclusion respecting rent.

Having attempted to show some of the hindrances to agricultural improvement, as existing under the relation of landlord and tenant, it will perhaps be expected to have shown what is proposed as a remedy; so that practical men may be able to show the world that their want of success as farmers was less to be attributed to ignorance than the bondage they were held in; that if their course of cropping was not the best, it was because there was no other left them. Their leases or agreements were such as the London lawyers or landlord's agents chose to fix, because it had been the usage immemorial to have such clauses; and, though long usage was deemed a prejudice when applied to tenants, it was quite a different thing when applied to landlords.

First, then, let the leases or agreements for farms be framed on a different model. That the landlord should be secured is admitted. The tenant also, who employs his capital upon the estate of another, has a claim to security; and that may be obtained by fewer clauses in leases—that is to say, fewer restrictions. It has before been attempted to show that a farmer must conduct his business to disadvantage if his own judgment be excluded in the management of his land. It is proposed, therefore, to have *no* restrictions during the main part of his lease. Suppose a tenant chooses, in this portion of it, to sow wheat on all his farm, and make no fallow for seven years together, who would be the sufferer? That the tenant be left to himself to adopt the course of farming which his mind, under his circumstances, and according to his locality, shall suggest, this may, doubtless, be considered by many as requiring too much; but in support of this view an instance shall be related which took place a few years back.

It was intimated to a tenant that, if he wished for a lease, his landlord was willing to grant it. He therefore allowed but little time to elapse before he presented himself, when the following conversation took place:—

Landlord.—You wish for a lease, I believe?

Tenant.—Yes, my lord, if you have no objection.

Landlord.—If I grant a lease for twenty-one years, what restrictions as to cultivation can you agree to?

Tenant.—No restrictions at all, my lord.

The noble lord, who was not remarkable for unbending to inferiors, could not here restrain a smile; but, seeming to allow for the simplicity of the tenant, began again:—

Landlord.—If, then, you object to restrictions, by what way do you propose to proceed?

Tenant.—My lord, I conceive that, in a lease of twenty-one years, I can do the farm no injury during the first fifteen or sixteen of it without inflicting upon myself a greater; and I think my own well-doing (so far as the portion of time I have mentioned) is a sufficient security to your lordship; but I am ready to allow that for the last five or six years it is possible for me to benefit myself, and yet do great injury to the farm: therefore, for that portion of the time, I am willing to submit to any conditions your lordship may think fit to impose.

Landlord.—Well, that is not so unreasonable. Then, for the last seven years, you will not object to farm the land equal to what has been done in the former part: say, one-seventh part fallow, the usual proportion of good preparation for wheat—such as clover-ley, bean or pea-stubble—and so on to the end?

Tenant.—My lord, I shall be happy to take the lease upon these terms.

A lease was granted immediately for the time specified; no other restraint was imposed upon the tenant; the lease expired; a second lease was granted upon the same terms, and is now in progress.

In this case, which is proposed as an example of liberality to landlords, there has been no backwardness on the part of the tenant to invest capital; as a proof of which, extra manure is annually purchased to the amount of two-thirds of the rent. This case has especial reference to leased property.

With respect to yearly hiring, it is proposed to do away all the restrictions which landlords have thought necessary for their own security, such as amount of fallow, quantity of manure, denial to grow certain roots, bonds respecting repairs, preservation of hedgerows and timber, restraint as to the quantity of wheat to be sown, and upon what preparation. Indeed, so numerous are the restraints, that it is scarcely possible to avoid a breach of some of them. Now, it is proposed to omit *all* these, which merely serve to swell the parchment—and, consequently, the lawyer's bill—and to substitute in their place a mutual agreement to pay for all damage sustained or benefit conferred by either party. Suppose, for instance, a landlord agrees to pay an outgoing tenant for any outlay of capital which has been expended on the land. If the tenant has not received a sufficient return, this to be ascertained by two respectable and indifferent persons, one to be appointed by each party. If the outlay was not injudiciously done, but was such as farmers under short lease would consider proper, such as a heavy coat of dung, which was over what the farm would naturally produce, then an allowance to be made according to the judgment of the said persons. So with draining, &c. But should the tenant be induced to run the farm (as the term is), by refusing to apply all necessary labour and manure such as the farm would naturally produce, then the damage sustained by the farm shall be ascertained in the same way, and the sum required to put the farm into a proper state, so as the incoming tenant shall be remunerated, shall be charged upon the outgoing one. If any doubt should arise of his ability to do this, let security be taken of him at his first admission. This, it is presumed, would secure a landlord, and not restrain a tenant. What, it may be asked, can it signify to a landlord whether his tenant grows *everything* or *nothing*, so that at the expiration of the term, whether by lease or yearly hiring, the landlord may re-enter upon his farm in a state fully equal to that in which it was when placed in the tenant's hands.

After all, leases on liberal terms are the things most conducive to agricultural improvement; indeed, they are the grand desideratum.

It has been customary to guard against exhausting crops; but if everything that exhausts is to be carefully excluded, how is the tenant expected to live? Is everything to tend to the landlord's advantage? Ought not more care and thought to be employed in the tenant's favour? It is presumed that no crop exhausts to a greater degree than wheat; so, if every exhausting crop is to be refused, there will be nothing left for the farmer to do but to spend his last farthing in improving his farm, and then retire to the union house, to make way for some other to follow in the same line.

Let landlords adopt the principle of "*Live, and let live;*" remove the restraints that now cramp the farmer's energies; when they obtain a good tenant, take care of him: and then agriculture, the foundation of national wealth, will flourish, and not till then, and be the cause of trade and manufactures flourishing also.

A TENANT FARMER.

East Kent, July 22, 1845.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A WEEKLY COUNCIL was held at the Society's House in Hanover Square, on Wednesday, the 30th of July. Present—The Right Hon. Lord PORTMAN, President, in the Chair; J. Baines, Esq.; T. Raymond Barker, Esq.; S. Bencraft, Esq.; J. F. Burke, Esq.; Rev. Thos. Cator; Col. Challoner: F. C. Cherry, Esq.; W. A. Cherry, Esq.; W. Dalgairns, Esq.; Col. Mac Douall; A. Ogilvie; Esq.; C. E. Overman, Esq.; Prof. Sewell; J. H. Tremayne, Esq.; T. Turner, Esq.; and T. R. Tweed, Esq.

Newcastle Meeting.—The Duke of NORTHUMBERLAND, one of the Vice-Presidents of the Society, communicated, through the Hon. Robert H. Clive, M.P. his wish to place the sum of 100*l.* at the disposal of the Council, to be applied by them in any way which in their opinion will best contribute to promote the agricultural improvement of the northern district, in which the Society's meeting will be held, at Newcastle-on-Tyne, in 1846. This communication was received with the best thanks of the Council, and its consideration referred to the next monthly meeting on the 6th of August.

Early Spring Feed.—The Duke of Richmond transmitted to the Council the following communications addressed to him by Mr. Dickinson, in reference to his mode of obtaining early spring feed for the horses of his establishment.

"*7, Curzon-street, May Fair, London,*
"*July* 12, 1845.

"I beg to send your Grace a report of my mode of cultivating Italian rye-grass as food for my horses, the success of which has astonished me very much, and which I am anxious to make known for the general welfare of agriculturists at large.

"My land, a strong clay in good heart, and underdrained, is finely pulverized during the summer months, after tares, or any early crop of corn; is sown broadcast with four bushels per acre of seed, grown by myself—without weeds—harrowed very lightly with bushes—iron harrows bury the seeds too deeply; if weeds grow they are pulled, and the grass stands for a crop, which in 1844 was cut the first time, the first week in March, with about ten inches of grass; April 13th it was cut the second time, May 4th the third time, May 24th the fourth time, June 14th the fifth time, July 22nd the sixth time, with ripe seed and three loads of hay-straw to the acre. Immediately after each of these crops the land was watered once from a London street water-cart, with two parts of pure urine from the stables, and one part of water, the produce of each crop increasing with the temperature of the atmosphere, from three quarters of a load per acre, as hay, to three loads per acre. The crop having shed a quantity of seed, I was doubtful the urine might injure its growing, so discontinued to water, but well harrowed it with iron harrows, and left it, expecting nothing more from it; it produced, however, three or four, I believe four, light crops afterwards, and has now standing upon it again three loads to the acre, the third crop for seed. My first cutting (1845) this year was not till April 6th; second, May 3rd; third, June 9th; fourth, two feet and a half long, now standing on the land. I think it necessary to observe, from my own experience, Italian rye-grass differs as much in quality and variety as English rye-grasses or English fruits; there are Italian rye-grasses that bloom at one foot and a half high; and that I grow, as your Grace has seen, stands from four to five feet. Any further information that may be required, so far as I am able, shall be given to any one wishing to grow the plant. I attach a letter sent me by a practical farmer, to whom I supplied seed for an acre, which will furnish interesting information to sheep graziers.

(Signed) "WILLIAM DICKINSON."

[Mr. J. Hunt to Mr. Dickinson.]

"*Hayes Gate, near Uxbridge, July* 1.

"With the Italian Rye Grass seed I had of you, I sowed about an acre the first week in September last, after a crop of spring Tares; the ground was manured with about 10 tons of good horse-dung. The second week in April I began to feed it off with ewes and lambs, and they made very quick progress, especially the lambs: the Grass producing an abundance of milk. There were forty-two couples, and the Grass supplied them three weeks, giving the ewes chaff and Oats, and the lambs Peas. After this they began to feed it again for want of other food. I took them off the Grass on the 13th of May, and on the 18th of June we mowed the whole for hay, which produced nearly two loads per acre; this was above five weeks' growth. I should not have pursued this plan had I not had Tares which I wanted off the land to sow with Swedes. The Grass is now growing freely, but not so fast as after feeding off. I want your water cart. I am quite satisfied of its being the most valuable plant I know of, especially for early spring feed: it comes to perfection for feed quite as early as Rye, and the comparison between the two for feeding qualities is as ten to one in favour of the Italian Rye Grass. I am so well satisfied of its goodness that I intend sowing a much larger breadth in the ensuing autumn after Wheat. (Signed) J. HUNT."

The President informed the Council that he had made arrangements for the trial of Mr. Dickinson's plan on the clays and alluvial soils of Somersetshire, as well as on the chalks of Dorsetshire; the result of which he would in due time communicate to the Council, along with those of an extended comparative trial he had instituted of the cultivation of the various Wheats on the soils of Dorsetshire.

Germination of Seeds.—The President laid before the Council the following communication addressed to him by Mr. La Beaume, in reference to the application of electric currents to seeds for the purpose of exciting their vitality and quickening their growth.

"*London*, 11, *Argyle-street, July* 30, 1845.

"As the President of your Society, I beg to lay before you the following facts, which I think important to the interests of agriculture, horticulture, and floriculture. By former, and also more recent experiments on a limited scale, I have fully succeeded in quickening the germination of various seeds, invigorating their plants, increasing their fecundity, and improving the quality of the produce. This is particularly important in turnip-seeds, as you well know. The means I have employed are not atmospheric electricity, galvanism, or electro-magnetism, which cannot apply, but electricity developed by a machine of adequate powers, and by a simple, peculiar, and effective process, easily understood, and easily used with very little manual labour. The time required is, on the whole, about half an hour, and 1,000 bushels of Wheat, or any other grain, can be electrified as easily as an ounce at the same time. I beg also to remark, that this my process applies equally to the resuscitation of the impaired vitality of old as well as bad seeds, to the revivification of withering plants, and to the increase of the quality and quantity of their fruit. In order to a more extended trial, and to the establishment of the facts I have communicated, if several members of your body will send me some packets of turnip and other seeds, I will freely and cheerfully electrify and return them in a day or two, so that success may be proved by an impartial trial under your auspices, and I shall neither seek nor receive any other reward than your approbation, and the satisfaction of diffusing practical knowledge for the public good.

(Signed) "M. LA BEAUME."

Mr. La Beaume expressed his intention of communicating to the Council at their next meeting the results obtained by the Earl of Essex, Mr. Lefroy, and others, in their comparative trials under similar circumstances, of seeds prepared, and not prepared, by this process; as well as an explanation in detail of the mode in which such process may be most advantageously effected.

M. Van Voost and M. D'Hondt, of Ghent, invited the members to an inspection of the results of their new mode of promoting the growth of plants.

Wheat Crops.—Capt. Hamilton, of Rozelle, in Ayrshire, communicated the following remarks in reference to the state of the wheat crops in Scotland:—

"*Rozelle, near Ayr, July* 13, 1845.

"I am happy to inform you that there were never seen finer crops of every kind than now on the ground in Ayrshire, and the farmers are all in good spirits, and the labourers generally fully employed. The weather has been, however, lately cold and wet, and yet it is surprising how forward our wheats are; almost all are now in full ear. I had Neapolitan Amalfi, red wheat, in full ear early in June; this is the wheat from which the best Macaroni is made, and is said to contain the largest proportion of gluten of any. It was sown 10th Jan., has stood perfectly well this severe winter, and seems a very early wheat—a good quality for our generally late climate; an acre of it was in full ear when Chidham wheat sown the same day alongside of it was barely in the shot blade.

(Signed) "ARCHIBALD HAMILTON."

The following communications were also laid before the Council:—

1. From the Honourable Edward Everett, a letter expressing his willingness to receive, and carry out, as an Honorary Member of the Society, the wishes of the Council, on his return to the United States, on the termination of his diplomatic mission to this country.
2. From the London and Birmingham and Grand Junction Railway Companies, acknowledgments of the Society's thanks for their efforts in promoting the objects of the Annual Country Meeting, by free conveyance of stock and implements along their respective lines, and the grant of every requisite facility in favour of the Exhibiters.
3. From Mr. Towers, of Pinkney's-green, Maidenhead, a communication on Dibbled Wheat, and the result of his trials of steeping grain.
4. From Mr. Hutchings, of Hanover-square, specimens of New Zealand and Australian Wheats, with a statement of their cultivation, by Mr. Brown, of Welfield, near Streatham Common.
5. From Mr. Chapman, of Doctors' Commons, a statement of the numerous uses to which Wheaten Flour is applied, besides that of food; and the economy of employing, for the purpose of paste-making in the arts, a cheaper farina from other sources.
6. From Mr. T. K. Short, of Martin-hall, Bawtry, an account of the cultivation and uses of the Cow-Parsnip.
7. From Sir Charles Lemon, Bart., a communication

addressed to him, by Mr. C. Newman, of Court-farm, on the subject of the failure of the Potato-crop, and the results of his experience in draining.

8. From Mr. Davidson, of Darlington, an essay on rotation of cropping.
9. An essay on the cultivation of Heath-lands, received after the date prescribed for competition.
10. From Mr. Dalgairns, of Guernsey, a description of a simple barrow-drill, used in that island with great economy and success.
11. From Mr. Hillyard, of Thorpelands, suggestions in reference to the Society's prize-sheet: and notice of a motion for rescinding the present regulation which excludes castrated animals from exhibition.
12. From Dr. Johnson, of Shrewsbury, a letter and pamphlet on the application of the town-sewerage of Shrewsbury.
13. From Mr. Moss, of Hull, a letter on the employment of labourers.
14. From Mr. Dickson, communications on Flax-cultivation.

The Council then adjourned to Wednesday, 6th of August.

A Monthly Council was held at the Society's House in Hanover-square, on Wednesday, the 6th of August—present, the Right Hon. Lord Portman, President, in the chair; Col. Austen, M.P.; T. Raymond Barker, Esq.; W. R. Browne, Esq.; J. French Burke, Esq.; F. C. Cherry, Esq.; W. A. Cherry, Esq.; A. E. Fuller, Esq., M.P.; H. Gibbs, Esq.; S. Grantham, Esq.; W. Fisher Hobbs, Esq.; E. Hussey, Esq.; J. Kinder, Esq.; Col. M'Douall; R. Milward, Esq.; H. Price, Esq.; Philip Pusey, Esq., M.P.; J. A. Ransome, Esq.; Prof. Sewell; Prof. Solly; J. Manners Sutton, Esq.; and T. Turner, Esq

Finances.—Mr. Raymond Barker, Chairman of the Finance Committee, presented to the Council the Monthly Report of the Accounts of the Society; from which it appeared, that the current cash-balance in the hands of the bankers was 5,313*l.*, and the amount of invested capital 8,200*l.*

Resolutions.—1. That the communication made by the Hon. R. H. Clive, M.P., of the Duke of Northumberland's donation of 100*l.* in promotion of the objects of the Society at their next year's country meeting, be referred to the General Newcastle Committee, with a request that they would report on the subject to the Council at the Monthly Meeting on the first Wednesday in December.

2. Mr. Etheredge having represented to the Council, that some of the exhibitors whose Tile-machines had been selected for subsequent trial, in competition for the Society's prize, infringed on certain patent rights held by him in reference to his own machine; the Council, on the motion of Mr. Gibbs, seconded by Mr. Fisher Hobbs, passed the following resolutions:—

(1). That the trial of the Tile-machines proceed.
(2). That the Judges be informed of the protest of Mr. Etheredge; and be indemnified by the Society against any legal consequences.
(3). That such arrangements be made through the lawyers of the Society with the proprietors of the selected Tile-machines, as shall save the Society from action-at-law, as users of the machines.
(4). That Mr. Pusey, Mr. Fisher Hobbs, Mr. Ransome, and Mr. Gibbs, be a Committee to carry out the foregoing resolutions.

3. That the Council cannot grant the petition of the omnibus and coach proprietors who worked the ground between Wolverhampton and Shrewsbury, on the occasion of the recent country meeting for an increased rate of remuneration beyond the terms of contract.

4. On the motion of Mr. Fisher Hobbs, seconded by Mr. Raymond Barker, it was resolved unanimously

(1). That a communication be made to the commissioners of police, conveying the best thanks of the Council for their arrangements, and the excellent conduct of the parties selected by them to attend the Shrewsbury meeting.
(2). That the silver medal of the Society be presented to inspector Charles Otway, of the metropolitan police, in testimony of the unqualified approbation entertained by the Council of his conduct, and of the valuable services rendered by him to the Society, at their annual country meetings.

Notices of Motion.—1. Mr. Shelley, at the monthly Council in November:—"That it is advisable, in the payment of the judges, both of implements and stock, that their *bonâ fide* expenses be repaid them."

2. Mr. Hillyard, at the monthly Council in December:—"That the resolution of Council, passed on the 26th of July, 1844, 'That no castrated or spayed animals be allowed to be exhibited at the country shows of the Society,' be rescinded."

3. Mr. Raymond Barker, at the Monthly Council in December:—"That the bye-law which requires the final settlement of all the prizes of any particular year, by the month of June in the year preceding, be taken into consideration."

4. Mr. Milward, at the Monthly Council in December:—"That as the sales by auction have hitherto not been satisfactory, it will be better to appoint an auctioneer."

Communications—From the Marquis of Northampton, informing the President that the Royal Agricultural Society of Jamaica had offered a prize of 100*l.*, placed at their disposal by the Governor of that island, along with second and third prizes of 30*l.* and 20*l.* each respectively, supplied from the funds of the Society, for the best text-book on agriculture, for the use of schools in Jamaica. From Mr. Grey, of Dilston, on Arrangements for the Accommodation of Judges of the Society's Shows. From Mr. La Beaume on the Germination of Seeds, the Preservation of Corn, Hay, and Clover stacks from spontaneous combustion, and the treatment of diseases to which labourers are more peculiarly liable. From Mr. Dodds, on the state of the crops in Lancashire. From Professor Sewell, presenting to the Society two transfusion Syringes for passing water or other liquids into the jugular vein, with a view to counteract the effect of rabid poison taken into the system; and at the same time repeating his request of last year, that should any of the members of the Society have sheep, calves, steers, or heifers, bitten by rabid dogs, and apprehensions be entertained from their symptoms that canine madness would ensue, they would do him the favour of sending them, without loss of time, addressed to him at the Royal Veterinary College, London, when he would cheerfully defray all expenses of such conveyance, and report to the parties the result of his experiments on the animals. From Lord St. John, offering his Tile-yard for the Society's trial of tile-machines. From Mr. Hillyard and Mr. Crisp, suggestions in reference to the prizes of the Society.

Among the numerous presents made to the Society, were a collection of samples of Alpaca wool, from Capt. Stanley Carr, and a China jug of large dimensions, embellished with designs of an agricultural character, as a specimen of art to the Society, on the occasion of their Shrewsbury meeting, by Messrs. Rose and Co., of the Coalbrook Dale China Works. For all which the thanks of the Council were ordered.

The House Committee having received authority to undertake the requisite repairs of the Society's house during the autumn, agreeably with the tenor of the lease, and the Finance Committee to make the usual arrangements for leave of absence to the Secretary, and to the clerks of the establishment, during the autumn recess, the Council adjourned to Wednesday, the 5th of November.

NEW MEMBERS.

Ashton, Richard, Limefield, Bury, Lancashire
Baker, John, Bridgnorth, Salop
Barker, Robert, Glynn, Barmouth, Merionethshire
Belliss, Thomas, Birmingham
Boddington, Benjamin, Presteign, Herefordshire
Bowman, Edward, East Stoke, Newark, Notts
Champion, Henry, Hafod, Rhayader, Radnorshire
Cholmondeley, Lord William Henry, Cholmondeley-hall, Cheshire
Cookson, John, Hatherton, Nantwich
Corbett, Rev. Joseph, Longnor, Salop
Davenport, Edward, Speenston-hall, Bunbury, Cheshire
Day, Theodore, Porthomal, Brecon
Dunn, George, Ellingham, Belford, Northumberland
Edwards, Sir John, Bart., Greenfields, Machynlleth, Montgomeryshire
Edwards, Joseph, Ross, Herefordshire
Elliott, Evan, Marsh, Landulph, Devonport
Field, James Pope, Chesham Vale, Bucks
Field, Joseph, Market-cell, Market-street, Beds
Glynne, Sir Stephen R., Bart., M.P., Hawarden Castle, Flintsh.
Hamilton, John, Sundrum, Ayr, Dumfriesshire
Hammond, Horace, Horsemonden, Lamberhurst, Kent
Hampton, Robert, Wytheford, Shrewsbury
Haslam, John, Chesham, Bury, Lancashire
Hickman, Captain, Old Swinford, Stourbridge, Worcester
Hogarth, John, Akeld, Wooler, Northumberland
How, William, Hammond's End, Harpenden, Herts
Jesty, Thomas, Druce Farm, Piddletown, Dorset
King, James, Dullingham, Cambridge
Marshall, Rev. Thomas, Eccleston, Chorley, Lancashire
Marshall, Francis, Grimstone Cottage, Wolverhampton
Middleton, John, Sparkham, Reepham, Norfolk
Moore, Rev. George Bridges, Tunstall, Sittingbourne, Kent
Murton, William, Tunstall, Sittingbourne
Ogden, John Maude, Sunderland, Durham
Owen, Richard, Nantwich, Cheshire
Pardoe, James, Sion-hill, Kidderminster, Worcestershire
Rees, Richard, Gelligron, Swansea
Smith, Samuel Steedman, Hopton Castle, Ludlow, Salop
Stroud, William, Swansea, Glamorganshire
Taylor, George, Brecon
Taylor, Silas B., 36, Regent-square, St. Pancras
Thompson, Robert, Walton, Stone, Staffordshire
Tollemache, Henry Bertie, Guard's Club, St. James's
Welch, John, Bachymbid, Bach, Ruthin, Denbighshire.

VALUE OF LAND AT THE CAPE OF GOOD HOPE.—A sale by auction took place lately at the Auction Mart of a farm for sheep at the Cape of Good Hope, comprising about 24,000 English acres of land. It was situated on the east side of the river Hope, and on the north, south, and west was bounded by Government land, being in the southern part of the division of Beaufort, called Van Rooyens Kreel, at Shoorstein. It was held under the crown at a quit rent of £1 6s. per annum. The auctioneer stated that the Cape wools were nearly on a par with the best Australasian crops, and that the lowest price of Government land was 2s. an acre. At that value the property was worth £2,400. It was a district well known to all those who have been at the Cape, and favourable to those who desire to emigrate. The first offer was £250. The biddings went on at £10, and the property was disposed of for £500.

YORKSHIRE AGRICULTURAL SOCIETY.

WEDNESDAY, AUGUST 6.

The following is a list of the prizes awarded:—

SHORT-HORNED CATTLE.

CLASS I.—For the best Bull of any age, £25; second ditto, £10. C. W. Harvey, Walton, Liverpool, first prize; Richard Booth, Warlaby, Northallerton, second prize.

CLASS II.—For the best yearling Bull, £20; second ditto, £10. William Hutton, Gate Burton, Gainsborough, first prize; The Earl of Harewood, Harewood House, Leeds, second prize.

CLASS III.—For the best Bull Calf, £10; second ditto, £5. Thomas Wetherell, Durham, first prize; George Wood, South Dalton, Beverley, second prize.

CLASS IV.—For the best Cow of any age, in calf or milk, £15: second ditto, £5. John Booth, Killerby, Catterick, first prize; Joseph Dunnington Jefferson, Thicket Priory, York, second prize.

CLASS V.—For the best three-year old Cow, in calf or milk, and having had a calf, £15; second ditto, £5. Hugh William Jackson, Leven Canal, Bevierley, first prize; John Collins, Danthorpe, Hedon, second prize.

CLASS VI.—For the best two-year old Heifer, in calf, £10; second ditto, £5. Richard Booth, Warlaby, Northallerton, first prize; W. T. Carruthers, Arthington Hall, Otley, second prize.

CLASS VII.—For the best Yearling Heifer, £10; second ditto, £5. E. W. Smith Owen, Condover, Shrewsbury, first prize; John Booth, Killerby, Catterick, second prize.

CLASS VIII.—For the best Heifer Calf, £10; second ditto, £5. William Brandham, Dringhoe, Burlington, first prize; John Parkinson, Leyfields, Newark, second prize.

CATTLE OF ANY BREED.

CLASS IX.—For the best Fat Ox of any age, £10. Henry Simpson, Bainton Field, Driffield.

CLASS X.—For the best Fat Cow or Heifer of any age, £10. John Smith, Welton Garth, South Cave.

LONG-WOOLLED SHEEP.

CLASS XI.—For the best Shearling Ram, £15; second ditto, £7. Percival Richardson, Horkstow, first prize; John Taylor, Burnham, Barton-on-Humber, second prize.

CLASS XII.—For the best Ram of any age, £10; second ditto, £5. George Robinson, Carnaby, Burlington, bred by him, first prize; John Taylor, Burnham, Barton-on-Humber, two shear, bred by him, second prize.

CLASS XIII.—For the best pen of five Ewes, £10; second ditto, £5. Robert Dawson, Sewerby, Burlington, bred by him, first prize; W. E. Botterill, Eastthorpe, Market Weighton, second prize.

CLASS XIV.—For the best pen of five shearling Wethers, £10; second ditto, £5. John Holliday, Barmston, Beverley, bred by him, first prize; George Angas, Neswick, Driffield, second prize.

CLASS XV.—For the best pen of five shearling Gimmers, £10; second ditto, £5. William Abraham, Barnetby-le-Wold, Brig, first prize; Mr. W. Richardson, Great Limber, second prize.

PIGS.

CLASS XVI.—For the best Boar, large breed, £5; second ditto, £2. James Teal, Holm-on-the-Wolds, Beverley, first prize; Robert Biglin, Preston, Hedon, second prize.

CLASS XVII.—For the best Sow, large breed, in pig or milk, £5; second ditto, £2. John Beetham, West Harlsey, Northallerton, first prize; Samuel Cole, Walkington, Beverley, second prize.

CLASS XVIII.—For the best Boar, small breed, £5; second ditto, £2. John Higginson, Thormanby, Thirsk, first prize; James Naylor, Rye Hill, Hedon, second prize.

CLASS XIX.—For the best Sow, small breed, in pig or milk, £5; second ditto, £2. John Higginson, Thormanby, Thirsk, first prize; George Dunhill, Moxon, Pontefract, second prize.

CLASS XX.—For the best three store Pigs, of the same litter, from four to nine months old, £5; second ditto, £2; Samuel Wiley, Brandsby, York, first prize; Lord Wenlock, Escrick Park, York, second prize.

HORSES.

CLASS XXI.—For the best Stallion for hunters, £10; second ditto, £5. Edward Horner Reynard, Sunderlandwick, first prize; George Allan, Bramham, Tadcaster, second prize.

CLASS XXII.—For the best Stallion for coach horses, £10; second ditto, £5. Thomas Holtby, Rotsey, Driffield, first prize; Joseph Wells, Crowle, second prize.

CLASS XXIII.—For the best Stallion for roadsters, £10; second ditto, £5. Thomas and Henry Smith, Shipton, Market Weighton, first prize; Thomas Richardson, York, second prize.

CLASS XXIV.—For the best Stallion for agricultural purposes, £10; second ditto, £5. George Angas, Neswick, Driffield, first prize; John Dawson, Buttercrambe Stamfordbridge, second prize.

CLASS XXV.—For the best Mare and Foal for hunting, £5; second ditto, £2. George Foster, Wansford, Driffield, first prize; Robert Crowe, jun., Speeton, Burlington, second prize.

CLASS XXVI.—For the best Mare and Foal for coaching, £5; second ditto, £2. Botterill Johnson, Frodingham-Bridge, Driffield, first prize; William Burton, Water Fulford, York, second prize.

CLASS XXVII.—For the best roadster Mare and Foal, £5; second ditto, £2. Henry Barkworth, Tranby, Hull, first prize; Luke Dennis, Beverley, second prize.

CLASS XXVIII.—For the best Mare and Foal for draught, £5; second ditto, £2. John Todd, Swanland, Hull, first prize; J. B. Thompson, Anlaby, Hull, second prize.

CLASS XXIX.—For the best three-year-old hunting Gelding or Filly, £5; second ditto, £2. Thomas Appleby, Holtby, York, first prize; Luke Dennis, Beverley, second prize.

CLASS XXX.—For the best three-year-old coaching Gelding or Filly, £5; second ditto, £2. John Tinegate, Preston, Hedon, first prize; Thomas Appleby, Holtby, York, second prize.

CLASS XXXI.—For the best two year old coaching Gelding or Filly, £5; second ditto, £2. Tilburn Dickinson, Bishop Wilton, Pocklington, first prize; James Hall, Scorbro', Beverley, second prize.

CLASS XXXII.—For the best three year old hackney Gelding or Filly, £5; second ditto, £2. Richard Jameson, Beverley, first prize; Luke Dennis, Beverley, brown Filly, bred by him, second prize.

CLASS XXXIII.—For the best pair of Horses of either sex, for agricultural purposes, worked during the season, £5; second ditto, £2. George Angas, Neswick, Driffield, first prize; Luke Dennis, Beverley, second prize.

PREMIUMS FOR POULTRY.

BEING A DONATION FROM SEVERAL GENTLEMEN.

CLASS XXXIV.—For the best pair of Fowls of the Dorking breed, male and female, £1; Thomas Jolly, Acomb, York.

CLASS XXXV.—For the best pair of Fowls of the Spanish breed, male and female, £1; J. W. Nutt, York.

CLASS XXXVI.—For the best pair of Fowls of the Malay breed, male and female, £1; Miss Ann S. Bolton, Beverley, aged 3 yrs.

CLASS XXXVII.—For the best pair of Fowls of any breed or cross, £1; Thomas Jolly, Acomb, York.

CLASS XXXVIII.—For the best male Fowl of any breed or cross, £1; Thomas Campbell, Sancton, Market-Weighton.

SHEPHERD.

To the shepherd, being an annual servant of a member of the society, who shall have lost the smallest proportionate number of ewes and lambs previous to the 12th of May, from those that produced lambs in 1845, the number of the flock not being less than two hundred, £5. To ditto, whose flock is not less than one hundred, £3. To ditto, whose flock is not less than fifty, £2.

William Jordan, Speeton, Burlington: John Stephenson, shepherd; No. of ewes, 250; lambs produced, 420; ewes lost, none; lambs lost, 17.—1st prize.

George Scott, Market Weighton: Christopher Wright, shepherd; No. of ewes, 101; lambs produced, 188; ewes lost, none; lambs lost, 6.—2nd prize.

Thomas Eeles, New House, Richmond: Joseph Martin, shepherd; No. of ewes, 97, lambs produced, 148; ewes lost, none; lambs lost, 4.—3rd prize.

PRIZES FOR IMPLEMENTS.

For the best assortment of implements in the show ground, the gold medal, to Mr. Crosskill, of Beverley.

For the best hand straw cutter, silver medal, to Mr. Busby, for Mr. Richmond's straw cutter.

For the best winnowing machine, silver medal, to Mr. Hornsby, of Spittlegate, Grantham.

For the best drill for general purposes, silver medal, to Mr. Hornsby.

For the best clod crushers, silver medal, to Mr. Crosskill.

For a new improved set of patent cart-wheels and axles, silver medal, to Mr. Crosskill.

For a winnowing machine, £3, to Mr. Wilson, of Beverley.

For a cake crusher, £2, to Mr. Hornsby.

For an improved churn, £2, to Mr. Busby.

For a harriff machine, £2, to Mr. Harrison, of Keyingham Marsh Hedon.

For a lot of iron fencing and gates for agricultural purposes, £2, to Mr. Hill, of Dudley.

For a six-holed hand dibble, £2, to Mr. S. Walker, of Dalby Lodge.

For a fruit gatherer, 10s., to Mr. Thomas Reed, Malton.

For a brick-pressing machine, £2, to Lord Wenlock, Escrick Park.

For a liquid manure-cart, £3, to Mr. Crosskill, Beverley.

For a hand-thrashing machine, £2, to Messrs. Barritt and Exall, Reading.

For the best tile and pipe machine, £10, to Mr. Charnock, of Wakefield.

THE JUDGES.

The following gentlemen were appointed the judges:—CATTLE.—Earl Spencer, of Wiseton, Bawtry, Notts; Mr. Thomas Charge, Barton, Richmond; Mr. Leonard Severs, Oliver, Richmond. In consequence of the absence through illness of Earl Spencer, Mr. Thomas Short, sen., of Martin, near Bawtry, was elected and served in his room. SHEEP and PIGS.—Mr. Hugh Watson, Keilor, Cupar Angus; Mr. Rd. Scott, Torworth; Mr. Wm. Torr, Riby, Limber. HORSES.—Mr. John Booth, Killerby, Catterick; Mr. Wm. Dickinson, 7, Curson-street, Mayfair, London; Mr. J. Harrison, Everton, Bawtry. IMPLEMENTS.—Mr. Peter Fairburn, Leeds; Mr. Mansfield Harrison, Keyingham Marsh, Hedon.

LIQUID MANURE COMPOSTS.

BY MR. GEO. WM. HAY, WHITERIGG, MELROSE.

Much has been said and written on the subject of liquid manure, and it is one to which we all pay far too little attention; for, in allowing it to escape from our cattle-folds in the first instance, we lose the very essence of our manures, and, in not providing ourselves with a tank, or other means of retaining it after its escape from these, we lose it altogether.

In Number VII. of the *Journal of Agriculture* for January, 1845, there is an article on this head by Mr. John Lawson, Elgin, giving us a method adopted by him for the application of the surplus urine of his cattle-folds.

I am at all times anxious and ready to try, not only everything by which there may be no waste of manure, but also any means by which I may be enabled to add to my stock of that very valuable article; but it appears to me that this method of Mr. Lawson's, though it may suit farmers in his part of the country, will not at all suit those in our locality (western district of Roxburgh), where the lime has to be driven 30 miles, less or more, and where the price per ton is 15s. at the least; and the distance from any town where sulphuric acid can be got is 36 miles, and the price per lb. is 2d., besides carriage—I mean the best acid; for I am aware that it can be got cheaper. Besides, we have no lime-kilns whereon to burn the earth, and consequently would require to construct one, which of itself is a consideration. Then there is the carting of the earth to be burned, as well as the after-carting to the pit beside the tank where it is to be mixed; all of which things it is scarcely possible to expect a small farmer to do. There is also the raising of the wooden shed to be added to all this, which probably is the most impracticable part of the whole. Far be it from me to wish to detract, in the smallest degree, from the merit due to Mr. Lawson for recording the practical results of his experience in this matter, and for his kindness in thus laying a means of supplying a great desideratum before his brother farmers; at the same time, I am afraid that not only is the labour of his method too great, but that the cost will far exceed the profit, seeing that guano and other manures can be had so cheap.

Having taken it upon me to differ so far from Mr. Lawson as regards the management of liquid manure, yet agreeing with him in the need there is for the husbanding of all our resources—and that at the very cheapest rate—I may be allowed to give my own method of using it for the last two years.

I have no cattle-folds, but from the stable and byre, as also from the court into which the manure from these is wheeled, as well as from the water-closet in the house, the *liquid* manure is conveyed by means of drains to a large covered tank, from which it is pumped occasionally into a large barrel, and run out upon grass land.

Beside the tank there is a pit dug, about a foot or eighteen inches deep, into which all the ashes from the house are put, together with the cleansings of the hen and pigeon houses, the floors of which are strewed often with sawdust—which can be obtained from sawyers, or a saw mill, if there is one near, at a nominal price, if any—and this is done every week, or oftener if needful.

A large covered barrow, such as is used by scavengers in towns (it is a square box placed upon a wheelbarrow frame, having a lid hinged in the centre, and moveable at pleasure, to allow of its being emptied the more easily), stands near the kitchen door, into which the ashes as brought from the grates are put. This I find by far the cleanest and simplest mode of retaining them for a time, as it gets quit of the filthy ash-pit so generally seen, and saves the usual cartage required, besides affording a ready means of transport to the pit.

When the ashes and cleansings from the houses are put into the pit, they are carefully mixed, and well watered with the liquid manure from the tank, either by means of a pitcher, or piece of pipe leading from the pump, as answers best at the time; and as a fresh supply of the several materials is brought, they are spread over the top of the last heap, and all turned over, and well watered.

Besides these several articles, there are two of great value, and which are too much lost sight of—nightsoil and blood. The former of these can be collected in considerable quantities about a farm, at very little trouble and expense. I have two houses on the premises, having boxes which slip out and in beneath the seat; these are regularly emptied into the pit among the ashes and turned over along with them. From the water-closet in the house a drain runs into a large barrel, sunk deep into the ground, puddled with clay outside, covered with a flat stone, and well cemented over with clay, and a thick coating of gravel over all; this is opened once a year, and the contents carried to the pit. There is a drain from the upper part of this barrel which allows the liquid part to run off into the tank.

The blood, which is used in the same way, I obtain from a slaughter-house in the neighbouring village; this, however, though it is of much consequence, cannot be obtained by farmers generally, and should not be taken into account.

In addition to the above, I may state that I have a supply of gas-water from a gas-work a few miles off—when the weather or other circumstances prevent its being run out upon the grass-land, the pit and its contents receive the benefit; this also must not be reckoned upon in general cases.

As I have touched upon gas-water, I may mention my method of using it, in case that way be different from what is practised by othars.

The barrel made use of is one holding 120 gallons; 15 gallons of gas-water, previously mixed with sulphuric acid at the rate of four ounces to the gallon, are put into the barrel, which is then filled up with water, making seven parts of water to one of gas-water, about the right proportion I think; this is then run out upon the young grass. An acre of land requires 14 of these barrels full, making in all 210 gallons of gas-water, and 52 lbs. of sulphuric acid. The expense of acid alone for this is about 8s. 8d., not taking into account at all the expense of gas-water, nor the far heavier one of filling the barrels and carting. This process does well enough for experiment, and is, I must say, highly beneficial, my grass being a splendid crop when it was cut; but it does not pay, nor can it be expected to do so; for unless the articles made use of be really at hand, it cannot be profitable to make such mixtures, and we had better, therefore, *buy* an article which we are sure will repay us.

With regard to the mixture thus obtained, the effects produced by it are felt not merely by the crop to which it is applied, but by the succeeding ones, as in the case of spring wheat this year after turnips. It was spread, not by the hand, but by a shovel out of the cart, regularly over the open drills, and these being drilled up, Swedish turnip seed was sown, and a very heavy crop followed, superior to that raised on well-rotted stable-yard manure, the drills being contiguous. On their removal, spring wheat was sown, and after it brairded, and during its growth, a great difference was perceptible, for which we could not account at first, until it was remembered that the mixture had been sown on that part of the field. The young grass is also very good.

At present, although we have used a considerable quantity for the garden and other purposes, there are about six or eight cart-loads lying ready for use, and by turnip time there will be a good deal more; and if I, who have so few resources at hand, am able to raise twelve, fourteen, or even more cart-loads, what may not be done upon a farm of moderate size, where there are several cottages, and consequently a quantity of ashes, &c., besides what comes from the farm-house itself? A vast quantity of very valuable materials may thus be easily collected, at a cost which is neither known nor felt, for there is no actual outlay, and the time taken in removing to the pit and turning is only an hour or so once a week.

I fear this has been drawn out to an unnecessary length, but should it be the means of inducing any reader of this journal to be more saving than hitherto of his ashes and nightsoil, as well as of the recent guano of his hen-house, I trust I shall be excused.—*From the Journal of Agriculture.*

EXTRACT OF A LETTER FROM PROFESSOR JOHNSTON TO W. M. ALEXANDER, Esq., OF BALLOCHMYLE.

LIME.

Nothing is more perplexing to the farmer than the varied effects of lime in different parts of such a district. I am sure you recollect the very interesting meeting of the St. Quivox Farmers' Club, at which we were present in Ayr, in October last, when the subject of discussion was the use of lime, and the very contradictory opinions which the most intelligent practical men expressed on that occasion. One unacquainted with the subject, would have considered it very strange and puzzling to hear, as we did, one-half of the fifty farmers there assembled declare, from *their own experience*, that lime was of no use whatever; while the other half thought favourably of it, and some, who had been laying it on at a cost of several hundred pounds a year, announced their intention of continuing to do so, because of the profit they derived from it. What would a merchant have thought of such contradictory opinions? How little skill, he would say, must these men have—how very uncertain the art they cultivate—how destitute of fixed principles on which a prudent man may rely!

And yet the stranger would err in thus supposing either that the art of culture is destitute of fixed principles or that those who prosecute this art are inferior in natural intelligence to the cultivators of any other art. The art is not destitute of principles nor the farmers of clear heads and strong natural sense; but these principles have never been distinctly stated to them—never put before them in the form of regular instruction, when their minds were young and open, or since they have been concerned with the cares of life, exhibited as a clear and obvious source of larger profit. Diffuse a knowledge of principles, and contradictory opinions, as well as contradictory practice, will disappear.

Each case of success or failure, from any mode of treating the land, will have its own specialities, and must be studied by itself; but it is obvious that if one soil contains naturally a large proportion of lime, while another contains almost none, the application of lime to the former must, as a general rule, be much less beneficial than to the latter. Now such is the case with the soil formed from the trap rocks. It contains naturally much lime. The rock of Balcarres Crag, for example, from an analysis made in my laboratory, appears to contain in every four tons as much lime as is present in one of pure limestone. There must be much, therefore, in the soil that is formed from such a rock. Now, in Ayrshire and in Fife, these rocks appear here and there in patches of greater or less extent over the breadth and length of both counties; and their crumbling or *rotten* portions form isolated tracts of fertile soil. Those who farm these soils may conscientiously and correctly declare that, on their land, while they have held it, lime has done no good; while their neighbours, who farm the cold clays of the adjoining coal measures may be applying it with a *certain* hope of profit. The road-scrapings which the former despise, the latter may find to act upon their grass lands, or on their green crops, like a moderate application of marl.

In connexion with this latter observation I may mention to you, as a curious fact, that the road-scrapings from Leith Walk and some adjoining streets, which are *metalled* with broken trap, are carted to the sea-shore at Leith, at an expense of £700 a-year, to be washed away and wasted by the tide. It is even said, I do not know how correctly, that parties are prohibited by a penalty from carrying any of this refuse away for the purpose of applying it to the land. To make them sensibly useful, these scrapings should be laid up in heaps for a year, to allow the silicates they contain to undergo partial decomposition.

TURNIPS.

I had the pleasure of meeting at Balcarres a number of the most intelligent farmers of the district, whom Colonel Lindsay had been kind enough to bring together. We had much conversation in the course of the evening, and we mutually put and answered many interesting practical questions. My friend and pupil, Mr. Norton, who was a spectator and listener, expressed, the following day, what I had myself thought, that during our many excursions, he had seldom met a more intelligent and less prejudiced company of practical men. They were not all from the immediate neighbourhood of Colinsburgh, some of them, whose farms I should like to visit, had come from Leauchars, the district which lies between the Eden and the Tay.

Among the topics to which our conversation turned was that of feeding with different kinds of turnips, and to their use with or without tops. When given to milk cows, I found the opinion here to be, that white turnips produced much *more* milk than Swedes, some said twice as much, but all allowed that yellow turnips gave a *richer* milk. Still that the same weight of globes should give so much larger a quantity is not easily explained, since the difference in the relative proportions of water they contain is comparatively trifling.

I asked some questions about turnip tops. All agreed that the turnips gave more milk when the tops were given along with them. This also must arise from some other cause than the quantity of water they contain, since according to experiments made in my laboratory, the

Bulbs of Swedes contain.... 88 per cent of water,
Tops of Swedes contain.... 85 do. do.

so that the *quantity* of milk must depend upon the chemical composition of the tops, and not merely upon the water they contain, since the bulbs contain the most.

A difference of opinion prevails as to their use in the feeding of growing and fattening stock. I am inclined to concur with one or two of the practical men present, who pronounced them to be good feeding, when given with a proper admixture of hay, straw, or other dry fodder, and especially to *young stock*. I am inclined to this opinion in consequence of the very interesting result of an analysis I am now making of the tops compared with the bulbs of the turnips. These experiments are not yet completed; but, so far as they have gone, you will see how practically interesting they are, from the following facts in regard to Swedes:—

	Water.		Dry Matter.
1° A ton of *bulbs* contains	1970 lbs.	and	270 lbs.
A ton of *leaves* contains	1900 lbs.	and	340 lbs.

Or the leaves contain, in the same weight, one fourth more dry food than the bulbs.

2° A ton of the *bulbs* gives 17 lbs. of ash.
A ton of the *leaves* gives 33 lbs. of ash.

Or the leaves, weight for weight, take from the soil twice as much as the bulbs do. Of course they convey into the stomach of the animal, in these same proportions, the inorganic substances of which the ash consists. But further—

3° In the ash of the leaves a much larger proportion than I had anticipated consists of the earthy phosphates—chiefly the phosphate of lime, of which as you recollect, the earthy part of the bones in a great measure consists. Thus,

A ton of *bulbs* contains 3 to 6 lbs of phosphates.
A ton of *leaves* contains 10 lbs. of phosphates.

So that not only does a given weight of *leaves* exhaust the soil of phosphates in a greater degree than an equal weight of *bulbs*, but it is also fitted to give to the animal more of those materials from which the bones are to be formed. Hence the reason why I am inclined to concur in opinion with those of the Fife farmers, whose experience had led them to consider the turnip tops a nourishing food for young stock. And as milk contains and requires for its production a considerable supply of these phosphates, it is not unlikely that the increased yield of milk caused by the turnip tops may be in some measure owing to the large proportion of phosphates which they convey into the stomach of the animal. Of course, every practical man knows that, if any food scours an animal, as turnip tops are sometimes said to do, it may prove injurious when given in too large quantity. It will be necessary therefore to give some other, perhaps some dry food, along with the green tops, to check any tendency they may have to produce this effect in an improper degree.

In regard to turnip tops, another opinion entertained by some of the Fife farmers attracted my attention. It is said that if the turnip tops are left in the field, and only the bulbs carried off, the land will be as much benefited as if the *whole* be eaten off with sheep. I do not know how far experience bears out this opinion—of what kind of soils it is correct—nor in reference to what kind of sheep. I shall make further inquiries, therefore, before I venture to offer you the explanation of the alleged fact which at present occurs to me.

ACCOUNT OF A VISIT TO MR. HEWITT DAVIS'S FARMS, NEAR CROYDON, SURREY.

The report of the deputation from the members of the Maidstone Farmers' Club, who inspected Mr. Davis's farms in October last, incited a desire in many other members to see his crops as they were approaching maturity. Mr. Davis was, therefore, kind enough to give a general invitation to the members of the club, of whom about twenty availed themselves on the 19th ult. Although this course did not render imperative any report, yet the previous report of the deputation from the club having excited considerable public attention, it has been deemed desirable to make one, and the following remarks embody the opinions, as to Mr. Davis's system of cultivation, the nature of the soil, and the estimated quantities and state of the crops, of the most experienced agriculturists of the party. The historical portions are founded on information derived from Mr. Davis himself.

In giving an estimate of the growth of crops, the first considerations must always be, the nature of the soil, and the cost of such crops. On entering Spring Park farm, the members were unanimous in their opinion as to the very great inferiority of the soil, which, as was stated in the former report, consisted of beach gravel and black sand, with a hard subsoil of white sand, in some parts of the field more resembling the sea-beach or a gravel walk than a cultivated soil. This land has been drained, subsoiled, and is now ploughed by the Kentish plough, once in every course, to the depth of twelve inches. Mr. Davis's rotation, quantities of seed, and times of sowing, are the following:—

1st year.. Rye and tares, for green meat and feeding-off with sheep, in April, May, June, and July, and followed by

,,	Mangold-wurzel	With a liberal dressing of farm-yard dung.
,,	Swedes........	
,,	Cabbages......	
,,	Turnips........	

2nd year.. Oats or barley, sown with clover.
3rd year.. Clover, twice mown for hay.
4th year.. Beans or Peas { The beans have turnips drilled between the rows, and which come into feed in Sept. and October.
5th year.. Wheat.

The quantities and periods at which he sows are the following:—

Rye.......	$1\frac{1}{2}$ bushels..	In Aug. and Sept.
Tares......	$1\frac{1}{2}$,,	In 3 sowings, Aug. Sept. [and Oct.
Mang. wur.	6lb.........	In April.
Swedes....	1 quart	In May.
Turnips ...	1 ,,	In July.
Cabbages..	1 every 3 ft..	In June.
Oats	7 pecks......	In Jan. Feb. and March.
Barley....	6 ,,	In Jan. Feb. Mar. & April.
Wheat....	3 ,,	In Sept. and October.
Peas.......	8 ,,	In Dec. Jan. and Feb.
Beans.....	8 ,,	In Sept. and October.

Mr. Davis's rye and tares for green feeding are sown in rows at nine inches apart, all his white crops at ten and a half or twelve inches, his pulse at 27 inches, as are also his root-crops and cabbages on the ridge.

The first piece of wheat on entering Spring Park farm was on a piece of rough heath land, of about ten acres, recently broken up, which few persons except Mr. Davis would have sown with wheat. Its preparation had cost a bushel of seed per acre and once ploughing, for which the two quarters per acre, at which the crop was estimated, was deemed a profitable return.

The average of the crops which the members saw on Spring Park farm was cautiously estimated at from $3\frac{1}{2}$ to 4 quarters per acre, barley $5\frac{1}{2}$ to 6 quarters, oats $7\frac{1}{2}$ to 8 quarters, beans $4\frac{1}{2}$ quarters; and it was a matter of surprise to most of the members, that such crops should be grown under any system, on the very inferior land which Mr. Davis cultivates. The *tillering* of the plants was this season apparently greater than that of the plants of last year (as stated in the last report, from the appearance of the stubbles). A considerable number of roots were examined, when the number of stalks to each root appeared to range as follows: —Wheat from 10 to 14; oats, from 10 to 20; and barley, from 10 to 15. The ears of all the crops were perfect and well filled, and the plants were very uniform and even in growth, much judgment having been apparently exercised in putting into the land rather a less than a greater number of plants than its capacity could mature. Judging from the general vigour of the plants, and the fulness of the grain, in no case did the land appear to be overdone. The strength of the straw deserves particular notice. It was more like reeds than straw. Indeed, Mr. Davis stated that he had last year sold his own straw at 60s. per load, and purchased inferior straw at 30s. for his own purposes. The beans were observed to be podded much lower on the stalk than is usual when more thickly sown.

The most striking features of Spring Park farm were most certainly the cultivation of the turnip and the cabbage. Mr. Davis drills his turnips on the ridge, and the workmanship was admirable. The plants had all "taken," and to the eye of a farmer a more beautiful sight than one of Mr. Davis's turnip fields could scarcely present itself. Amongst the implements noticed on this farm were a nine hollow-ringed presser, and a Scotch expanding horse-hoe for cultivating between ridges, which were much noticed. The presser Mr. Davis uses both before and after sowing his seed, the effect of which is to chequer the land into little squares, and almost wholly to defeat the wire-worm, which can scarcely make its way from one square into the next so as to do much damage.

The members next walked over Shirley farm, the greater part of which is also evidently very poor land, and before Mr. Davis took it, had had four tenants in seven years. The most remarkable objects on this farm were a splendid piece of mangel wurzel, which, for forwardness and uniform vigour, excited the admiration of every member of the party; a very fine piece of peas, which were exceedingly well podded, and some beans, with turnips sown between the rows, attracted much notice. Both farms were in admirable cultivation; excepting annuals, there was scarcely a weed to be seen.

The party then visited Selsden farm. Mr. Davis states that this farm in 1833 came into his hands for cultivation, as agent to the late George Smith, Esq. The soil, which lies on the chalk, was considered very poor, and scarcely worth cultivation; indeed, it was offered, with excellent farm buildings, to a farmer of the neighbourhood, at 10s. per acre, free of tithe; and the only offer that could be obtained for even a portion of it was 8s. per acre. It was deemed too poor to grow either beans or clover. The stack-yard contained only three stack-frames; and the hay, oats, and straw, for keeping the fourteen horses which were found necessary to do the work of the farm and the estate, had to be purchased. The number of sheep kept was only sixty-seven. The whole of this farm has been since trench-ploughed 15 inches deep, and some thousand loads of flints carried off from it. The result has been that nine new stack-frames have been added to the stack-yard, and there has been sold off the farm annually about 600*l*. worth of clover hay, beans, and oats, besides the fattening of about 260 wethers, 100 couples ewes and lambs, 12 bullocks, and about 150 pigs. Nine horses now do the work, which before required fourteen horses; and the weekly wages are little more than half the amount which they reached under the old system. Manure was formerly purchased, but none has been bought for many years, and Mr. Davis considers that no more will in future be required than is furnished by the stock, so long as the present system of high feeding with oil-cake, and rotation of cropping, are continued. The cattle are fatted on oil-cake and straw: all the dressings are reserved for the green and root-crops; the rotation observed separates widely the same crops, and care is taken not to put two plants into a space of land which has only the capacity to mature one plant. The total results of this experiment Mr. Davis was kind enough to give to the party in figures. After deducting agent's salary and bailiff's wages, and all other charges which a farmer would not have to pay, giving a higher rate of wages than that generally paid by the district, and all other expenses, the following sums have been handed over to the proprietor by Mr. Davis, as profit on the last five years. For the year ending Michaelmas—

	£	s.	d.
1840	228	17	8
1841	497	19	1
1842	334	14	3
1843	259	4	1
1844	158	3	8

The falling off in the years 1842 and 1843 is attributed to the sudden and general depreciation of agricultural produce, on account of the alteration in the tariff and corn laws. The profits of 1844 would also, as Mr. Davis estimates, have reached between 300*l*. and 400*l*., had it not been for the serious injury done to the crops by rabbits. Part of Selsden farm adjoins some hundreds of acres of wood-land, of which the game, as well as that on two adjoining estates, is strictly preserved; and Mr. Smith, the owner of the farm, having himself taken to preserve in 1842, the rabbits increased so rapidly, that of one 12-acre piece of wheat, only three acres were cut at harvest, the rest having been completely destroyed. Leave has since been given to destroy the rabbits.

The party were highly interested by the appearance of this farm, which is generally in admirable condition. The average yield of wheat was estimated at not much less than four quarters; but one piece, from a bushel of seed per acre, drilled at 12 inches, was unhesitatingly set at five quarters. A piece of barley was declared by several experienced farmers to be one of the finest they had ever seen, and was estimated, at least, at from six to seven quarters. The clover showed exceedingly well for a second cut. The cabbages and Swedes were excellent, one piece of Swedes being particularly forward. The winter beans were rather patchy, evidently from having been eaten by birds; and the only field which could be said not to be in the cleanest possible state of cultivation, was a piece of peas, of which, however, the pods were remarkably good. A field of buck-wheat attracted much attention. The field had missed for clover, had been once ploughed, and a bushel of buck-wheat drilled per acre. Mr. Davis highly recommended this crop in cases where clover misses, and calculated on getting five quarters per acre from this piece, which certainly looked very promising.

The members were much pleased with the state of the crops on this farm, which were very greatly superior to those which might have been expected even from much better land; and although not prepared to recommend the immediate adoption of such thin sowing in all soils, they were yet much impressed with the general superiority of Mr. Davis's system on the soils he cultivates, the very rational principles on which he appears to have formed every part of it, and the unconquerable zeal and determination with which, in the face of many difficulties, he had so triumphantly carried it out.

The members were no less sensible of the readiness and candour with which Mr. Davis courted and met every inquiry, and the general urbanity which they experienced at his hands.

George Whiting, Hon. Sec.

P.S.—The secretary having written to Mr. Davis for the statistical matter relating to Selsden farm, that gentleman has favoured him, in addition, with the assurance that he grows all his wheat *at a cost of 35s. per quarter*, and that "this can be proved by calculating the labour and the rent on one side, and the return of corn and straw on the other."—*Maidstone Gazette.*

RAPE AND STONE OR STUBBLE TURNIP FOR USE IN AUTUMN.

The period of the year in which the stock-master perhaps experiences the greatest difficulty in maintaining the condition of his stock is from the early part of September, when the pastures begin to fail, to the early part of October, when the turnips are begun to be consumed; and this difficulty is not so much felt in the mere inability to support the condition required by the stock during the summer, as in the injury inflicted from the want of sufficient food on the constitution of the animal, by a rapid falling off of its condition in the beginning of winter; for it is a fact which admits of no doubt, that, when an animal loses condition in autumn, the greater part of the succeeding winter passes away before it regains the point at which it began to fall off, whatever may have been the quantity, and however nutritious the food it may have received.

Cattle may have plenty of fresh air, and abundance of exercise in seeking a subsistence upon bare pasture, and though these are necessary means for maintaining good health, yet, when accompanied with exposure of the body to a cold atmosphere, in the latter end of autumn, and with a deficiency of food to generate animal heat to counteract the effects of the cold, they only aggrevate the evil, by wearing the flesh off the bones. And sheep may brouse upon the tufts of grass left by cattle in summer, and nibble the points of the twigs of bushes, and thereby keep in life, but the astringent property of such food, immediately succeeding the effects produced by the succulent character of pasture grass, produces derangement of the digestive organs, which renders sheep easily susceptible of diseases incident to the vicissitudes of weather and of hunger.

It is a melancholy sight to observe creatures, which are only profitable in a high state of condition, allowed to wander over the bare fields in autumn in quest of food, and thereby to eke out day by day a miserable existence. It has often excited our wonder, why people will attempt to keep stock when they know they have not the means of supporting them in condition from birth to maturity.

As long as that best of forage plants—the red clover—afforded two good cuttings in a season, the aftermath of the second cutting supplied as much pasturage as supported the stock in good condition to the beginning of winter, until, in fact, the turnips were ready for use; but since the land has evidently become tired of growing red-clover so often, and a second cutting of it cannot be depended upon every season in the latter part of autumn, a period of a month's duration then not unfrequently occurs in which stock suffer from the pinching effects of hunger. Such an occurrence should, indeed, never happen on a well-regulated farm; for, since dependance cannot be placed on clover every year, a substitute should be cultivated, ready to be made use of whenever the clover is seen to fail; and, fortunately, there is more than one plant which comes to perfection at the very season when a scarcity of clover is most felt.

One of these autumnal substitutes is the *rape*, and it has the accommodating property of growing well in any species of soil—whether clay, turnip land, or moss. Raised in the same manner as turnips, and at the same time, it will be ready for use by the beginning of September. No assurance of a full crop, however, can be expected but by means of manure, and both bone-dust and guano present ready means of securing such a crop. The rape imposes little trouble in cultivation during the summer, farther than to scuffle the ground to keep the weeds down at first, and the subsequent rapid growth of the crop will check the future progress of the weeds. The rape crop is not singled; and, on that account, the seed should be sown much thinner than with turnips, to allow the air to pass between the drills, in order to encourage the development of the leaves, which are the useful part of the plant when cultivated for forage.

Inconvenience may be felt in sowing a large breadth of rape at once, and for this reason. By the time the entire crop is nearly eaten down, the stems become so strong as to be troublesome in disposing of them, when the land is about to be ploughed for the succeeding grain crop. Large stems of plants must either be pulled up, which is a laborious operation for even men to perform, and much more so for women, and carried off the land; or be ploughed down, and buried by the furrow slice. on being placed in the plough furrows with the small graip.

The only way of avoiding this inconvenience is fortunately a simple one, which is, to sow the entire space of ground to be occupied with rape at different times, so that the crop shall always be found in a young growing state, when the stock which subsists upon it arrives at it, and the stems then being always small and succulent, are either eaten estirely up, or the stems are easily buried with the plough.

It must be borne in mind, however, that rape is only suited for the support of sheep upon the land, and cannot conveniently be mown like clover with the scythe, or pulled like turnips for cattle. It is a fortunate circumstance, nevertheless, that so useful a forage plant as rape can be so easily raised for the use of sheep alone, and become available at the very season it is most desirable for that species of stock to have it. It has also proved itself a valuable preparation for ewes about to be put to the tup, by inducing that habit of body most favourable for the conception of twin lambs.

Besides rape, there is a species of turnip, bearing the appellation of the *stubble or stone turnip*, which is fit for use by cattle at the same season that rape is useful for sheep.

We believe this stubble turnip to be the ordinary white stone turnip of the gardens. It is not large, being about the size of a small white globe turnip, and the largest specimen does not weigh more than seven pounds. The stem and leaves are small.

Mr. Richard Makins of Shellacres, in Northumberland, was the first person we know who cultivated it in the field; and he informs us that it may be sown as late as the first of July, and yet be ready for use by the 1st September, that is, in only two months, though, of course, it will continue to grow after that period. Should it be desired to attain its full size by the 1st September, it should be sown earlier than July. Mr. Makins sowed it as late as the 11th July last year, and had a good crop of it by September; but last year was a peculiarly favourable one for the growth of turnips. There would still be time to sow it this season after this notice of it shall have reached our readers.

It is apt to sport a flatness of top, which is an objection against it as a winter turnip, but which is one of the characteristics of the garden stone turnip.

It may be easily raised with bone-dust or guano, or a mixture of them with rape-cake. Being a fast grower, it cannot be expected to be very firm in the bulb, though that is both juicy and sweet.

It is consumed by being led out to the pasture fields to the cattle, or upon the stubble immediately after harvest. It has been so used in England for several years; and hence may have arisen its cognomen there of the stubble turnip.

We would remark, in conclusion, that when we possess the rape for sheep, and the stubble turnip for cattle. it will be the farmer's own fault should his stock want a sufficiency of food in autumn, before the period has arrived for hurdling the sheep on the land, or for housing the cattle in the steading for the winter.—*From the Journal of Agriculture.*

ON FARM ENCLOSURES.

In every cultivated country enclosures are necessary both for shelter and protection to the growing crops from the intrusion of animals; nothing, in fact, contributes more to the comfort, the convenience, and the successful prosecution of the business of husbandry than a proper subdivision of farms into suitable enclosures. The enclosing of land, therefore, being a fundamental and important branch of agricultural improvement, the general principles on which it is founded, and the best method by which it may be effected, are esential objects of inquiry to the farmer.

In the enclosure of farm lands there are peculiar circumstances to be taken into consideration, depending on locality, as well as general circumstances, which, in all cases, are to be regarded. Among the former the most important, as immediately demanding attention, is the nature of the soil. This prescribes the system of husbandry to be adopted, and that system mainly regulates the number and size of the enclosures. On the richer class of soils pasturage is sometimes not practised, the land being in constant cultivation; and then, however necessary lines of division may be for the purposes of tillage, enclosures, in the ordinary acceptation of the term, are not required. Although an important purpose of enclosures is protection from storms, as well as protection from the inroads of the domestic animals among the growing crops, both purposes being secured by fences of considerable height, of whatever kind may be most suitable to the locality, yet in the case of soils of such great fertility as to admit of pasturage being dispensed with, it is seldom that protection from storms forms a very important object; exposed situations, where such protection is most required, being almost invariable accompaniments of soils low in the scale of fertility. Shelter obtained by enclosures is not less essential in exposed upland situations for the welfare of live stock than for the production of their food, though the latter circumstance is seldom regarded in the light in which its importance demands. All experience in times past showed the importance of shelter to the domestic animals of the farm, and the miserable condition which was an invariable concomitant of undue exposure, however well they may have been fed; but it was reserved for modern science to show satisfactorily why such a result is always to be expected, and that *heat is, to a certain extent, an equivalent for food*. But a uniform and rather elevated temperature is not less essential to animal than to vegetable life. The stunted growth and miserable appearance assumed by such parts of the plantation as are exposed to the biting blast sufficiently exhibit its injurious effects; and here they are so conspicuous because they have been so long endured. On the sapling of a few years old exposure has not so palpably affixed the indelible characters of its injurious influence, unless placed in juxtaposition with another similar to itself, and differing only in being sheltered, when the very different progress attained by both will be apparent. When such effects are only of one year's standing, then the injurious consequences resulting from undue exposure are still less perceptible, although it is not less true on that account that they exist.

Evaporation is constantly going forward from the surface of the earth whereon moisture exists, and one of the most important consequences of this process to the husbandman is the production of a greatly diminished temperature in the soil thereby, as it proceeds. A certain, though varying, proportion of watery vapour is constantly in suspension in the atmosphere, the precise proportion which it can take up from the earth, and retain, depending on its peculiar state as regarding uniformity of temperature and the absence of currents at the surface of the ground or at any degree of elevation in the atmosphere to which this vapour extends. In calm weather evaporation must take place slowly, as is well known to every one who must have observed the comparative slowness with which any peculiar substance is said to *dry* when the air is still. In this case that portion of the atmosphere in contact with the earth soon absorbs from the soil as much vapour as it can retain, after which the process of evaporation must go forward very slowly. The agitation of the atmosphere, however, causes it to be again carried on afresh, in consequence of bringing another portion of air, not previously saturated with vapour, into contact with the damp surface. But currents of wind are considerably affected in all cases by strips of plantations and by hedge-rows, and sometimes they are altogether guarded against by these means. Evaporation, therefore, being seen to be productive of an increased degree of cold, and this process being facilitated by the agitation of the atmosphere by winds, it follows that any means which can at all reduce the velocity of currents of air in passing over the surface of the ground, and protect the soil from their action, will, at the same time, ensure the maintenance of an increased degree of temperature in the ground, and thus materially add to the growth and luxuriance of the plants produced on it.

It would at present occupy too much space, and prolong this article beyond all due limits, to enter at length into the theory of the action of heat upon plants and animals. Instances of its effects are constantly occurring. Who has not observed the luxuriant foliage along the fence, while the exposed centre of the field may be quite bare? But although shelter is known to be so beneficial, it may, like every thing else, be abused, by being carried too far, when it is not less injurious than undue exposure. The produce of paddocks, though luxuriant, is often unhealthy; and it cannot be questioned but much injury is sustained by many of the English farmers by the over-spreading of the trees in their hedgerows, which, within proper limits, are not less objects of beauty than of utility.*

---

* It is scarcely necessary to dwell further on the utility of shelter, *properly arranged;* but it may not be uninteresting to quote the remarks of Mr. Thos. Bishop on the subject, in a letter to Mr. Bain, of Edinburgh, and published by the latter gentleman in the *Quarterly Journal of Agriculture*:—

"I must say generally that the advantages of shelter from plantations in cold and exposed situations are very great; not only to the agriculturist for his grain crops, the food and comfort of his live stock, and the beauty of the country by a change of scenery, but *they are the source of an extended income to the proprietor,* who, by a comparatively trivial outlay in planting, and the purchase of plants judiciously selected for soil and climate, secures himself the most beneficial returns. At the same time he is creating healthful employment for the industrious and labouring classes at every period of the year, and in all is adding to the wealth and happiness of the country, in accordance with the primitive injunction of the Great Lawgiver, to subdue the earth.

"Within my recollection, from the flow of the Almond Water by Lyndoch Cottage to the Vale of Mowni, a distance of ten or twelve miles in length, by two and a half in breadth, the whole was one bare waste of moorland, whereon the curlew, the plover, and moor bird reigned supreme, being only occasionally invaded by flocks of wild geese in their passage from north to south. The greater part is now under thriving plantations, with various smiling residences in the intervening hollows.

"Previous to the division of the common muir of Methven, included in the above range in 1793, the late Lord Lynedoch and Lord Methven had each secured their lower slopes of land adjoining the moor with belts of plantation. The year following I entered Lord Methven's service, and in 1798 planted about sixty acres of the higher muir ground, valued at 2s. per acre, for shelter to eighty or ninety acres set apart for cultivation, and let in three divisions to six individuals. The progress made in improving the land was very slow the first fifteen

In the arrangement of enclosures in exposed situations provision should be made for shelter by planting, whether in large masses or in belts surrounding the quarter from which the prevailing winds blow. In upland districts shelter obtained by such means, when employed on a large scale, improves even the climate of the country in a sensible degree, prolongs the duration of food on the pastures, and protects the live stock from many diseases incidental to wet and cold.

Where there are great variations in the nature of the soils to be enclosed, it will be proper to separate the light from the heavy. They are not only better calculated for different crops and different rotations, but are naturally adapted to be cultivated at different seasons of the year. It is unfortunate, therefore, to have soils of a heterogeneous nature in the same field where it can be avoided. Where a small part of a field only differs from the remainder in composition and properties, the constituent parts of it may often be so altered by admixture with the other parts as to nearly assimilate the whole in quality.

It is seldom that possession of a farm is obtained which is not previously divided into enclosures of some kind. These, however, are often of such a description, both with regard to size and shape, and the nature of the fences by which they are separated, that it may be desirable to level the old fences in whole or in part, and adopt an arrangement more in accordance with the nature of the farm. Where the fences are crooked, and occupy a large space, either by the spreading of bramble or by large earthen banks, the better plan is to remove them at once, even were they situated in the proper place, and form new ones in their stead. In some of the finest parts of the country, and in situations in which shelter cannot be an object, but rather a nuisance, huge banks of earth may be seen for fences, overgrown with bramble of every description, and frequently occupying from ten to fifteen or twenty feet in breadth. The great loss sustained by such fences from the large extent of surface they occupy, and the harbour for birds which they afford, must be enormous, more especially when the enclosures are small. But the removal of these, however desirable, is exceedingly expensive; and how far the occupier may be justified in encountering such expenditure, must depend on the particular circumstances of the case, and cannot be ascertained without reference to them.

In considering the arrangement of the entire divisions of a farm, the position, shape, number, and size of the enclosures demand especial attention, these being also altogether regulated by the peculiar circumstances of the case.

The *position* of an enclosure mostly depends on the aspect of the ground, and it is ascertained by finding the proper direction of the ridges which it contains. The ridges should always, if possible, run north and south, to permit both sides of them to derive equal benefit from the solar rays. On flat ground this direction may be easily secured; but the inclination of uneven ground may be in an opposite direction, and as surface water may engender more evils to land than the solar rays can confer benefit, the ridges must follow nearly the inclination of the ground. Where there is any considerable declivity, the length of the ridges and consequently that of the fields should be comparatively short, as currents of water after heavy rains would be so much increased by the length of their course as to carry a great portion of the finer particles of the soil off the land. In ploughing, also, the horses become too much fatigued by an inordinate length of furrow. The direction of the ridge and consequent position of the enclosure, where a uniform degree of inclination prevails throughout, are in some degree dependent on a circumstance connected with the operation of ploughing. The draught in ploughing is very great in the ascent beside in the descent, and in our arranging the direction of the ridge it should be an object to diminish this in the former case, even should we increase it in the latter; and this is to be done by altering the line slightly from that of the inclination of the field; or instead of ploughing right up and down the hill, that the furrow should be carried somewhat in a slanting direction. But in determining the direction of the ridge, it is important to distinguish between carrying this slanting line to the right or to the left of the line of ascent. If carried to the left hand side of this line, the inclination will be thereby diminished; but a little reflection will suffice to shew that to counterbalance this, an increased degree of resistance is given to the furrow slice in endeavouring to throw it against the hill, while the resistance of the furrow slice in descending is diminished. This variation from the line of ascent has, therefore, increased the evil it was intended to remedy. In carrying the furrow slice in a slightly slanting direction from the line of ascent to the right hand side, it will be seen that these disadvantages do not exist, and that the draught in ascending has been considerably lessened. An increased facility has been given to the falling off of the furrow slice in the ascent, though it has been decreased in the descent; but as the draught in the latter case is at all times easy, it is only necessary in the case of the descending furrow to arrange the line so that the slice can be deposited in the required position, without having any tendency to fall back again to its original place after the plough has passed along. The position thus fixed on for the ridges should regulate that of the field, as, unless in cross ploughing, in preparing the land for a drill crop, short ridges should not occur at the sides of the field, as occasioning a waste of time in ploughing.

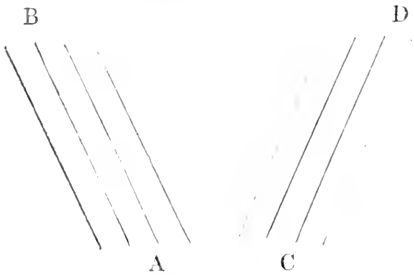
The *shape* of enclosures, when circumstances permit, should invariably be rectangular. It is easily

---

years, but thereafter went on more rapidly, *being aided by the shelter derived from the growth of the plantations;* and the whole has now become *fair land,* bearing annually crops of oats, barley, peas, potatoes, and turnips, &c.; and in spring 1838, exactly forty years from the time of putting down the said plantations, I sold four acres of larch and fir (average growth) standing thereon for £220, which with the value of reserved trees, and average amount per acre for thinnings sold previously, gave a return of £67 per acre.

demonstrable that the shape which constitutes most to economy in the labour of a moderately-sized field is the square; and in the case of small enclosures, the oblong rectangle is to be preferred. Frequent turnings of the plough occupy much time; but on the other hand, as already remarked, an inordinate length of ridge, to obtain few turnings, fatigues the horses beyond their strength. The strength of the animals of draught is, in this case, the measure of the greatest length of ridge, to secure the greatest economy of labour in ploughing a field. The corners of fields should also, if possible, be right-angled; as the plough can turn over more of the ground in four square corners of a field than in two acute and in two obtuse angled corners.

The foregoing observations will be better understood by a reference to the illustration annexed. Ascending in the direction A B will be seen to increase the up-hill draught, by causing the furrow-slice thereby formed to be thrown against the hill; but a furrow-slice carried along in the direction C D will fall from the plough as formed with greater facility than when the line of ploughing is right up and down the hill. It must be observed that this deviation from the line of ascent must not be carried too far, as the decending furrow slice could not then be laid over with regularity.



The length of the field, and consequent length of the ridges, is known to have a much greater effect in influencing the quantity of ground which can be ploughed in a given time than is usually supposed, from the additional loss of time thus occasioned in turning at the headlands of the field. The difference thus produced is strikingly exemplified in the accompanying table. The time occupied in turning is only calculated at half a minute, but this is quite sufficient for an expert ploughman and pair of horses. When more than two horses are employed in the plough, the time lost in turning will, however, be much greater; and this will, in a corresponding degree, influence the quantity gone over in a given time.

Length of Ridge.	Breadth of Furrow Slice.	Furrow slices in an acre.	Time lost in turning in ploughing an acre.	Time occupied in ploughing an acre, the rate of walking being— 1½ miles per hour.	2 miles per hour.	2½ miles per hour.
Yards.	Inches.		h. m.	h. m.	h. m.	h. m.
66	8	330	2 45	11 00	8 56	7 42
132	—	165	1 22	9 37	7 33	6 19
264	—	82	0 41	8 56	6 52	5 38
396	—	55	0 27	8 42	6 38	5 24
594	—	36	0 18	8 33	6 29	5 15
792	—	27	0 13	8 23	6 24	5 10

It is an important arrangement, in laying out farm lands, to have the fences of the fields placed parallel to each other. The advantage of this arrangement is unquestionable, as an opportunity is thereby afforded of carrying on the operation of cross ploughing when necessary, as well as that of ordinary ploughing, with the greatest facility; and wherever this parallelism is neglected, wedge-shaped ridges must be thrust in somewhere to equalise the field; and the ploughing of these ridgelets consumes much more time than ploughing an equal space would under other circumstances. The suitable place for all such truncated ridges is at the boundaries of the farm, the position of which do not admit of alteration.

The *situation of the fences*, too, sometimes requires considerable judgment to ascertain. A fence running in a straight line along the summit of an elevated piece of ground affords excellent shelter on both sides. Indeed, a fence placed in this position secures more shelter to fields, than placed in any other situation; and, if other circumstances will permit, the elevated summits of rising grounds may be advantageously chosen as the sites for fences. But it frequently happens that the lower ends of fields cannot be enclosed by straight lines, a rivulet or hollow between two rising grounds occasionally terminating their lower ends. In that case the fence ought to follow the water or hollow ground, in order to provide the means of ready egress for the surface water coming from both sides. A serpentine fence in a hollow, contrary to such on a rising ground, affords more shelter than a straight one, as the direction of the wind in such situations is almost invariably that of the valley. A public road or canal passing through a farm, or stripes of plantation already growing in it, affect the laying out of enclosures. Whether any of these exists before or after the land is enclosed, the irregular sides of the enclosures, which alone should contain points or truncated ridges, should be placed next such obstacles. It may not be out of place here to mention that a public road is a great acquisition in passing through or near to farm lands, as it may save the making of more than one private one; and in the arrangement of the fields, it should be an object as much as possible to secure easy ingress and egress to each from the road. Easy access to and from fields to roads is an important means of preserving the health and strength of horses, and of saving the tear and wear of carriages and harness.

The number and size of the enclosures must obviously be regulated by that of the farm, and by the course of cropping practised on it. It is a general rule to divide the fields according to the rotation; that is, a farm on which the four-course rotation is practised should have four enclosures or fields; and if the six-course rotation, then a corresponding number of fields is required. It is a good arrangement to have the whole of each field in the same description of crop, and to have the produce of the farm every year as equally divided among the several cultivated crops as the soil and season will admit; and this can be obtained only by having the enclosures of an equal size, and adapting the number of them to the rotation.

When the four or five years' course rotation is adopted, the farm, it is thus seen, is conveniently laid off into four or five divisions; but in the case of large farms, the fields would then be of inordinate size, and eight or ten divisions would suit the rotation equally well, two of the fields, in that case, being in the same sort of crop. Placing the same kind of crop, particularly green crop and grass, in moderately-sized fields in different parts of the farm almost always insures a good crop in one of the situations; and the labour bestowed on any kind of crop being for the time confined to one moderately-sized field, probably secures a favourable seed-time and harvest to that field; at least, the risk arising from a change of weather, which affects labour as well as crop, is, in a great degree, avoided.

A very obvious advantage attending this arrangement is, that it tends to equalize labour. On large farms, where the entire of the turnip or clover crop, for example, is near the extremity of the grounds, or at a considerable distance from the buildings of the farm, it is clear that the labour of supplying the cattle with these bulky crops, as well as the carriage of the manure to the fields, is much greater than if the fields were so arranged that the half of each of these crops should be situated more convenient to the homestead; and by means of there being two fields for each crop on the farm, it is easy to connect one field thus conveniently situated with another at a greater distance.

But the advantages of this arrangement are not confined merely to the equalization of labour. It may also in a great measure render the annual produce of the farm equal and uniform, notwithstanding a considerable diversity of quality in the soil. A field of inferior soil may be connected in the rotation with one that is naturally rich; and in the consumption of the green crop, as well as in the application of the manure, the poor land may gradually be assimilated in the quality and quantity of its produce to the rich, without injury to the latter. Thus, a field under turnips may be so fertile that it would greatly injure the succeeding corn crop to consume the turnips on the ground; while another may be naturally so poor or deficient in tenacity, as to render it inexpedient to consume any considerable portion of the crop elsewhere.

Two or three small enclosures near the homestead are also indispensable on any farm. These may be from half an acre to two or three acres each. They are conveniently used for tups when out of season, ewes at the period of lambing, young calves, and for young animals generally after being weaned. They also afford an appropriate retreat for sick and convalescent animals, where they can remain undisturbed from the intrusion of others.

In the enclosure of upland and mountain districts the course of proceeding is different from that to be adopted on the plains. In the former case shelter is an especial object to be secured, and frequently every other consideration must give way to the attainment of it. Such situations are frequently exclusively devoted to the use of live stock, and the enclosures are for the most part of a large size. The live stock of the mountains possess more active habits than those of the plains, as they undergo more exercise in the collection of their food.

Access to good water is an important consideration in every enclosure in which live stock are at any time to be kept. The best pasturage will never improve the condition of cattle to the extent of which it is capable of doing without the digestive aid of plenty of good water.

The peculiar *kind of fence* to be employed in the division of farm lands depends in a great degree on the locality. The live fence is generally to be preferred in all situations where it can be produced; but in exposed situations and in mountainous districts none, or few, of the common hedge plants can be made to grow. In this respect it is to be regretted that the range of the common hawthorn is not more extended as regards the climate in which it can be grown. As a hedge plant no other can at all enter into competition with it, but it will not succeed on inferior soils or in exposed situations. The whin or gorse may often be substituted in such cases for the hawthorn, but, as compared with the latter, it is exceedingly limited in its duration, and is also liable, by the dispersion of its seeds, to spread over the surrounding grounds, unless prevented by the operation of the implements of tillage. Plants are occasionally cultivated in hedge-rows more with a view to their produce than to serve the purpose of a fence, such as the various kinds of timber grown as hop-poles in certain districts, and willows for basket work; but such are obviously not to be included in the list of hedge plants, properly so called. A mixture of plants in hedge-rows cannot generally be recommended though frequently introduced, as it gives a bad appearance to the fence, and it rarely happens that a soil will be found equally suited to the growth of a great number of plants.

The comparative merits of the different kinds of fences which may be employed have been warmly contested; but in such cases it seems to be lost sight of that this is purely a question of circumstances. In bleak situations hedges certainly will not grow; and there are also some situations in the most favoured soils for the growth of hedges in which other kinds of fence may be introduced with advantage, as in those parts of low-lying fields near the margins of sluggish rivers, which are liable to inundate their banks in winter, or even during the periodical rains of summer. Hedges in such situations lose their vigour of growth, and become a prey to parasitical mosses and lichens. In hollow grounds near bogs or fresh-water lakes, over which vapours are frequently suspended during the nights in summer, and which blight the vegetation of the most vigorous hedges, stone walls, or railing of some sort, will be preferable to hedges. The sides of paths leading to watering places from fields, and particularly if they are environed with plantations, are best protected by stone walls. In these situations, which are all inimical to the growth of hedges, stone walls will constitute a better fence, and they will be produced at less expense, than the thorn hedge. In every other situation hedges will certainly be preferable, as they become not only a strong fence, but they at the same time afford a most valuable shelter to every kind of live stock. Currents of wind passing over the top of stone walls receive a percussion, and generate blasts of air in whirling motions on the leeward side of the wall; whereas these currents, in being permitted to pass through a hedge, are much weakened by being subdivided into numerous smaller ones. Such considerations as these should guide the farmer in constructing that kind of fence which is best suited to the particular situation in which it is to be placed.

It is further to be regarded as a wise provision in the economy of nature, that the earth itself furnishes the most appropriate materials for the fencing of land. On elevated grounds much exposed to the vicissitudes of the weather, which would greatly retard the vegetation of arborescent plants, rock generally predominates; and in gravelly deposits, which are not favourable to the development of most shrubby plants, materials are often abundant which are eminently appropriate to the construction of dry stone fences. Again, in a champaign country, abounding in those rich deposits of clay and loam which are highly qualified for the rearing of every kind of tree, stone is scarce, and cannot be employed in the formation of fences.

To the live fence it is often objected as being supposed to be expensive to rear to maturity, for the attainment of which a considerable length of time is required, during which it is not efficient as a fence—to be difficult to keep in order afterwards—to occupy too much land—to exhaust its fertility for a considerable distance around them, and to afford a refuge for vermin. On the other hand, stone walls are supposed to produce a bleak appearance in a cultivated country,—to afford little or no shelter to live stock, and to require constant repair; and they cannot be made an efficient fence for some kinds of sheep without incurring great expense in either building high walls or in placing some inconvenient fence-wood on the top of low ones. As a mere fence for cattle in particular, the wall is as good as a hedge; but the former is in its best state from the hands of the builder, and unfortunately decays daily; but the latter acquires strength with its growth, and under proper management will last for ages.

Another consideration may be noticed in the arrangement of fences, which, though of comparatively minor importance, is yet not altogether undeserving of regard. In every case lines of fences will occasionally intersect each other, forming corners which the plough cannot reach, and which, to prevent the untidy appearance which waste patches of ground invariably produce, must be cultivated by the spade. In these it is advisable to form a small enclosure, a portion being taken off each of the surrounding fields for the purpose, though a small additional expenditure in fencing be thereby incurred. The space thus enclosed may be planted for shelter and ornament; or a portion of it may be reserved for a watering place, which may be easily approached by a simple contrivance from each of the surrounding fields.

Before concluding this subject, a passing notice of the propriety of introducing timber trees into hedge-rows may not be irrelevant. This is a subject on which there is much difference of opinion. So far as regards the appearance of hedge-row timber on the landscape, every one must admire their effect, and were we to estimate their value by the consideration of beauty alone, they would be beyond all price. Notwithstanding the objection of formality urged against timber trees arranged in this manner, it cannot be doubted that they impart such a clothed and lively aspect to the country as nothing else can give; and the cultivated scenery of many parts of England is on this account amongst the richest any where seen. Were there not, then, serious objections to be brought against the practice on other grounds, no difference of opinion could exist regarding it. But the practical farmer is accustomed to look at things rather on account of their utility than their beauty, and so far as the testimony of practical men is to be regarded, it may be considered to be all but universal in the condemnation of the system. So early as the time of the author of the "Gentlemen Farmer," the injurious effects of trees in hedge-rows were loudly complained of; and in that work we find Lord Kames declare, as his opinion, that "to plant trees in the line of a hedge, or within a few feet of it, ought to be absolutely prohibited as a pernicious practice. It is amazing that people should fall into this error, when they ought to know that there never was a good thorn-hedge with trees in it. And how should it be otherwise? An oak, a beech, or an elm grows faster than a thorn; when suffered to grow in the midst of a thorn hedge, it spreads its roots every where, and robs the thorns of their nourishment. Nor is this all. The tree overshadowing the thorns, keeps the sun and air from them. At the same time, no tree takes worse from being overshadowed than a thorn." Severe as is this censure of the practice, it cannot be said to be unjust. Even as regards the value of timber in hedge-rows, much cannot be said in its favour, as it rarely or never attains to a great size, and is besides often distorted in shape by the force of winds. When any portion of this timber comes to be removed either by accident or design, the fence also suffers severe and irreparable injury. On the whole, then, it may be said, that, so far as regards appearance, he who would not advocate the extension of hedge-row timber would be decidedly wanting in taste, and therefore it is not to be wondered that landed proprietors generally are advocates of it; but so far as the practical farmer is concerned, it cannot be doubted that the trees do much injury not only to the fence, but also to the surrounding crops, both by the shade of their tops, and by the exhaustion of the soil by their roots; and further, that their disposal, were they even left in the hands of the farmer (which, however, is generally not the case), to counterbalance the injury which they inflicted during their growth, would not afford any considerable return.

But, however inimical the farmer may be to the existence of timber trees in his hedge-rows, the total or even partial destruction of such as at present exist cannot be recommended. It would, to use the words of an eloquent writer on the subject, be ungracious treatment, now that they are planted and growing, to root out every one of them without delay; but they may be treated as annuitants, whose consummation may be devoutly wished for, and whose places will not be replenished by similar occupants. Plantations, and clumps and belts of trees, afford better shelter than single rows; and when they can be judiciously planted in situations where little use can be made of the ground for culture (and there is no property without many such situations upon it), and in other situations where they would screen fields from the prevailing winds, they not only become useful timber, but ornamental objects in the landscape—objects which fill the eye, rivet the attention, and are vastly more tasteful than any single row of stunted trees can be.

Closely connected with a convenient arrangement of the fences of the farm is the proper situation of field gates, which impart an air of neatness and order. This branch of farm management is often too much neglected, and the entrances to fields may often be seen to consist merely of an opening made in the fence, and defended only by a number of large thorn bushes, or by some other means equally simple and inartificial.

The situation of the gate should be in the middle of that side of the field which is nearest to the road leading to the farmery; because in carting home produce and in carting out manure, the labour is less on a well formed road than on the soft headland of the field, and carting more or less injures the ground. When the entrance to a field is situated near a corner of it, the headland is cut up and injured by the frequent repetition of the carts in the same track, and this is avoided as far as possible by having the gates placed near the centre of the fence forming the near boundary of the field.

When a public road passes through the farm, entrances to the field may be made from it; but in the case of large farms many fields may occur not thus advantageously situated, and especially in the case of clay farms; such roads must be formed as will secure convenient access to every field. On wet and clayey soils these roads must be formed of durable materials, otherwise access to the fields is impracticable during the winter months; but on dry soils, provided attention is paid to fill up the ruts as they are formed, farm roads may easily be kept in order. It is essentially necessary that a piece of road should be formed at the entrance to every field, in the gateway; that being the place which is most frequently subjected to injury. Without this precaution it often becomes a mire, where corn is thrown down and spoiled in the harvest; or if it is attempted to avoid the mire, the gate-posts and adjoining fence are damaged. J. Sproule.

FIXING AMMONIA IN DUNGHILLS.

TO THE EDITOR OF THE BURY AND NORWICH POST.

Sir,—It is now two years since I took some pains to bring before the public a plan for experimental co-operation, by means of which practical agriculturists might efficiently test the suggestions of chemists and others, without much trouble or cost on the part of separate individuals. By this means also, as it appeared to myself and others better judges than I am, a secure method might be established of accelerating the progress of certain inquiries which must yet be made before a satisfactory connexion can be established between science and practice. I selected, almost at random, an experiment to be tried by not less than 50 experimenters, according to the plan proposed; and 95 individuals consented to undertake it, and to return to me certain printed schedules filled up with the results they might obtain. I promised to collate these schedules, and to make known the general result, whatever it might be, which could be deduced from them. I have received returns from only 17 persons, and six others have given me reasons why they were unable to keep to their engagement; but I have had no communications from the remaining 72. It is very possible that whatever zeal I felt in promoting the scheme has been considerably damped at finding so great a falling off, as more than three-quarters in the numbers have sent me no notice whatever of their proceedings; whilst, of the 17 returns, not more than 12 are sufficiently filled up to make their results of any positive value. I suspect that I have, in consequence, been procrastinating the somewhat troublesome task of reducing the various quantities in the several schedules to a common standard of comparison—a trouble which might readily have been avoided, if all the experiments had been undertaken on the same scale. I had purposely left it open to the judgment of the several experimenters in this first essay to determine for themselves whatever spaces and quantities they might choose to adopt; but experience has convinced me that this latitude has been a source of embarrassment to some, and that I should have received more returns if I had been more precise in exactly stating how much ground should be set out, and the precise quantity of the several materials to be used in the experiment. Though I shall not feel justified in deducing any positive conclusions from returns that have not been sufficiently numerous, according to the scale upon which the experiment has been undertaken, yet I find, from much additional information that has been obtained, that gypsum does certainly act to a limited extent in arresting decomposition in open dunghills; and that a certain, but not large, amount of sulphate of ammonia is formed by its decomposing some of the carbonate of ammonia. It has been announced that the common green copperas (sulphate of iron) is far more serviceable than gypsum for this purpose. Although I had no intention of engaging further in these inquiries, my knowledge of chemistry being much too limited, yet, as an application has been made to me to prepare a schedule for an agricultural society in Devonshire, I have suggested an experiment for testing the comparative values of gypsum, sulphate of iron, and muriate of lime, as fixers of ammonia in open dunghills. I have been furnished with several copies of this schedule B, and shall be happy to forward one to any person who may be inclined to undertake the whole or part of the experiments it suggests. It is drawn up more briefly and precisely than the former. The expense of the materials to be used cannot amount to more than a few pence; and the time that need be consumed in carrying it out would not occupy a couple of labourers above a few hours. I shall hope before another fortnight is past to have my time sufficiently at command to draw up a tabular view of the scanty results which schedule A has produced, and to offer some comments upon them. I find my former views of the utility of the scheme proposed vastly refreshed and strengthened by having lately breathed a little of the scientific atmosphere that was distilled at the important meeting of the British Association at Cambridge; and I cannot yet utterly relinquish the hope that those persons who are professing the greatest anxiety for the union of science with practice will sooner or later become convinced of the necessity of organizing some efficient scheme of experimental co-operation. The failure of my own efforts ought not to be taken as a bad omen: I am not competent to have done more than point out its importance, and to have directed attention to the like suggestions on the part of persons best qualified to make them. Success can be expected only when those who are directing the aim of the whole agricultural body shall have prevailed with the locally dispersed societies and clubs to unite in carrying out so desirable an object. J. S. Henslow.

Hitcham, 7th July

A PRIZE ESSAY ON MANURES.

By Samuel L. Dana.

Published by the Massachusetts Society for the Protection of Agriculture.

"Manures are the riches of the field."—Chaptal.

SECTION FIRST.

Clearing and breaking up, and making Compost.

There is one thing settled in farming, stable manure never fails. It always tells. There are no two ways about it. There is here neither theory, nor speculation, nor doubt, nor misgiving. "Muck it well, master, and it will come right," is an old proverb. It is considered a fact so well established, that nobody thinks of disputing it. There is advantage in asking why barn-yard manure never fails. The answer is easy. It contains all that plants need for their growth. If we know then what plants contain we can easily tell what is in manure. The whole doctrine of manures then falls into two plain principles, on which hang all the law and the "*profits*" of agriculture.

1. Plants contain and need certain substances which are essential to their growth.

2. Manure contains all those substances which plants want. If then we would find out what it is which manure contains that makes plants grow, we must first find out what a grown plant contains. This cannot be done without some little, a very little knowledge of chemistry. Do not be startled, reader. I suppose that you may know nothing of chemistry, no, not even its terms. As a very sensible man, who wrote letters on Botany to a young lady, said, to encourage his pupil, it was possible to be a very good botanist without knowing one plant by name, so is it possible to become a very good agricultural chemist without knowing little more than the chemical names of a very few substances. You know nothing of chemistry it may be, and as little of law; yet you will go to law, and learn some of its terms by a dear-bought experience. The law terms are harder to learn than the chemical terms. Now I fear that some persons, who have followed me thus far, will shut up the book. It is, say they, all stuff, book-farming, and beyond us. If one may not understand what manure is without this learning, we may as well begin where our fathers ended, and that was where our forefathers began ages ago. By a little law, however, picked up as a juryman or witness, selectman, town-clerk, justice of the peace, yea, perhaps, hearing an indictment read, men do come to understand what a lawyer means when he talks. So, too, by a little chemical talk, a man may learn what a chemist means when he talks of oxygen, hydrogen, nitrogen, chlorine, and carbon; potash, soda, lime (all these are old friends, the very names make us feel at home again), alumina, magnesia, iron, manganese, and silex, sulphur, and phosphorus. Here is a long list. Long as it is, perhaps it will be thought worth learning, when you are told, that these are the names of all the substances found in plants—every substance which they want. Out of these is made every plant—every part of every plant, from the hyssop on the wall to the mountain cedar, contains some or all of these. Be not disheartened. Look over, reader, the list again carefully, see how many are old names of things which you know. Of the fourteen, you know nearly one half by name and by nature. These are potash, soda, lime, magnesia, iron, sulphur. Perhaps you will add, that you know carbon is coal, or rather coal carbon. You have heard, from some travelling lecturer at your town Lyceum, that oxygen and hydrogen together form water. That oxygen and nitrogen form the air you breathe; that nitrogen and hydrogen form ammonia or sal volatile, which gives the sharp smell to the smelling-bottle. Besides, the thing has been said so often, that you must have heard it, that chlorine, the substance which bleaches in bleaching salts united to soda makes common salt, or if chlorine is united to ammonia sal ammoniac is formed. Now by changes and combinations among these fourteen things, nature makes everything we find in plants. Many of these are invisible, as is the air. The substance called chlorine, perhaps you have never seen, but if you ever smelt it you will never forget it. It is often smelt in a piece of bleached cotton when opened in the shops. It gives the smell to bleaching powder used to disinfect the air, during cholera and other diseases. If you could see it, it would appear merely a faint yellowish green air. It is all-powerful on vegetation. As it forms a part of common salt, say half of its weight, we may dismiss the further consideration of it, by saying, that, in some shape or other, chlorine is universally diffused in soil and plants.

The list above may be divided as follows: first, the airy or volatile; secondly, the earths and metals; thirdly, the alkalies; fourthly, the inflammables. Only the third and fourth divisions require to be explained or defined. The substances called potash and soda are termed alkalies. They are said to have alkaline properties. Touch your tongue with a bit of quicklime, it has a hot, burning, bitter taste. These are called alkaline properties. Besides these they have the power of combining with and taking the sour out of all sour liquids or acids, that is, the acid and the alkali neutralize each other. This word alkali is of Arabic origin; its very name shows one of the properties of alkalies. "Kali" is the Arabic word for bitter, and "al," is like our word super—we say fine and superfine; so kali, is bitter; alkali, superlatively bitter: or, truly, alkali means, the "dregs of bitterness." I wish, reader, for your own sake, as well as my own, that you should fix in your mind what I have said about alkali and alkaline properties. Alkali is a general term: it includes all those substances which have an action like the ley of wood ashes, which you use for soap-making. If this ley is boiled down dry, you know it forms potash. Now lime fresh slaked has the alkaline properties of potash, but weaker, and so has the calcined magnesia of the shops, but in a less degree than lime. Here we have two substances, earthy in their look, having alkaline properties: they are called, therefore, alkaline earths. But what we understand chiefly by the term alkalies, means potash, soda, and ammonia. Potash is the alkali of land plants; soda is the alkali of sea plants; and ammonia is the alkali of animal substances. Potash and soda are fixed, that is, not easily raised in vapor by fire. Ammonia always exists as vapor unless fixed by something else. Hence we have a distinction among alkalies which is easily remembered. This distinction is founded on the source from which they are procured, and upon their nature when heated. Potash is vegetable alkali, derived from land plants; soda is marine alkali derived from sea plants; ammonia is animal alkali, derived from animal substances.

Potash and soda are fixed alkalies; ammonia is a volatile alkali. Potash makes soft soap with grease, and soda forms hard soap. Ammonia forms neither hard nor soft, it makes with oil a kind of ointment, used to rub a sore throat with, under the name of volatile liniment. But though there be these three alkalies, and two alkaline earths, I want you to fix in your mind, reader, that they all have common properties, called alkaline, and which will enable you to understand their action, without more ado about their chemistry. The inflammables, or our fourth division, are sulphur and phosphorus; both used in making friction matches. The phosphorus first takes fire by rubbing, and this sets the sulphur burning. Now, the smoke arising from these is only the sulphur and phosphorus united to the vital part of the common air. This compound of vital air, or oxygen, as it is called, and inflammables, forms acids called sulphuric and phosphoric acids. So if you burn coal or carbon, it is well known you form fixed air, or carbonic acid. That is, by burning, the coal or carbon unites with the oxygen or vital part of common air, and forms carbonic acid. The heavy, deadly air, which arises from burning charcoal, has all the properties of an acid. And now let us see what these properties are. All acids unite or combine with the alkalies, alkaline earths, and the metals. When acids and alkalies do thus unite, they each lose their distinguishing properties. They form a new substance called a salt. It is very important you should fix well in your mind this definition of a salt. You are not to confine your idea of a salt to common salt. That is a capital example of the whole class. It is soda, an alkali, united to an acid, or chlorine, or, to speak in the terms the most intelligible, to muriatic acid. So saltpetre is a salt. It is potash united to aqua-fortis. Yet in saltpetre you perceive neither potash nor aqua-fortis. These have united, their characters are neutralized by each other. They have formed a neutral salt. Our list of substances found in plants is thus reduced from things which you did not know to things which you do know; and so we have saved the trouble of learning more of their chemistry.

We have reduced the airy or volatile into water, formed of oxygen and hydrogen; or volative alkali, formed of nitrogen and hydrogen; or into acids, as the carbonic, formed of oxygen and carbon—as the sulphuric, formed of oxygen and sulphur—as the phosphroric, formed of oxygen and phosphorus; and having thus got water and acids, these unite with all the alkaline, earthy, and metallic bodies, and form salts. To give you new examples of these, I may mention Glauber's salts and Epsom salts. Glauber's salt is formed of soda and sulphuric acid; Epsom salts, of magnesia and sulphuric acid; alum, of alumina or clay and sulphuric acid; green vitriol, of iron and sulphuric acid; white vitriol, of zinc and sulphuric acid; plaster of paris, of lime and sulphuric acid; bones, of lime and phosphoric acid; chalk and limestone, of lime and carbonic acid. These are all examples of salts; that is, an acid or a substance acting the part of an acid, united to an alkali, metal, or earth.

We have thus gone over, in a very general way, enough of chemistry for any one to understand the chemical nature of manure. You see, reader, that with common attention, bestowed for an evening's reading, one may learn these chemical terms and their meaning. And now, having learned this first lesson, let us review the ground gone over, and fix once and for all these first principles in our minds. Let us do this by a practical application of the knowledge we have gained. Let us analyse a plant. Do not be startled at the word. To analyse, means to separate a compound substance into the several substances which form it. This may be done by a very particular and minute, or by a more general division. It may be done for our present purpose, by separating the several substances of a plant into classes of compounds. You are already chemist enough to undertake this mode of analysis; in truth, you have already done it, again and again. For our purpose, the ancient chemists had a very good division of all matter into four elements—fire, air, earth, and water. Now, by fire you separate plants into the other three elements. You are, reader, though perhaps you do not know it, somewhat of a practical chemist. Whenever you have burned a charcoal-pit, what did you? You separated the wood into air, water, and earth.

You drove off by heat or fire the airy or volatile parts of the plant, you left its carbon or coal; if you had burnt this, you would have left ashes. Now these ashes are the earthy parts of plants. If you burn a green stick of wood, you drive off first its water and volatile parts, which form soot. You burn its carbon, and leave its ashes or salts. So that by simply burning you reduce the substance or elements of plants to water, carbon, salts. All plants then, without exception, contain the several substances in our list above, as water, carbon, and salts. To apply this knowledge to manure, we must say a word on the form in which some of these, which we call the elements of plants, exist in them. The sap is water, it holds dissolved in it some salts of the plant. This sap or juice forms a pretty large proportion of the roots, say seventy-five to eighty parts in one hundred of potatoes, turnips, beets, &c. This may be called the water of vegetation. If we dry beetroot, or any other plant, we merely drive off this water of vegetation. Now what have we left? To go back to our process of analysis, let us char the dried root. We drive off more water and volatile parts. This water did not exist as such in the plant. It existed there as hydrogen and oxygen gas. Now this word gas is a chemical term, and it means any substance in vapor, which cannot be condensed into a liquid or solid at common temperatures. Different gases may unite, and so become solids or liquids. Steam is not gas, for it is the vapor of water, and immediately returns to the state of water, below 212 degrees. Perfect steam is invisible, so are most gases. The air we breathe is composed of two gases, oxygen and nitrogen. We do not see them, we cannot by cooling or compression make air take other shape than invisible air. This is the general property of gas as distinguished from vapor or steam. Oxygen and hydrogen in plants exist in just the proportions to form water, but we do not know that they are united in these proportions. We have compelled them to unite by heating the substance or root. The carbon is by this same process consumed, and, you know, has thus formed carbonic acid. Besides this a portion of the carbon unites with some of the hydrogen of the plant. This forms light, inflammable air. Now you may collect this light, inflammable air in any stagnant water where plants are decaying. Decay gives exactly the same products as are formed in making charcoal. Decay is only slow combustion or burning: no matter whether we char the plant or leave it to decay, we obtain exactly the same products as we did by our analysis, that is, carbon and salts.

But because there is not heat enough we leave by decay a portion of the hydrogen and oxygen still united to the coal. A slow *mouldering* fire leaves products more like those of decay. Decay is a slow mouldering fire, hence the products of the decay of plants are very aptly termed *mould*. It is the product of a mouldering fire, that is, an imperceptible union of the oxygen of the air with the carbon of the plant. A union so slow that it gives out neither heat nor light. And yet it is in its results the same as if fire had actually been seen and felt. Mould contains, then, a part of the carbon, oxygen, and hydrogen, or, if you like the terms better, mould of soil consists of the water and coal and salts of the plants. Mould is truly manure. If the mould of soil, as it has thus been defined, were separated from the earthy portions of soil, it would deprive that soil of the power of growing crops. Here then we come to a broad distinction between soil and manure. The soil is the earth on which plants grow. The mould is the manure of that soil. The soil is the earthy; the mould, that is, the carbon and salts, together with the elements of water, are the vegetable part of arable land. But though the earthy part, the soil, as it is usually called, acts as a support, on which plants grow, it does not play a mere mechanical part. It has a distinct, decided, and important action upon the manure. This action is chiefly chemical; and the fact that soils and manures do mutually affect the growing plant, is proved by the circumstance, that the first plants which grew derived their salts from the earth.

But this chemical action of soil does not belong to the present discussion. We can understand what manures are without deciding how they act. We can theorize and guess about the how of their action when we have learned what they are. That is chiefly what the farmer wants to know. He wants to know what manure is, and what is likely to act as a manure. To these points we shall confine our present remarks. Pointing out the great principles applicable to all manures, the nature of soils, and the manner in which they affect manures, must be left for another essay. The vegetable or manure part of soil alone is to be now considered. Consider now, reader, the great results to which our analysis has led us: that a slow, mouldering fire gives us the same products as are formed by decay; that this is only a slow, mouldering fire, and that mould, its product, is the natural manure of plants. It follows, that whatever substance produces mould, that is, water, carbon, and salts, may be used instead of this natural manure. Among the salts found in mould, some are volatile, and are easily dissolved by water. Others are fixed, that is, not evaporating easily, or not at all, and are quite insoluble in water. Now the first, or volatile, and soluble, first act when used in manure. They act quick and are quickly done. The fixed and insoluble act slower, they last longer. The volatile act in the early stages of growth, the fixed in the later periods. The great difference in the action of manures depends almost entirely upon the salts which they contain. These are the most important and essential. It is not so much the vegetable mould of manure which you want, as the salts which it contains. This is a well-settled principle. Land which has undergone the skinning process, old, worn out and run out land, still contains a very large portion of vegetable matter: the coal or carbon of mould without its salts. Give this worn out land salts, and you may by these alone bring it back not only to its first virgin freshness, but you may even by salts alone make it fairer and richer than it was before man ever cultivated it.

Too much stress has been all along laid upon the kind of soil. Go now to "Flob," in West Cambridge, no better farms or farmers, look the world through. Ask any of these practical men, whether the sandy and gravelly soil of Old Cambridge Common, or even of Seekonk Plain, can be made to bear as rich crops as their land? They will tell you yea. If your land will hold manure, muck it well and it will be as good. Now this holding of manure belongs to the subject of soils, and throwing that out of consideration, it is found that even lands which do not hold manure, which have been worn out and exhausted by cropping, hold yet a great deal of insoluble coal of mould. They want salts, and something which will make this inert, dead vegetable matter of the soil active. The mould is active in proportion as it is more or less dissolved by water. Mould consists of two parts: one is dissolved, though only in a slight degree, by water; the other is not dissolved by water. Some substances, however, do render mould very easily dissolved by water. Hence, if you reflect a moment on these facts, it will be seen that mould itself, being valuable in proportion to the ease with which water dissolves it, that whatever substance so enables mould to dissolve, may be added to it, and thus increase its value. Now the things which do this are the alkalies, soda, potash, and ammonia. These principles being well settled, we may enter on the consideration of each different manure. They will be valuable in proportion to the quantity and kind of salts each contains, added to the power they may have of producing by their decay substances which make their mould soluble. Now this last property, that is, the property of producing a substance which makes mould soluble, depends wholly upon the nitrogen of the manure. This nitrogen in the process of decay, becomes volatile alkali or ammonia. The word ammonia will occur so often in the present discussion, that we should endeavour to fix some definite idea to it. You need not, reader, be acquainted with all its chemical properties. I suppose every man who will be likely to read these remarks has smelled ammonia. It has been already said, that it gives the peculiar pungent smell to the common smelling-bottle. This is volatile ammonia. It is always formed when animal or vegetable bodies decay.

It has been already said, and is now repeated in order that it may never be forgotten, that ammonia is formed by the union of hydrogen and nitrogen. Hydrogen and nitrogen, two airs, nitrogen forming four-fifths of the air we breathe, let that be borne in mind, and without going into the chemistry of ammonia further, or the mode of calculating how much ammonia a pound of nitrogen will make, it may be laid down, and must be remembered too, that every pound of nitrogen may be called two and a half pounds of sal volatile, or smelling salts of the smelling-bottle. Two and a half pounds of volatile ammonia formed from one pound of nitrogen. If then we can determine, as chemistry may, how much nitrogen exists or forms a part of manure, two and a half times that will be the ammonia of that manure. If then the vegetable part of manure is as we have said, valuable and active, in proportion to its degree of being dissolved by water, then, as ammonia gives it this easy solubility, we may safely say, that the quantity of nitrogen in manure, is the measure of the value of its vegetable part. One thing must be guarded against, not to place from this view the whole of the value of manure upon its ammonia. Remember that manure consists of carbon, water, and salts. The whole are equally essential to its action. There is no eye, nor ear, nor foot, nor hand in manure which may say to the other members, "I have no need of thee." The whole act together; but it is not to be doubted, that ammonia is the heart of manure, and keeps up the healthy circulation among the other members.

SECTION SECOND.

Shovelling over the Compost Heap.

The above remarks may be called our compost heap. It must be well shovelled over. You must, reader, before you cart it out and spread it, understand well what this compost contains. Now just let me turn over a few shovels full, and fork out the main points to which I wish to call your attention.

1st. That all plants find in stable manure every thing they want.

2nd. That stable manure consists of water, coal, and salts.

3d. That these, water, coal, and salts, consist in all plants of certain substances, in number fourteen, which are called,

1. Oxygen, 2. hydrogen, 3. nitrogen, 4. carbon, 5. sulphur, 6. phosphorus, 7. potash, 8. soda, 9. lime, 10. magnesia, 11. alumina or clay, 12, iron, 13. manganese, 14. chlorine, which last, as we have said, forms about one half the weight of common salt. And if you always associate with the word chlorine, the fertilizing properties of common salt, you will, perhaps, have as good an idea of this substance as a farmer need have, to understand the action of chlorine.

4th. These fourteen substances may be divided into four classes.

1st. The airy or gases, oxygen, hydrogen, nitrogen, and chlorine.

2nd. The combustibles, carbon, sulphur, and phosphorus.

3d. The earths and metals, lime, clay, magnesia, iron, and manganese.

4th. The alkalies, potash, and soda.

You may be surprised that I have not turned up ammonia, but this exists in plants as hydrogen and nitrogen.

5th. The term salt includes a vast variety of substances, formed of alkalies, earths and metals, combined with acids. Fix well the meaning of this term in your mind, and remember the distinction pointed out, that some salts are volatile, and act quick in manure, and others are fixed and act slower.

6th. When plants die or decay they return to the earth or air these fourteen substances. Those returned to the earth from mould, which thus is composed of carbon, salts, and water, is natural manure.

7th Mould consists of two kinds, one of which may be, and the other cannot be dissolved by water. Alkalies put it into a state to be dissolved, and in proportion as it is dissolved it becomes valuable as a manure.

8th. If then manure contains only water, carbon, and salts, any substance which affords similar products may be substituted for it. Hence we come to a division of manures into natural and artificial. The consideration of these is the carting out and spreading of our compost. And we shall first consider in detail the natural manures.

That is, those which are furnished us by the dung and urine of animals, and the manure or mould formed by the decay of animal bodies or plants. These are truly the natural manures, consisting of water, mould, and salts. This is all that is found in cattle dung. This being premised, we may divide manures, reader, for your more convenient consideration, not by their origin, but by their composition. We may divide manures into these three classes—First, those consisting of vegetable or animal matter, called mould; secondly, those consisting chiefly of salts; and, thirdly, those consisting of a mixture of these two classes. And, beginning with the last first, we will now proceed to their consideration.

SECTION THIRD.

Carting out and Spreading.

The general chemical information set forth in the preceding sections will be of no service to you, reader, if it conducts you not beyond the result arrived at in the close of the last section, that cattle dung is composed of water, mould, and salts.

You want to know what salts, and how they act.

If you understand this you may be able to say beforehand whether other things, supposing their nature understood, can take the place of the mould and salts.

The mould, then, of cattle dung, as of all other mould, contains the following substances:—

The water consists of oxygen and hydrogen.

The mould consists of carbon, oxygen, hydrogen, nitrogen, and ammonia.

Thus it is seen that the mould contains all the substances found in the first class into which the elements of plants were divided. The salts contain the sulphur, phosphorus, and the carbon as sulphuric, phosphoric, and carbonic acids, and the chlorine, as muriatic acid or spirits of salt.

The acids formed of the elements of the fourth class of the substances entering into plants are combined with those of the second and third classes, namely, the potash, soda, lime, clay, magnesia, iron, and manganese. Here then we have all the elements of plants found in cattle dung. Let us detail their several proportions. We have all that plants need distributed in cattle dung, as follows:—

In 100lbs. of clear cattle dung are—

Water	83·60
Mould, composed of hay	14·10
Bile and slime	1·275
Albumen, a substance like the white of an egg	·175
Salts, silica or sand	·14
Potash united to oil of vitriol, forming a salt	·05
Potash united to acid of mould	·07
Common salt	·08
Bone-dust or phosphate of lime	·23
Plaster of Paris	·12
Chalk or corbonate of lime	·12
Magnesia, iron, manganese, clay, united to the several acids above	·14
	100

SECTION FOURTH.

Of the Action of Mould in Cattle Dung.

Here, then, we have cattle dung with its several ingredients spread out before us.

We have now to study its action. We need here consider only the salts and mould. The water is only water, and has no other action than water. The mould includes the hay, for that has, by chewing, and the action of the beast's stomach, lost so much of its character, that, mingled with the slime and bile, &c., it more rapidly decays than fresh hay would placed in similar circumstances. During this act of decay, as you have already learned, the volatile parts of the mould are given off in part. These escape, as in burning wood, as water and steam, carbonic acid, and ammonia. In consequence of this slow mouldering fire or decay, the manure heats. Here then we have three very decided and important actions produced by the vegetable part or mould of cattle dung. First, carbonic acid is given off; second, ammonia is formed; third, heat is produced. Let us now consider each of these, and their effects.

First, the great action of the carbonic acid is upon the soil, its earthy parts. It has the same action on these that air, rain, and frost have; it divides and reduces them. It not only reduces them to powder, but it extracts from the earth potash and the alkalies. This is a very important act, and shows why it is necessary that decay or fermentation should take place in and under the soil among sprouting seeds and growing roots, in order that they may obtain from the soil the salts they want.

If well-rotted manure contains abundance of these salts ready formed in its mould, then there will be less necessity of this action of carbonic acid. But here again it must be remembered, that this abundance of salts ready formed in mould can be produced only at the expense of great loss by fermentation of real valuable parts. For,

Secondly, the next great action of the mould of cattle dung is to produce or form ammonia. This plays a threefold part: its first action is to render the mould more soluble, this action it possesses in common with the fixed alkalies, potash, and soda. All the alkalies put a large but undefined portion of mould into a state fit to become food for plants. The second action of ammonia is this, it hastens decay; it is the bellows, we may say, kindling the slow mouldering fire. The third action of ammonia is to combine with any free acids, such as vinegar, or even an acid formed of mould itself, but especially with aqua-fortis or nitric acid, which is always produced where animal or vegetable matters decay. This is a highly important fact. The result of this action, the production of ammonia and aqua-fortis during the formation of mould, is, that a kind of saltpetre is thereby produced; that is, the ammonia and aqua-fortis unite and form a salt with properties similar to saltpetre. But we want the first and second action of ammonia to occur before the third takes place. Consider now, reader, whether a more beautiful and effectual way can be devised to hasten decay, and render mould more fit for nourishing plants than this which nature has provided. The ammonia is volatile; it remains, not like potash and soda, where it is put, incapable of moving unless dissolved by water; but ammonia, like steam, pervades every part, it is as expansive as steam; heated up by the slow mouldering fire of decay, it penetrates the whole mass of mould. It does its work there. What is that work? It has already been told. But, if it finds no acid to combine with, it then unites with the mould itself; it is absorbed by it.

The mould holds it fast; it stores it up against the time when growing plants may need it. Now it is only where the abundance of ammonia produced satisfies these actions of hastening decay, making mould soluble, and filling its pores without combining with it, that the formation of saltpetre takes place; so where animal matters, which are the great source of ammonia, decay, there we may expect all these actions to occur. How important, then, is that action of mouldering, which produces ammonia. If, reader, you will reflect upon the consequences of this action you will at once see, that if the mould is in too small a quantity to retain the ammonia it may escape. If by a wasty exposure you allow your mould to dissipate itself in air, as it certainly will, you not only incur the loss of that part of the mould, but you diminish at the same time the chance of keeping the ammonia which has been formed. No doubt all cattle dung exposed to air forms more ammonia than it can retain. Hence the necessity and the reason of forming composts with this substance. Keep what you have got and catch what you can, must never be lost sight of in manure. The third action of mould is, the production of heat. Little need be said upon this; that a slight degree of heat hastens the sprouting of seeds you well know; that different manures produce different degrees of heat; that some are hot, some cold, you well know, and adapt your seed and manure to each other. The degree of heat depends upon the rapidity with which decay occurs; and this is effected by the quantity of ammonia which each manure can afford. The great point to which your attention should be directed when considering the power of mouldering to produce heat, is, that it shall not go so far as to burn up your manure just as hay will heat and take fire.

SECTION FIFTH.

Of the Action of the Salts of Cattle Dung.

Here it is we find ourselves thrown on a sea of opinions, without chart, compass, or pilot, if we trust to the conflicting theories which have been set up for land-marks and light-houses. Let us therefore, reader, trust to ourselves, aided by the little chemistry we have learned from the preceding remarks about the composition of salts.

I have endeavoured to impress on your memory that the term salt is very comprehensive. But then, to encourage one, it is also to be remembered that salts are compounds of alkalies, earths, and metals and acids. Now the earths, alkalies, metals may be united to each of the known acids (and their name is legion), yet you may not, by this change of acids, alter the nature of the earth, alkali or metal. That always remains the same; every time you change the acid you alter the character of the salt. Thus soda may be united to oil of vitriol and form Glauber's salt, or to aqua-fortis and form South American saltpetre, or to muriatic acid and form common table salt. The soda is called the base, or basis, of this salt, that is always soda; you do not change its character by changing the acid. To give another example, lime may be united to carbonic acid and form chalk or marble or limestone, or it may be united to oil of vitriol and form plaster of Paris, or to phosphoric acid and form bone-dust. Now, in each case, the base of the salt—that is, the lime—remains unchanged; but, changing the acid, we change the nature of the salt, and of course its effects will be different. Now it is plain that where the base of the salt remains the same that will always act the same, but different effects will be produced by different acids. Each base acts always one way, but each has an action similar to every other. Each acid acts also one way, but each has an action distinct from every other; impress this on your mind. Reflect upon it a moment, and you will perceive that salts produce different effects according to the nature of their acid. Now this may be illustrated thus: you take every day, probably, with your every meal, common salt, that is, soda, a base, united to muriatic acid. Your digestion and health are all the better for it. You give your cattle a little salt. It does them good. Suppose now you change the acid of that salt, leaving soda, its base, in the same quantity you daily take. Instead of the muriatic, suppose you substitute the nitric acid, or, what is the same thing, suppose you use saltpetre, from Peru, instead of common salt. You need not be told, that you would poison yourself and your cattle by so doing. You can drink, I dare say you have, cream of tartar punch. You feel the better for it. It is refreshing, cooling, opening. Now cream of tartar is a salt of potash; it is potash and tartaric acid. You have a fever. Your doctor gives you a sweat with Silvius's salt, that is, acetate of ammonia, a salt composed of that and vinegar; or you take perhaps an effervescing draught, formed of lemon-juice and pearl-ashes. All does you good; but suppose now you change these cooling, vegetable acids for a mineral acid, say oil of vitriol. You may not take potash, united with a dose of oil of vitriol equivalent to the tartaric acid in the cream of tartar, without serious injury. So is it, reader, in farming, the acids of some salts are not only harmless but beneficial to plants; others are actual poisons. In the first case salts help to nourish plants, as common salt helps to nourish yourself; in other cases they poison plants, just as they would impair your constitution, or perhaps kill you. But it is to be remembered, as in our own case, even those that poison, in a small dose, become medicines, so, in plants, a small dose is not only good, but truly essential. Now if we divide the acids into two classes, the nourishers and the poisoners, such will also be the nature of the salts. When we, therefore, attempt such a general division of the salts, it may be said that all the acids derived from the vegetable kingdom are harmless; so are the acids called mineral, yet whose components are in part like those of the vegetable acids; for instance, aqua-fortis or nitric acid. But the true mineral acids are poisonous, such are oil of vitriol and spirits of salt. One thing is here to be borne in mind. It must never be out of sight, in trying to understand how salts make plants grow. You cast your salt upon the ground, it lies there, no action occurs. It rains. Your salt is dissolved and disappears; it seems to do no good. Cast your salt now among sprouting seeds, and growing roots; here is life; well, now, life is just as much a power of force as electricity is. It exerts its force, no matter how, that is quite another consideration. I say, life exerts its force here to separate the acid and the base of a salt, just like a chemical force. We can and do separate the components of salts by other substances, nay, we do it by electricity alone.

Now this is all which it is necessary for you to know, and to understand about this action of plants upon salts; it does disunite the components of the salts. What is the consequence? The alkali, earth, and metal act as such, the same as if no acid was present. The acid also acts by itself; if it is a nourisher, it helps the plant; if it is a poisoner, it hurts it. It produces either a healthy, green crop, the effect of alkali, or a stunted yellow, sickly plant, the effect of acids. Now neutralize this acid, kill it. You see your crops start into luxuriance, and reap where you have strewed. So much for illustration. Let us now apply this view of the action of salts to those contained in cattle dung. In the first place we have salts of potash, of soda, of lime; these are the most abundant and active. Then we have salts of iron, manganese, of clay, and magnesia. These last, existing in small proportion, may be thrown out of the account, bearing in mind, however, that, though we set these aside, a plant does not; they enter equally with the others into its composition. Let us begin with the salts of potash. It is found combined in cattle dung, first, with a vegetable acid, the acid of mould. It is a nourisher of plants. Secondly, with sulphuric acid or the acid of sulphur, called oil of vitriol. This is one of the poisoners, existing only in small proportions in cow dung; it ministers to the wants of a healthy plant. The same is true of the common salt or the muriate of soda of dung. If it existed in larger quantities it would poison the plants to which it might be applied. The next salts are those of lime, phosphate and sulphate of lime, or lime united to sulphuric or phosphoric acid, forming plaster and bone-dust. The acids here, if abundant, would have a decided bad influence, they are poisoners; but the carbonic acid, in the carbonate of lime, is a nourisher. Now from the small quantity in which these all exist in cattle dung, they act only beneficially. But if you apply a great excess, even of cattle dung, you may be sure of an unfavorable result. It will be produced by the acids of those salts which we have called poisonous. To continue our remarks on the acids of salts of dung, it is to be observed, that they act also upon the soil.

They decompose that. That is, they extract from the soil alkalies, or other substances, like those in the original salt. Now though applied, as they must be, in very small doses in cattle dung, yet, because of their decomposing action on soil, they continually renew themselves, they last till all their acid is taken up to supply the wants of growing plants. Let us now, reader, if you understand how the acids of the salts of dung act, turn to the bases or the alkalies and metals and earths of these salts. What is their action? What purpose do they serve in dung applied as manure? First, they enter into and form a part of the living plants, they form a part of its necessary food as much as do the constituents of mould. Secondly, when these alkalies, and metallic bases are let loose, by the disuniting power of a growing plant, then they act aa alkalies upon mould. They hasten decay, render mould more soluble, fit it to become food for plants. This account of the action of mould and salts in cattle dung may appear to you, reader, long and hard to be understood. I do request you not to pass it over on that account. A patient reading, perhaps some may require two or more readings, will put you in possession of all you need know, to understand the why and the wherefore of the action of mould, and salts of whatever manure may be used. What has been said of the action of mould, and salts in cattle dung is equally applicable to all manures. If, then, you bend your bones to this subject, and master it, your labour of understanding the action of other manures will be reduced to the mere statement of the several substances which they may contain. We therefore proceed to point out other manures, composed of the droppings of animals.

SECTION SIXTH.

Of Night Soil, Hog Manure, Horse and Sheep Dung.

These have not all been analysed with the same degree of care, and as often as has cattle dung; some, as, for instance, night soil, has been examined thoroughly but once. Now it is not quite fair to base our reasoning upon these single analyses, and say, that this or that manure contains this or that salt in greater or less quantity than another.

The quantity and kind of salts are materially affected by several circumstances, which will be considered in the next section. An analysis, made when the animal is fed and worked one way, will vary from the result which would be obtained when the circumstances are varied. It is, therefore, quite useless, in the general consideration of the composition of manures, to enter upon the details of each. General results, general expressions of facts, are sufficient for understanding the nature of animal droppings. It is well ascertained, however, that all these droppings, of various animals, contain essentially the same salts as does cattle dung. They all contain portions of each of the substances which form plants. It will be enough for the purpose of this essay, to present to your eye, reader, a table, showing the proportions of water, mould, and salts, which the dung of yourself and your stock presents.

	Water,	Mould.	Salts.
Night soil and hog manure,	75.30	23.50	1.20
Horse dung,	71.20	27.00	.96
Sheep dung,	67.90	22.50	3.06

SECTION SEVENTH.

Of the circumstances which affect the quality and quantity of Animal Dung.

That we may reduce to some general principle, easily understood and easily remembered, the facts scattered up and down among the mass of writers and observers about the different quality of manure, afforded by different animals, or the same animals at different times, let me, reader, request your company while I walk into a new department of your chemistry. You may not understand the reasons of this difference in manures; why, for instance, fattening cattle give stronger manure than working oxen, without going a little into the mode how animals are nourished. The whole may be stated in plain terms thus:—All food serves two purposes. The first is to keep up the animal heat, and this part of food disappears in breathing or in forming fat; that is, after serving its purpose in the animal body it goes off in the breath or sweat, or it forms fat. It is so essential to the action of breathing, that we will term it food for breathing, or the breathers. The second purpose answered by food is, to build up, sustain, and renew the waste of the body.

Now all this is done from the blood. To form blood, animals must be supplied with its materials ready formed. They are ready formed in plants; and animals never do form the materials for making blood. We may therefore term this kind of food the blood formers. We have then two classes of food. The breathers and the fat formers; and the blood formers. If we look to the nature of these different classes, we find that sugar, starch, and gum are breathers. Now there are three principles found in plants exactly and identically the same in chemical composition with white of egg, flesh, and curd of milk. Now these three principles exactly alike, whether derived from animals or from plants, are the only blood formers. I shall not, reader, tax your attention further upon this subject, than to say and to beg you to remember these important facts. First, all food for breathing and forming fat contains only these three elements, oxygen, hydrogen, and carbon. Secondly, all food for forming flesh and blood in addition to these contains nitrogen.

This is the gist of the whole matter, so far as relates to manure. Bear in mind as you go on with me, reader, this fact, that of all the food animals take, that alone which can form flesh and blood contains nitrogen. The door is now open for explaining why age, sex, kind of employment, difference of food, difference of animal, can and do produce a marked difference in the value of different manures. And first let us consider how the quantity is affected; this depends on the kind of food. The analysis of cattle dung which has been given, is that of cows fed on hay, that is, herds, grass, red top, &c., or what is usually termed English hay, potatoes, and water. The cattle kept up the year round; an animal so treated consumed in seven days,

Water	611 lbs.
Potatoes	87 "
Hay..........................	167 "

During this time she dropped clear dung 599 lbs., or very nearly a bushel of dung a day. Every attention was here paid to accuracy of measurement and weight. The annual amount of dung from one cow exceeds by this account that which is usually assigned. But, as it is a matter of some importance for the farmer to estimate what the produce of his stock may be in dung, the following statement, containing the results of a large establishment, will probably give that average.

At this establishment the cows were kept up the year round for their dung. It was collected for use free from litter, and measured daily into large tubs of known capacity. The average number of cows kept was fifty-four for nine and a half years. During that time they consumed of beets, meal, and pumpkins, brewery grains, cornstalks, turnips, potatoes, carrots, and cabbages, 942,436 lbs. giving an average of green fodder, for each cow per year, 1,837 lbs. Average consumption of hay for each cow per annum, 8,164 lbs. The total dung for nine and a half years was 120,520 bushels, or per annum 235 bushels. This gives a daily consumption of green food, 5 lbs., and 22 lbs. of hay per cow, and two and a half pecks of dung per day, or about 56 lbs. per cow.

But according to some experiments, made to determine how much the quality of the food affected the quantity of dung, it appears that the solid and fluid excrements partially dried, were compared with the food, as follows:

	Cattle.	Sheep.	Horses.
In	lbs.	lbs.	lbs.
100 lbs. of rye straw gave dung	43	40	42
" " " hay " "	44	42	45
" " " potatoes " "	14	13	
" " " mangel-wurzel "	6		
" " " green clover "	9⅓	8½	
" " " oats " "		49	51
" " " rye " "			53

My own experiments on this subject gave for 100 lbs. of hay and potatoes as above, estimating both as dry, or free from water of vegetation, 32.9 lbs. of dung, and this estimated as dry is reduced to 5.6 lbs., or 26 lbs. of dry food gave 14 lbs. of dry dung. But as a general fact, we may say, that well-cured hay and the grains give one half of their weight of dung and urine; potatoes, roots, and green grass about one tenth. It will be easily understood why the quality of food should affect the quantity of dung. The more watery, the less in bulk is voided, because there is actually less substance taken. And as the animal requires this to form its flesh and blood and fat, and to keep up his breathing, so will he exhaust more completely his food. More going to support him, less is returned by the ordinary channels. So when much vegetable fibre exists, as in chopped straw and hay, then, as it goes but little way towards supporting breathing or forming blood, a greater bulk is rejected. In grains, on the contrary, which afford much of all that the animal requires, less is extracted and more voided. These circumstances are intimately connected with

The Quality of the Dung.

It is affected first, by the season; second, by the age; third, by the sex; fourth, by the condition; fifth, by the mode of employment; sixth, by the nature of the beast; seventh, the kind of food.

1st. The season; it is because digestion is worse in summer than in winter, a general fact, summer manure is best. And where cattle are summer soiled, it is said the manure is worth double that from stall-fed winter cattle. I do not think much is to be attributed to the worse digestion in summer, but the cause of this great difference in value, is to be found in the fact, that soiled cattle generally get a large proportion of blood-forming food.

The wear and tear of their flesh is little, and hence, requiring little of their food to keep up their flesh, a greater portion goes off in dung, which thus becomes rich in ammonia. The green plants, rich in nitrogen, afford abundance for milk, which, being rich in all the elements of cream, should afford large returns of butter.

2nd. Age; from the fact, that young and growing animals require not only food to form flesh and blood, to repair the incessant waste and change taking place in their bodies, as in older animals, but also a further supply to increase the bulk of their frame, it is evident, that their food will be more completely exhausted of all its principles, and that also less will be returned as dung. All experience confirms this reasoning, and decides that the manure of young animals is ever the weakest and poorest.

3d. The sex. This is one of the most powerful of the causes which affect the strength of dung. From the remarks which have been already made, and which I trust, reader, are now fresh in your memory, of the important part acted by nitrogen in dung, it must be plain why sex should exercise such influence.

1st. In all food, as we have explained, that only which contains nitrogen, can form flesh and blood, or substances of similar constitution, that is, requiring a large proportion of nitrogen, as milk. Hence an animal with young, that is, a cow, before calving, requires not only materials for its own repair, but to build up and perfect its young. Hence the food will be most completely exhausted of its nitrogen, and consequently the dung become proportionably weaker.

2nd. The young having been formed, then milk is required for its sustenance. Milk contains a large proportion of nitrogenous or blood-forming elements, and so the cause which originally made the dung weak, continues to operate during all the time the animal is in milk. Sex, then it is evident, affects materially the quality of the dung.

4th. The condition. If the animal is in good condition, and full grown, it requires only food enough to supply materials to renew its waste.

Hence, the food, supposing that always in sufficient quantity, is less exhausted of its elements, than when the animal is in poor condition. In the last case, not only waste, but new materials must be supplied. If the animal is improving in *flesh* (and here, reader, I would have you bear in mind, the destinction between flesh and fat), if the animal is improving in flesh, then the manure is always less strong, than when he is gaining fat. There is no manure so strong as that of fattening animals. An animal stall fed, kept in proper warmth, requires but little of his breathing food, to keep up his heat. All the starch, gum, sugar, &c., go to form fat. Having little use for his muscles or flesh, that suffers little waste, and the nitrogen which should go to form flesh, is voided in dung. If it is a she, no milk is given during this period, for a cow, in milk, fats not.

The dung then of fattening animals, contains more of all the elements of food for plants, than at any other period, and is peculiarly rich in nitrogen. I trust, reader, it is not so long since you have met the word ammonia, that you have forgotten its source and origin are due to this nitrogen. Now the source of this nitrogen is in the food, and as, during fattening, grain is supplied for its starch, &c., to make fat, and very little waste of the body taking place, the extra nitrogen of the blood-forming materials of grain, is nearly all voided in dung.

5th. The mode of employment. Your working beasts, suffer great wear and tear of flesh and blood, bone and muscle, thews and sinews. Hence their daily food supplies only this daily waste; the food is very thoroughly exhausted, and of course the dung is weak. It derives its chief value from the excretions of those parts of the body which are voided as waste materials, among the excrements. There is a distinction to be noted here; excretions are the worn out flesh and blood elements, excrements the undigested and unused food; dung includes both excretions and excrements. Now the chief value of the dung of working cattle depends upon the excretions.

6th. The nature of the beast. If his coat is wool, he requires more sulphur and phosphorus, the natural yolk or sweat of his wool, more lime and ammonia, than does the hairy coated animal. Hence sheep produce manure less rich in many of the elements of plants, than cattle; but as at the same time it contains a large proportion of nitrogen, and is very finely chewed, it runs quicker into fermentation. It is a hotter manure, quick to eat, quick to work, and is soon done.

7th. The kind of food. We have already spoken of this as affecting the quantity of dung. Its effects are no less marked on its quality. Now all that requires to be said on this subject, is to remind you, reader, of the two divisions of food, the fat formers, and the flesh and blood formers. It must be evident, that the more of this last the food contains, that is, the more nitrogenous is the food, the richer the dung. Hence, grains of all sorts, peas, beans, &c., will always give a richer dung than fruits, as apples, &c. The more nitrogenous the hay the richer the dung. Meadow catstail and rye grass are nearly six times stronger in ammonia than oat grass. Red clover is twice as rich in nitrogen as herds grass; wheat, barley, and rye straw, green carrots and potatoes, contain only about one third to one fifth the ammonia of herds grass, and turnips only about one sixth. The quantity of ammonia contained in these different grasses and straws, shows at once, the effect they must have in the compost heap. The kind of litter must have no small effect upon the value of manure. And while we are upon this subject, it may not be out of place to mention, that the kind of a green crop turned in, materially affects the value of the process. While the straws of the grain bearing-plants afford for every ton of green crop turned in, about three quarters of a pound of ammonia, green corn stalks and herds grass, about five pounds of ammonia per ton; red clover affords about seventeen pounds of ammonia per ton. The very great value of clover in enriching land is thus made evident. But to return to the quality of the dung, as affected by the food, it has been proved, that animals fattening on oil cake, give manure in value double that of common stock. Here abundance of nitrogen is supplied where very little is required, and consequently much is voided in dung. The point to which we have arrived is a breathing place; the remarks which have been offered upon the action of salts, have prepared the way for our entering upon the next Section;—the second class of manures.

SECTION EIGHTH.

Manures consisting of Salts.

In using the term salts here, to designate a class of manures, I wish to distinguish between these and mineral manures, as they are usually termed.

These manures are similar in kind to the salts whose action in cow dung we have already considered. They are truly mineral salts, derived from the mineral kingdom, entering into and forming a part of plants, and from this source introduced into the dung of animals. Their action, whatever be their name, has been explained. But the salts composing the second class of manures now under consideration, are not of mineral origin. They are derived from the animal kingdom. The source from which they are formed is the living process of the animal body. They are animal salts. Here, then, let us divide the second class of manures into animal salts, which are truly manures, both their base and their acid acting as nourishers of plants, and into mineral salts. Here again, reader, you will find that the few facts, which we have pointed out relating to the food and nourishment of animals, will help us on our way, in tracing the source of these animal salts. It has been already said, that the food of animals is divided into two classes; that which does and that which does not contain nitrogen. All domestic animals eat these classes together. In a few words, let us trace their course after the animal has digested them. The one class goes to form fat, or to support the natural heat of the body, and passes off by the skin in sweat, or in moisture of the breath, and all its excess or undigested part goes off in dung. The excess of nitrogenous food, all that not required for repairing the daily waste of the body, or to increase its growth, also passes off in dung, as excrement. This is a small portion, and its effects on the strength of dung have been pointed out. But the wear and tear, as we may call it, of the flesh and blood, the parts which are daily and constantly thrown out of the body, as excretions, or old materials, enter the circulation, and pass out of the body in urine. This is the point to which I would call your attention. The undigested food, and the excrements not containing nitrogen, go off in dung. The food and the spent parts of the body, containing nitrogen, go off in urine. This last, too, is the course of most alkaline salts taken into the body. They pass off in urine. Here, then, we come to the subject quite prepared to understand it. The urine is a collection of salts, some are of mineral, others of animal origin. But that which gives the urine its peculiar and characteristic properties, is a substance formed from the nitrogenous food, and termed UREA. Now you need hardly trouble yourself to remember this new name; all I want you to understand about it is, that when urine is exposed to air it rots, and this peculiar substance is changed to ammonia. That is the point to be remembered. In considering urine, therefore, as a manure, it will not be necessary to point out further the mode of its action, than to refer that of every animal, to its salts and power of forming ammonia. The quantity of the last will be in proportion to the quantity of urea. There are other salts of ammonia in urine, and also mineral salts. These affect but little the value of urine as a manure.

It is the urea, essence of urine, that substance which forms ammonia in rotting urine, which alone makes this liquid more valuable than dung. Hence, reader, if this is impressed on your mind, you will perceive, that the chiefest things to be regarded in urine, are first, the circumstances which affect the quality, and quantity. Second, the best mode of promoting a change of urine to ammonia. Third. the time required for the process, and fourth, the best mode of preserving the ammonia, when formed. You will perceive, reader, that all along, I have endeavoured to point out the principles on which manures act. If you go by general principles, then for a plain practical farmer, like yourself, with only chemistry enough to understand a few of its terms, it must be quite a thankless service, to point out to you in detail, all the various things contained in urine. It will confuse you more, than the names, ay, and hard ones too, which are given to the varieties of pears and apples. All you want to know is this, does urine contain, as solid dung does, water, mould, and salts?

It does. The mould is so small a part, it may be left out of view. The salts are like those in the solid dung, mineral salts, and then we have the peculiar principle urea, which for all practical purposes may be called ammonia. We may then with this division present in a table the composition of the urine of various animals at one glance:

	Water.	Salts.	Ammonia.
Cattle urine, per 100 lbs.	92.62	3.38	4.
Horse " " "	94.00	5.03	.70
Sheep " " "	98.	12.	2.80
Hog " " "	92.60	1.76	5.64
Human " " "	95.75	1.88	2.36

Now cast your eye carefully over this table, the figures at once tell you the value of these different liquids. The last column gives the true value. The other salts vary much in quantity, and this affects the quality. The actual amount of ammonia in human urine and cattle dung is about the same; yet in actual practice it is found the effects of urine are double those of dung. Look now for the reason of this; in the first place, the principle which gives ammonia in urine runs at once by putrefaction into that state. It gives nothing else; whereas in dung, the ammonia arises from a slower decay, and the principle which here affords ammonia may, and without doubt does, form other products. Hence we have a quick action with the liquid, a slower one with the solid. A second cause of the better effects of the liquid is, that it contains besides its ammonia, a far greater amount of salts, and these give a more permanent effect. The amount of salts in human, cow, and horse dung is about one pound in every hundred. While the urine of the same animals contains nearly six pounds in every hundred. A third cause of the greater fertilising action, is found in the peculiar character of some of these salts, which are composed of soda, potash, lime, &c., united to an acid formed from urea, in the animal body, This acid is like the acid of saltpetre; it is a nourisher of plants, as much so as is carbonic acid.

SECTION NINTH.

Of the causes which make Urine better or worse, more or less, and the Modes of Preserving it.

There can be no boubt, that the same causes which we have pointed out as affecting the value of dung, affect also the urine.

We have already alluded, (page 255), to the four chief circumstances to be regarded in urine. And first, of its composition. It will be affected by the age, sex, food, and difference of animal. The process of forming urine is the same in man and animals. Now if we reason here, as we surely may, from analogy, then the effect of age and sex upon the quantity of the essence of urine or urea, will appear from the result of one hundred and twenty analyses of urine.

In 24 hours there are discharged by men, 432 grains of urea.
By women, ...293 "
By old men, from 76 to 80 years of age, 123 "
By children 8 years of age. .. .. 208 "
By children 4 years of age .. .. 70 "

It will be recollected, that each grain of urea is equal to a grain of carbonate of ammonia of the shops, so that a healthy man discharges daily about an ounce of this salt. If then other animals are affected by age and sex, as is the human species, then we may say that bulls and oxen give a better urine than cows, steers better than calves, and a venerable old cow gives nearly as much of the essence of urine as two calves.

Food affects the quantity of water, and that acting merely to dilute the urine, renders it weaker in salts for a given amount, though perhaps not the daily amount of salts. Supposing the animal well fed, so as to keep up the wear and tear of his blood and flesh, then as the urine derives its chief value from the worn out materials of the body, the actual amount of urea daily discharged may be the same, though the amount of the urine may vary considerably. We may increase the amount of salts and acids by particular food, but this can never be continued long enough to change materially the character of urine as a manure. Difference of animal has also a great effect on the quality of urine. The more active, the greater the wear and tear of the flesh, the better the urine in working animals. Where the animal is stall-fed, there no doubt the urine is still richer, and the urine of fattening animals. is still more valuable. Hence of all animals, commend me to swine, as manufacturers of ammonia. Cast your eye on the table (page 255) of the amount of urea or ammonia furnished by various animals. No one exceeds the hog. He seems specially formed by nature for this office. He eats every thing. His habits require very little of that class of food which forms flesh and blood. He is a fat-former, a magazine of lard, a real oil-butt, and demands, therefore, the food essential to form fat and keep up his heat. He returns of course, having little lean meat to form, (nobody would praise him for that), having little flesh to form to increase his size, he returns quickly the waste his body suffers, as urea, which becomes ammonia. But it is only the still, and quiet, and penned animal, which gives this valuable product. If we would cause him simply to produce the greatest amount of his manufactory, without taking into account his labour in shovelling over the compost heap, perhaps no better rule can be given, than the Shaker practice of feeding with lettuce leaves. Having little brains to replenish or build up, and not quick in his nerves, (for be it known to you, reader, the opium of lettuce leaves is supposed to contribute mainly to the formation of brain and nerves), the opium-eating hog will return a vast amount of the nitrogen of his lettuce, in the shape of ammonia. If now you add to the facts, common to the nourishment of swine, the action of ammonia on mould, as it has been explained, you will see, that he who neglects to fill his yards with mould, and swine to convert it, overlooks one of the cheapest, most effectual, and certain modes of forming manure, which practice and theory unite in pronouncing the surest element of the farmer's success. Not only is the quality of urine affected by age, sex, food, difference of animal, but the season also exerts an influence upon this liquid. The urine of cattle often contains ammonia ready formed in summer, but never in winter. In cold weather the amount of ammonia, or rather the principle affording it, is less: often it is not one half in winter what it is in summer. This certainly is a misfortune to the farmer, who generally keeps his cattle up only in winter; but then it is an argument also for the practice of summer soiling.

Secondly, with respect to the circumstances necessary to change urea to ammonia; or, in short words, or to fully ripen urine, or to make it a fit manure. These also depend upon the season, in part. It is to be remembered, reader, that this rotting of urine is only fermentation. It takes place because there is a principle in urine which brings on fermentation, just as it does in new cider. Now if it is by fermentation that urine rots, it will take place, as all fermentation does, best at a moderate temperature. The cold of winter will prevent it. Hence your winter manure must be allowed time, as the heat of spring comes on, to ferment, that the urine may be changed to ammonia; and every means must be taken to prevent the heat rising beyond, in the manure heap, or falling below a moderate temperate warmth. These are the circumstances which chiefly promote the change from urea to ammonia.

Thirdly, in regard to the time in which this change will take place, it will require at least one month; and six weeks are better. If urine be allowed to rot for a month, it fully doubles its quantity of ammonia. In fact, it would have contained more than double the ammonia of fresh urine, had not a portion escaped.

This brings us to our fourth point, the best mode of preventing the flying off of the ammonia when this change has taken place. Much has been said about tanks, and vats, and urine-pits, and many plans devised for preventing the escape of volatile ammonia. But when once the action of ammonia upon mould is understood, as we have already pointed it out, I am persuaded, reader, that these tanks, and vats, and urine carts, will appear to you not only expensive and cumbersome, but useless. Your first point is, to save your ammonia, your second is, never to use urine in its caustic or burning state. If you do, you will assuredly burn your crop, as the puddle formed by a cow burns the grass upon which she empties her watering-pot. Here the urine forming caustic ammonia acts as would caustic potash, or a lump of stone lime, left to slake upon the grass. You want to change this burning or caustic ammonia into mild ammonia, or to combine it with some substance which has not only that effect, but also keeps it from flying away. Unless you understand, then, the principles of these actions, and apply them too, your labor is all vanity, when you attempt to save your own or your cattle's urine.

These principles are, in number, two. First, the principle which changes caustic to mild ammonia, is carbonic acid derived from air, or decomposing mould. Second, the principles which render ammonia less volatile, or wholly fixed, are certain acids formed in mould, as sour mould, or certain salts which give up their acid to the ammonia. Plaster of Paris does this, by changing its lime for ammonia. Now let us go into the reason of this a little, and see if we can understand it. Very slowly and supposing moisture present, the oil of vitriol of the plaster quits its lime and unites to the ammonia, and so changes a volatile into a fixed salt. Now this is a change which has been of late much insisted on, and the practice recommended of strewing the stable and barn-cellars, and even the privies, with plaster, to save the ammonia which escapes in these places. But it is doubtful whether the saving is as great as is usually supposed, for the ammonia arising from the urine is caustic, it flies off as caustic ammonia, that has no effect upon plaster. To produce this mutual effect of ammonia and plaster, the caustic ammonia must previously have been made mild. However, this plan is applicable only on a small scale. Copperas, alum, common salt, potashes, and wood-ashes, all act to fix the volatile ammonia, and have all been recommended for this purpose. But it is easily seen. that, in employing some of these substances, is to buy ammonia almost at apothecary's price. These practices will be followed, therefore, only by those who place the crop and its value upon ammonia. This is a limited and narrow view. The true and farmer-like, as well as the most scientific and natural mode of preserving the ammonia of urine, is to fill your yards and barn-cellars with plenty of mould; by which I mean truly decayed and decaying vegetable matter as well as loam. There is no mode more effectual, no mode more economical. Consider now for a moment how mould formed and forming, and ammonia act. Have I not said again and again, that ammonia hastens decay? that it makes mould more easily dissolved? and cooks the food of plants? That action having occurred during its progress, acids were formed. The ammonia unites with them, loses its burning properties, and becomes fixed. The acids having been satisfied, the ammonia is actually imbibed and retained by mould.

It does not drink it in like a sponge, but the mould forms a peculiar chemical compound with ammonia. This peculiar compound, while it does not render the mould an easily dissolved matter, yet holds ammonia by so feeble a force, that it easily yields to the power of growing plants. It gives up the stored ammonia at the place where, and the time when, it is most wanted. If you remember these actions of mould and ammonia, it will be as plain as day, that what we have said of the inexpediency and expense of vats, and tanks, and urine-carts, must not only be true, but is confirmed by the experience of a host of hard-working, thinking, practical men. In connection with urine, the dung of birds, for instance, domestic fowls of all kinds, and pigeons, may be here mentioned. These animals discharge their solids and what we may term their liquids together. Their urea comes out combined with or forming part of their dung. Now reflecting a moment on the nature of their food, strongly nitrogenous, being seeds, grains, &c., all animals, bugs, grasshoppers, &c., we can understand how their droppings are peculiarly rich in ammonia and salts. The strongest of all manures is found in the droppings of the poultry-yard.

But since these form but a small portion of the farmer's stock, and are never regarded as a principal source of manure, their further consideration may be omitted. It may perhaps be here added, that as from their nature bird-droppings run quickly into fermentation, with warmth and moisture, so they act quickly and are quickly done. They are more allied to sheep dung than to other manures. Their mould not being great, droppings of poultry require to be mixed with decayed vegetable matter or loam. To this class belongs the manure brought from the Pacific Ocean, under the name of guano, a Spanish word for excrement. New England farmers can find cheaper sources of salts, to which the main value of guano is owing, and therefore, reader, we shall detain you no longer on this point.

SECTION TENTH.

Mineral Salts or Manures.

Having thus considered the salts derived from the animal, let us now proceed to those derived from the mineral kingdom. Among these we shall find some whose action is similar to that of the animal salts. That is, they are true nourishers of plants.

They afford, by the action of the growing plant, the same elements as the animal salts. Of this nature is saltpetre. Now, reader, I want you to understand by saltpetre, not only that well-known substance, but also that which has lately been much used in farming, South American saltpetre. This differs from common saltpetre by changing its potash for soda. One step more; I want you to understand by saltpetre, not one salt, but, in farming, a class of salts; that is, a number, having the same acid, which may be combined with several different bases which all act one way. Saltpetre being a salt, of course must be composed of an acid and a base. The acid is always aqua-fortis or nitric-acid. The base may be potash, or soda, or lime, or ammonia. These all may be called saltpetre. In forming saltpetre, it is generally that variety which contains lime and aqua-fortis which is procured. So far as we understand the action of salts, and this has been fully explained, the action of the varieties of saltpetre is the same; and were it not for the peculiar nature of the aqua-fortis or acid of saltpetre, the explanation of the action of this salt might be referred to the general laws above set forth. But the acid of saltpetre is composed of volatile ingredients. It is nothing more or less than a compound of the common air we breathe. Surprising as it may seem, reader, yet it is not the less true, the common air is a mixture of oxygen and nitrogen. What a bland and harmless, yea, what a healthful blessing is air, not only to us but to plants! It is a mere mixture, not a chemical compound, a mere mixture. In every hundred parts, eighty of nitrogen, twenty of oxygen. Yet if you compel, as natural operations are continually compelling the air to unite chemically, so that fourteen parts of nitrogen shall unite to forty parts of oxygen, you will form aqua-fortis. Now I do not mean to trouble your head further with the chemistry of saltpetre than merely to say, that having thus shown you the composition and origin of the acid of all kinds of saltpetre, you will readily see that a substance which affords such an abundance of nitrogen cannot but be beneficial to plants. This nitrogen may and probably does form some portion of ammonia in the soil. It may enter as nitrogen into the plants dissolved in water as a very weak aqua-fortis.

We have said so much upon the action of ammonia and nitrogen that you will see how important a part nitre is likely to play in manure. Not only does the nitrogen act here, but the oxygen, the other component of the acid, also acts. It acts upon the mould as air itself would. Besides, the mould of soil and manure imbibes and condenses this oxygen in its pores, and consequently heats a little; so that saltpetre, whether added as such to soil, or formed in manure, as it is always, helps to warm a little the soil like fermenting manure. So far as these effects are desirable they may be expected from the use of saltpetre. But this, reader, if you buy your saltpetre, is procuring a small effect at a great price. The action of the alkali of saltpetre is not different from alkali in other shapes, and therefore if you have money to lay out for salts, let me advise you, reader, to spend it rather for ashes than for saltpetre.

SECTION ELEVENTH.

Of Artificial Nitre Beds.

But there is a fashion in manures as well as in other things, and saltpetre is now so fashionable that you may be inclined to use it. Be it so. I will show you, reader, how to make it for yourself, and at the same time form a large pile of capital mould. But as you have began to inquire a little into the reason of things, let us go a little into the reasons why the earth under all barns where cattle are kept, why the plaster of old houses and cellar walls, always afford saltpetre. You well know that this is the case, and why? We have already told you that the acid of saltpetre, that is, the aquafortis, is formed of the air we breathe. Now alkalies and porous bodies compel the constituents of air, under certain circumstances, to unite and form aqua-fortis, and this immediately unites to the alkali and forms saltpetre. The best alkali to compel this union is ammonia. Hence, where plenty of animal matter is fermenting or rotting, or where plenty of urine is, there, porous bodies being present, saltpetre will be formed. Now this is enough for you to understand the principle upon which I propose to you to form an artificial nitre-bed for your own use. It has been found that the manure of twenty-five cows, asses, and mules, in layers of about four inches thick, with layers of the same thickness of chalky soil, first one and then the other, and now and then damped with the urine of the stable, produces from 1,000 to 1,200 lbs. of saltpetre in four years.

The heap is formed under cover, and occasionally shovelled over. At the end of two years it is a mass of rich mould. It is left two years longer with an occasional turning over, but it is not wet with urine for the last few months. The dung the farmer has always; he wants the porous chalky body. This may be furnished by spent ashes mixed up with its bulk of loam. Hence the following rule may be given:—One cord of clear cow-dung, one cord of spent ashes, one cord of loam, or swamp muck. Mix the ashes and the swamp muck well, and having hard-rammed the barn-cellar floor, or that under a shed, lay a bed upon it four inches thick of these mixed materials, then a layer of dung, three or four inches thick, and so on, till the pile is two or three feet high, topping off with loam; wet it occasionally with urine, keeping it always about as moist as garden mould; shovel over once a fortnight for two years. The pile now contains about fifty pounds of several varieties of saltpetre, and mixed throughout with nearly three cords of excellent manure; it may, therefore, be now used according to the farmer's judgment. By thoughtful management he may, after the first two years, annually collect as many fifty pounds as he employs cords of cow dung. But, however prepared, nitre affords by its elements nourishment to plants; all its parts act; its alkali acts, and its acid acts.

SECTION TWELFTH.

Ashes.

It is easy to see that salts, whatever be their name or nature, which are likely to be of any service to the farmer, are those only which either enter into and form part of the plants, or which, by the action of their acid or base, act on the earthy parts of soil, or upon the mould. Salts either poison or nourish plants. The first, like the medicines we take, are good in small doses; the second can hardly injure, even by their excess. If we recur to the principle with which we set out early in this essay, that the ashes of plants contain all their salts, then rightly to know what salts are likely to produce good effects as manure, we should first study the composition of ashes. We have in ashes a great variety of substances—they come from the soil; they form a part of plants. The dead plant returns them again to their mother earth, or we, losing the volatile parts of a plant, its mould and ammonia, by burning, collect its salt as ashes. Let us see what these salts are made of. In the first place, you know all salts are composed of an acid and a base.

The bases are	*The acids are*
Potash and soda,	Carbonic, or carbon united to oxygen.
Lime,	Phosphoric or phosphorus, united to oxygen.
Magnesia,	Sulphuric, or sulphur, united to oxygen.
Clay,	Muriatic, essentially composed of chlorine.
Iron,	
Manganese,	
Silex, or the earth of flints,	

Now, if we throw out the carbonic acid, which has been formed in burning, we have left in ashes, three acids, which are united with the bases, and may form the following salts in plants, namely:—Glauber's salt, Epsom salt, common table-salt, bone-dust, a salt of lime, and what we may term a bone-dust salt of iron, or phosphate of iron, plaster of Paris, or gypsum, copperas, alum, and some other salts, which need not be enumerated. Our list comprises the principal and those most likely to be used in farming. Well, now the lesson to be drawn from this composition of ashes is this, that there is scarcely any salt occurring in commerce which may not be used in agriculture, instead of those found in ashes. In fact, almost all salts which occur in a large way, as refuse materials from manufactures or other sources, have been used, and all with greater or less success, as manures; and if you cast your eye over the acids and bases of common ashes, this seems quite reasonable. It is not expected that a plain farmer, possessing little or no chemical knowledge, should be able to tell beforehand what the effect of a salt would be applied to his land; but if he understands what the composition of ashes is, he may be sure that in any quantity in which the salt is likely to occur it cannot be injurious, provided it is mixed up with plenty of mould, and a little ashes, or alkali, which will kill or neutralize any excess of the poisonous acid.

In ashes, we have one part which may be leached out, and a part which remains after leaching, called spent ashes. Let us see, then, in leaching what parts we take away. First, we take away all the acids except the phosphoric; secondly, we take away nearly all the potash and soda—what is left? The phosphoric acid, and all the bases. It is evident, therefore, that the strength of ashes can never be wholly leached out, if that depends upon the salts. In spent ashes, we have nearly all the bone-dust left; and, besides this, a portion of what is usually considered the real strength—that is, the potash. This is chemically united to certain of the other constituents of ashes. You cannot leach it out, leach you never so long. Upset your leach-tubs, shovel over your spent ashes, mix it up with fermenting manure, where a plenty of fixed air is given off. Here is the secret of the value of spent ashes, so far as the potash or ley is concerned. This exposure to air, to carbonic acid, lets loose the potash which was chemically combined with the other matters. Water would never have done this. Mark now a practical lesson taught here by chemistry, and confirmed by experience. Leached ashes must never be used on wet soil, if we want its alkali to act. The close wet soil, perhaps even half covered at times with water, excludes the air. The carbonic acid of air, that which alone extracts the alkali from spent ashes, cannot here act. There is this other lesson to be learned from these facts, that it is chiefly the alkaline action which is wanted from spent ashes. Hence no one who thus understands the source, and the true value of ashes, will allow the alkaline portion to be first leached out, unless he can find a more economical use for it than its application as a fertilizer. Perhaps no fact speaks louder that the great action of spent ashes is that of its potash than this, that where we prevent that from being extracted, the spent ashes are of little value. If, then, spent ashes derive their great value from the potash, much more will unleached ashes derive their value from their potash.

Now, reader, the point to which I have led you in these remarks is this, that the more alkaline any salt is, the better is it for manure. Hence, as a general rule about the use of salts, it may be laid down that the alkaline salts, that is, potash, pearl-ash, common ashes, barilla ashes, white, or soda ash, are the best. And as these, in all their various shapes, are the cheapest and most common articles, so you need not run after a long list of other salts. Next in value to the real alkalies are spent ashes, used in a light, porous, open, sandy soil, if you would derive the greatest benefit from them. Next to these comes peat ashes. You well know these are of no value to the soap maker: but not so to you—they show only traces of alkaline power. But treat them as you did spent ashes. Their power, independent of their bone-dust, which is by no means small, and their plaster, which is still greater, and their lime, which is perhaps the greatest, lies in the alkali, which is locked up, as it is in spent ashes. Treat them, therefore, as you did spent ashes, and then, peat ashes will and do afford alkali. So too coal ashes, even your hard anthracite ashes, yield all the substances which spent ashes do. It is easily seen, therefore, when, how, and where, spent ashes, peat ashes, coal ashes, are most likely to do good. Perhaps we may not have a better place to state the fact, that a cord of soap-boiler's spent ashes contains about fifty pounds of potash. When we add to this, one hundred and seventeen pounds of bone-dust, and about a ton and a half of chalk, or carbonate of lime, which acts chiefly on the soil, and so comes not now under consideration. It is seen that there is no cheaper source of alkali and salts, to one within reasonable carting distance of a soap-boiler, than spent ashes. They are marl, bone-dust, plaster, and alkali combined.

SECTION THIRTEENTH.

Manures composed chiefly of Mould.

These are of vegetable or animal origin. And first, of animal mould. Here we shall find, that we come perhaps better prepared to understand this part of our subject, than either of the preceding classes. We have explained the principles which enable us to understand, why it is that animal and vegetable substances produce, by decay, identical matters. The only difference consists in the quantity of these matters. Let me here, reader, call to your remembrance, the facts we stated respecting the two classes of food, and the two classes of substances formed from that food by animals. A certain portion of that food contains none of that principle which forms ammonia. This portion of food makes fat. Another portion of food contains the substance which forms ammonia. This part of the food forms flesh and blood, and the other parts of the body, skin, hair, feathers, bristles, wool, horns, hoofs, nails and claws, thews and sinews. Now, when a body dies and decays, the mould which it forms will be rich manure, or poor manure, just in proportion as it contains more or less of the substances, formed out of that portion of food which furnishes flesh and blood. The fat, therefore, in animal mould, plays a very inferior part to that acted by the flesh and blood. In a word, as I wish to dismiss the fatty matters from our present consideration, I may do this, reader, by stating to you, all that you need know—that in decay, fat forms chiefly carbonic acid. If, therefore, you call to mind what we have said about the action of that, you will see how fat acts in manure. But the flesh and blood, and the substances formed from it, give precisely the same things as vegetables do when they decay, that is, water, mould, and salts. The great difference between the decay of animal and vegetable matters, is this, that as the animal bodies are far richer in the substance, which forms ammonia, so they afford a richer source of manure. The animal body contains that element, in quantity enough, not only to fill the pores of its own mould, but also enough to impregnate a large quantity of mould from other sources. The vegetable body, on the contrary, contains scarcely enough ammonia to fill its own mould. Vegetables differ in the quantities of the elements of food which can furnish flesh and blood, and hence those vegetables are best for manure which furnish most ammonia. We have already remarked on the difference, in this respect, between straws, grasses, and clover. But without going further into this comparison, which can have no other practical bearing than to show you the immense difference in value, in animal and vegetable bodies, in forming manure; we may here resolve the subject into one great principle. The substance which forms flesh and blood, whether derived from plants or animals, alone forms ammonia during their decay; and the mould thence arising, is rich or poor manure, just in proportion as it contains the substance fit to form flesh and blood. Starting from this principle, we find that animal substances, as flesh, fish, fowl, the body generally, including its various forms of covering, hair, wool, feathers, nails, hoofs, horns, claws, &c., afford, in the process of decay, about ten times more ammonia than the straws and grasses usually entering into the compost heap. The animal bodies give more volatile alkala than their mould can contain.

It is given off in such quantity that decay is rapidly hastened. All the signs of putrefaction, therefore, rapidly take place. The quantity of mould being small, nothing holds the volatile parts, they escape and are lost. Now common sense and practical foresight have stepped in here, from time immemorial, and taught mankind the necessity and the utility of preventing the waste of the volatile and most valuable parts of the decayed animal substances, by covering them in with earth, soil, &c. These imbibe the escaping virtue or strength, and become rich and fertilizing. It remains to state, that every pound of animal carcass can impregnate ten pounds of vegetable mould; or, taking our arable soils as they usually occur, one pound of flesh, fish, blood, wool, horn, &c., can fertilize three hundred pounds of common loam. You will see, therefore, reader, how little you have now to learn of the necessity of saving everything in the shape of animal matters, and converting them to manure, by turning them into your compost heap. It is to be remarked, that the dry forms of animal substances undergo the process of decay when left to their own action very slowly. Wool, hair, flocks, horn-shavings, &c., or even leather chips and curriers' shavings, bear long exposure, and seem quite indestructible. They yet are rich in all the true virtue of manure. They want something to bring this out, to set them a working, to bring on fermentation. Well, on this head we may lay down two rules; the first is, that if buried among a heap of fermenting matter, that communicates a similar change to these dry, animal substances. This is slow work. The second rule is, that if these dry matters are buried in the soil among the roots of growing plants, then these act more powerfully than fermentation, and the dry substances are converted to manure with a speed which may be called quick, compared to the fermenting process. The practical lesson to be drawn from these differences of action between the fleshy and horny parts of animals is, that when you want a quick and short action of manure, to use the fleshy and fluid parts. Where you want a more slow and permanent action, to commence and long last after the first is over, to use the dryer and harder parts. If now we turn to the other division of mould, that from vegetables, we find it lacking in the very thing which was superabundant in the animal mould. That thing is volative alkali. The great mass of vegetable mould is always impregnated, but always slightly charged with volatile alkali. There is not enough of the flesh and blood forming element in vegetables to hasten the decay of vegetable matter, or to convert them after decay into rich manure. Now here again not science, but practical common sense steps in, and did step in long ago, and as she taught mankind the necessity of adding soil or mould to the decaying animal matter, so here, to enrich vegetable mould, she teaches that animal matter, or that which is its representative, ALKALINE SALTS, must be added to vegetable mould, to make it active. It is not the mould alone which plants want. We have seen all along how nature provides a certain amount of salts in her virgin mould; we by cropping exhaust these faster than the mould. We have tons of that, yet our fields are barren. They want, as has been explained, salts. And now, reader, having been brought by this course of reasoning to what the mould wants, consider what tons and tons of useless mould you have in your swamp muck and peat bogs, your hassocks, and your turfy meadows. All these, foot upon foot in depth as they lie, are truly vegetable mould in a greater or less degree of decay. If you dig this up, and expose it to the air, that itself sets it to work; decay is hastened, volatile matters escape, yea, ammonia, the master-spirit among manures, is secretly forming and at work, warming and sweetening the cold and sour muck. Without further preparation, practice confirms what theory preaches, that this process alone furnishes from these beds of vegetable mould, a very good manure. It is already highly charged with all the salts which a plant wants. But experience, doubtless led by the light of the good results of mixing mould with animal matter to preserve its strength, has also reversed the practice, and taught the utility of adding to vegetable mould quickening salts; that is, either the volatile alkali, by composting the mould with stable manure, or alkali in the shape of ashes, or potash, or soda ash, or lime, or a mixture of these. In fact, whatever substance can by putrefaction give off volatile alkali will, and must, and does convert vegetable mould, of itself dead and inactive, into a quick and fertilizing manure.

If, then, reader, you pause here a moment upon this fact, and then cast your view backward over the principles we have endeavoured to impress on your memory, you will perceive that there is not among all the classes and kinds of manure which we have shown you, one which may not be added, or, as is the phrase, composted with peat, meadow-mud, swamp-muck, pond-mud, or by whatever other name these great store-houses of vegetable matter are called. These are the true sources of abundant manure, to all whose stock of cattle, &c., is too small to give manure enough for the farmer's use. It is the farmer's business to make a choice, if he has any but Hobson's, of what substance or mixture of substances he will use. We have shown him how small a portion of animal matter, one to ten, of pure mould, will impregnate that substance. Taking then a cord of this swamp-muck, we shall find it contains, in round numbers, about one thousand pounds of real dry vegetable mould. So that the carcass of an animal weighing one hundred pounds, evenly and well mixed up with a cord of fresh-dug muck, will make a cord of manure, containing all the elements, and their amount too, of a cord of dung. But it is not from the carcasses of animals that the farmer expects to derive the quickening salts for his muck. This can be the source of that power only to the butchers (what fat lands they all have!), or to the dwellers near the sea, where fish is plentiful. A barrel of alewives, it is said, fertilizes a waggon-load of loam. The carcass of a horse converts and fertilizes five or six cords of swamp-muck. A cord of clear stable dung changes two cords of this same muck into a manure as rich and durable as stable-manure itself. These are all the results, reader, of actual practice. The explanation of the principle has only come in since the practice, and showed the how and the why of this action. But the merit of explaining this action, would be, is nothing, if it had not conducted one step further. The explanation of the principle of the action of animal matters, animal manures of all kinds, whether solid or liquid, or muck or peat, has led chemistry to propose, where these cheap and common forms of quickening power are not to be had, to mix ashes or potash, or soda ash with swamp-muck. Now, reader, this is not an idle, visionary, book-farming scheme. It is, perhaps, one of the few successful, direct applications of chemistry to farming, which speaks out in defence of such book-farming, in tones and terms which bespeak your favourable consideration for the attempt which science is making to lend you, reader, a helping hand. This proposal, the offspring of science, has been carried out successfully by practical men in our country, and has made its way abroad. Though this is not the place to give you the details of their results, you may rely upon the fact that alkali and swamp-muck do form a manure, cord for cord, in all soils, equal to stable dung. Well, now, after your patience in going over these pages, I hope you will find your reward in this statement. To be sure, it might have been said at once, and so have done with it, but I hoped, reader, and I am sure I have not been disappointed, that you liked to dive a little into the reason of things, and felt that you had farmed too long by the rule of thumb, to be satisfied that it was the road either to improvement or profit. And so among your first attempts at improving your worn-out lands, always supposing you have not a barn-cellar, hogs, and swamp-muck, so aptly called by one of your own self-made practical men, the "farmer's locomotive," I presume you may like to know the proportions in which you may mix swamp-muck and alkali. You can hardly go wrong here by using too much; the great danger is, you will use to little alkali. But calculating on the proportion of mould in fresh-dug swamp-muck or peat, it may stated as a rule, grounded on the quantity of quickening power in a cord of stable manure, that every cord of swamp-muck requires eight bushels of common ashes, or thirty pounds of common potash, or twenty pounds of white or soda ash, to convert it into manure equal, cord for cord, to that from your stable. Dig up your peat in the fall, let it lay over winter to fall to powder, calculate your quantity when fresh dug, and allow nothing for shrinking in the spring; when your alkali is to be well mixed in with the mould, and after shovelling over for a few weeks, use it as you would stable manure.

These quantities of ashes and alkali are the lowest which may be advised. Three or four times this amount may be used with advantage, but both the quantity of alkali and the number of loads per acre must, and will be determined by each for himself. It is a question of ways and means rather than of practice. But supposing the smallest quantity of ashes or of alkali to be used which we have advised, then at least five cords of the compost should be used per acre. This may be applied to any soil, light or heavy. But there is another form of this same swamp-muck and alkali, which should be used only on light, loamy, sandy soils to produce its greatest benefit, though even on heavy soils, if not very wet, it may be used with great advantage. This is a compost of one cord of spent ashes to three cords of swamp-muck. This is decidedly the best mixture which has yet been tried; we have in this all that mixture of various salts and mould which plants want, and both by the action of the mould and by that of the air, the alkali of the spent ashes, which no leaching would extract, is soon let loose, and produces all the effects of so much clear potash or soda.

I have thus, reader, given you a few of the ways by which you may convert your peat bogs and swamps into manure when you have neither cattle nor hogs. I have not thought it worth while to go into this subject further, and give you directions for lime and salt, or other matters which might be used. I have given you the most common and those well known and at hand. All you want then to apply these principles of forming composts is, to give them that little attention which will enable you to understand them; and the rest must be left to your practical common sense, without some share of which, farming, like everything else, would be vanity and vexation of spirit.

I would here, reader, take my leave of you, and in the hope that we may again meet to have another talk. There are a great many other points relating to manure which can be understood only after we have made ourselves somewhat acquainted with the chemistry of the soil. Then, having explained that before the full action of manure can be understood, we must proceed a step further, and consider what changes take place in growing crops, and the effects of these growing crops upon soil and manure; the quantity and kind of salts they extract, and how soil is exhausted. This would lead to the consideration of the quantity and kind of manure to be applied to different soils, and the value of different manures. But there is one other very important thing belonging to our subject. Crops exhaust land, but fatten animals. Now this last properly belongs to that part of our subject relating to the changes occurring in vegetables, and their power of exhausting the soil. It will be seen, therefore, that the whole covers the ground called "agricultural chemistry." This essay is only its first part. If it meets your acceptance, I trust it may encourage its author to draw up its second part on soils, and its third part on the effect of crops on soil, and their value as food for animals.

ON THE INFLUENCE OF CLIMATE ON VEGETATION WITHIN THE LIMITS OF GREAT BRITAIN AND IRELAND.

BY JAMES ANDERSON, ESQ.,

LATE OF GORTHLECK, AUTHOR OF VARIOUS PRIZE ESSAYS, &c. &c.

It is necessary to preface our subject with a few introductory remarks regarding the properties and relations of the atmosphere which surrounds us, to enable an uninstructed reader to form anything like a correct estimate of the general action and modes of operation of climatic influences, in order to his more perfect comprehension of the influence of climate on cultivation within our own island. But we shall endeavour to be as brief and practical as is at all consistent with ordinary perspicuity, and after a very few words of necessary initiatory explanation, we shall be careful to limit our remarks to what is strictly applicable to practical agriculture.

The air which we breathe, then, with the clouds and vapours floating in it, surrounds the earth on all sides to an unknown height, and together form a moveable envelope or covering denominated the atmosphere. The air is a fluid body, elastic, compressible, and ponderable, exerting the force of weight and pressure on every body by which it comes in contact. The mean pressure on a square inch, at the level of the sea, is $14\frac{1}{2}$ lbs., decreasing as the place is above its level, and increasing if below it. The air has also a variable capacity for heat, becoming hotter and colder by rarefaction. On ascending the atmosphere the density diminishes, as the lower parts are more condensed by sustaining the greater weight or pressure of the air above them. The heat of the air is mainly derived either immediately from the sun, by the interception of the solar rays, or indirectly from contact with the earth's surface, which is heated more or less as it is turned towards the sun. The greater the temperature of the air, the greater the quantity of aqueous vapour that can exist in a given space—the more capacity, in a word, has the air for moisture.

The artificial cultivation of vegetables, as well as the natural distribution of plants, appears to be principally regulated by the temperature of the atmosphere; and each plant has generally a particular climate which it prefers, and beyond certain limits it cannot exist. Elevation and moisture are conditions which may likewise be considered as powerfully affecting their artificial cultivation and natural distribution. But temperature has the most obvious effect on vegetation. In regard to climate and vegetable productions, our globe has been aptly compared, in its two hemispheres, to two immense mountains placed base to base, the circumference of which, at foot, is constituted by the equator, and the two poles represent the summits, crowned with perpetual glaciers; and thus the two extremes of climate are represented by the country within the tropics, and that which approaches the poles; and in the intermediate zones the climate becomes progressively colder as it approaches the poles. The same gradation is observable on ascending a tropical mountain; and as the temperature falls in the ascent, so does the exuberant luxuriance of the vegetation decrease, until a soil and climate be found in a higher summit, similar, in respect to a general character, to those in the vicinity of the poles. This, in an inferior degree, though in pretty uniform gradation, holds true of mountains and elevated grounds in our own islands. We may state that the natural situation of each cultivated agricultural crop, at a determined elevation above the level of the sea, is so much greater in proportion as the country is nearer the equator, and less in more temperate regions; or the further we recede from the equator, the greater influence has the exposure on temperature. But in temperate climates those plants which are but little affected by temperature, and which grow in all its latitudes, are found to thrive often indifferently at various elevations. But where those plants are found that avoid, naturally, too high or two low a degree of temperature, and yet grow at different latitudes, we always observe it is where the effect of elevation may compensate that of latitude. Thus, the potato, which succeeds so well in our plains, is cultivated at 10,000 feet above the level of the sea in Peru. There can be no question that heat is the most obvious and powerful agent in effecting the existence and growth of plants. Vegetation is arrested when the temperature is below the freezing point, for water becoming solid cannot enter into the vegetable tissue; and it is now a universally received opinion that water is the great menstruum which holds the food of all vegetables in such a fit state of solution as to render it capable of being absorbed by the root pores or spongioles. At other times, from excessive drought, the soil may be so parched, or dried up, as to render it incapable of parting with its nutritive properties.

Plants with a large and spongy cellular tissue, those with broadly expanded leaves, with many cortical pores, those with few or no hairs on the surface, those of very rapid growth, and which deposit little oil or resin, and those whose texture is not easily injured by humidity, and such as possess numerous roots, require to absorb much moisture, and can only live in situations where they find it in large proportion. But plants with a firm and compact cellular tissue—those with small rigid leaves, few pores, and abundantly clothed with hairs, of slow growth, and depositing much oil or resin, whose cellular tissue is easily corrupted or decayed by excessive moisture, and the root development scanty, generally succeed best in dry situations.

With regard to temperature, not only ought the medium temperature of a country to be considered, but the temperature at different seasons, and particularly of winter. An attack of frost is always most prejudicial in a moist country in a humid season, and when a plant is situated in a bed saturated with moisture.

We state, generally, in determining the temperature of a country, that 400 feet of elevation are held to be equal to a degree of latitude, and a degree of latitude to a degree of Fahrenheit. Nevertheless, Humboldt's opinion is, that in the temperate zone, an ascent of 110 yards diminishes the temperature equal to a degree of latitude. In Great Britain, however, it has been calculated that an additional elevation of 60 yards is equal to a degree of latitude. It must be observed, however, of mountains distant from the equator, that the warmest side is towards the south, though this is often counterbalanced by the comparative inferiority of soil, as soils which face the south are more liable to have their substance carried away, from the heavy rains beating upon them from the south and south-west, and from the variations from frost to snow in the spring months, which are greater with a southern than a northern aspect. Hence, while the soils fronting the north may be firm and fast bound, those fronting the south may be loosened by the influence of the sun, and washed away by occasional showers in the intervals of thaws.

We shall now approach our subject in the following order, and state as succinctly as possible—

I. Our own observations of the influence of climate on the various cultivated agricultural crops.

II. The influence of climate in determining the system and rotation of cropping in various localities.

III. Its influence on the cultivation of wood-land and the various forest trees, and

IV. We shall briefly conclude with a few interesting tables, accompanied with explanatory statements and general remarks.

I. We shall state in this division of our subject our own observations on the influence of climate on the various cultivated agricultural crops, and we shall begin with wheat as the most important and valuable.

1. Wheat.—The most considerable elevation to which the cultivation of wheat extends in the north of England does not exceed 10,000 feet above the level of the sea. In Scotland, between latitude 57° and 58°, wheat cannot be expected to thrive at a greater elevation than 400 feet. Many individuals from the south had attempted its cultivation on an extensive scale at upwards of 600 feet; but their success has not been equal to their expectations, nor even so great as to justify the continuance of the practice on the same scale—not to talk of an extension—for the crops ripened only in favourable seasons, and then, no doubt, returned pretty satisfactorily. However, along the coast margin wheat does succeed tolerably in some favourabe spots at a somewhat higher level. The cultivation of wheat in Scotland is almost wholly confined to the eastern side of the country, at least in latitude 56°, the west being the district of pasture; and the climate of the west of Ireland is also moist, though mild; and this may be also stated of England. Perhaps generally in our Islands we may say that there are few places where wheat will succeed well at at a greater elevation than 600 feet, and 500 feet may be more safely stated as the extreme medium level at which this crop can be cultivated with a probable chance of profit, and even then harvest will be a month later than at the foot of the eminences, and the grain lighter. The spring and summer varieties have been long cultivated in some parts of England, and they may be very suitable for the more southern, although they are not so well adapted for the northern climates. Of winter wheat, the red varieties are the most hardy, and suited to late and less favourable climates though yielding inferior flour; and the woolly chaffed white yield the best, but are delicate, and liable to mildew and disease, and only suited to the most favourable climates of our islands. A wheat crop will endure a great deal of cold, if sown in dry and well drained soil, particularly with a covering of snow, and in such a situation, with a temperature of 32°, will vegetate and establish its roots freely in the soil. The crop is often injured, however, severely by our dry withering frosty winds in February, March, and April, and hoar frost, when in ear; and sultry winds and fogs produce mildew and blight. In low situations, such as river banks and valleys, mildew is very frequent. Wheat should have a dry, warm, moderately moist season for blossoming and ripening; and cold or heavy rains at this season are very prejudicial, and produce an inferior grain deficient in gluten. Sir Humphrey Davy found Sicilian wheat much superior in this respect to our best growths, and the growths of the Mediterranean coasts and isles will ever command a proportionally higher price in our market. The principal grain counties in England, and where the largest holdings are to be found, are the following: Norfolk, Suffolk, Essex, Hertford, Surrey, Kent, Sussex, Hants, Bedford, Berks, Yorkshire, Durham, and Northumberland. It speaks volumes for the climate in those localities.

2. Barley.—This crop is often a hazardous one in the climate of our islands, as it is very easily injured by heavy rains or superabundant moisture, either during the period of growth, blooming, ripening, or harvesting, which, at either of these periods,

must ever reduce the value of the crop very seriously. A crop of barley has been frequently reaped without a shower from seed time; though gentle showers from seed time till it shoots into ear are desirable. A good harvest time is of immense importance, for this easily injured crop in particular. In selecting a sort for cultivation, due regard must be had at all times to climate; for there is a hardy variety of winter barley which is very suitable to some climates, though the earliest and the best is the spring barley. Now, from what we have said, it will be evident that barley delights in a dry climate, and that an excess of moisture is at any period highly prejudicial. The following are the principal English barley counties—Norfolk, Suffolk, Cambridge, Bedford, Lincoln, Northampton, Berks, and the upper parts of Hereford, Warwick, and Salop. The climate of the east coasts of Scotland and Ireland are, of course, best adapted for this grain, being less humid than the west. There is a coarse variety cultivated in the higher districts and less favourable climate of Scotland and Ireland, called "Bigg," or "Barley Bigg," which produces a smaller grain, and, of course, less valuable; and this variety was till lately, and sometimes even yet, is fed down with sheep in spring, and left for a crop, when it usually proves immensely productive, both in quantity of straw and grain. This grain is found at the intermediate heights between wheat and

3. Oats.—This is an invaluable grain in northern climates, too cold or moist for either wheat or barley, and seems in such situations intended by Nature to supply their place as bread corn. In warm climates it degenerates, and becomes chaffy and light of weight; its open panicle gets dried up and contracted, being ill adapted to protect the grain, and resist the influence of a hot sun, or to convey sufficient nutriment to the ears. Even in the south of England this crop degenerates. In Lancashire, Cornwall, and some parts of Ireland, and on the western coast of Scotland, where the annual depth of rain equals from 40 to 60 inches, this crop thrives admirably, and in such situations is less impoverishing to the soil than in more favoured localities. The oat then requires a comparatively cool and moist climate to come to perfection; and in a very dry season, even in its more favourite localities, it becomes thick-husked, long-awned, and unproductive. In England oats are grown at a height of nearly 200 feet, though in backward seasons the sheaves will be found among the snow, in October and November; in Scotland about the 57th degree of latitude; and in similar climates in Ireland, oats will not ripen in an average of seasons in an inland situation, at a greater elevation than 900 or 1,000 feet; and this, we have had particular occasion to remark, was entirely owing to climate, as the soil was sufficiently good where they were tried in some parts at a higher level.

4. Turnips.—The turnip will produce small tubers at the same height at which we have placed the oat. A cool and temperate, but not rapid, climate, is most suitable to the turnip; and this crop does not succeed so well in the extreme south of England as in Northumberland, and in Scotland, and Ireland, under tolerable management. In such localities the turnip is found to produce greater weights with less forcing.

5. Clover.—A temperate climate is best suited to clover, neither very hot nor very dry and cold; but if a herbage crop is alone desired, warmth, attended with moisture, is desirable; if a seed crop, then a dry climate and warm temperature. We need not give a special notice, but include rye-grass under this subdivision, as it is generally sown in some proportion for hay with clover; but may just mention that rye-grass is very valuable on uplands, where clover is a precarious crop, and will not succeed. The great value of rye-grass is its adaptation to almost all soils and climates. The clover and rye-grass will succeed perfectly at the same elevation with oats.

6. Mangold Wurzel.—This crop is adapted to a milder climate than the turnip, as it requires to be sown from the beginning to the middle of April; and the soils for which it is adapted can rarely be got ready in time on a large scale, as they require to be brought to a very fine tilth; and its germination is very tender, and easily injured by early frosts and insect enemies; and, consequently, in our islands its cultivation is but partial and local.

7. Potato.—The potato will produce moderately at the same height as oats, turnips, and clover, and succeeds even in a similar climate—that is to say, in a climate moist rather than dry, and cool rather than hot. In the localities we specified, in talking of the oat, and particularly in Lancashire and Ireland, the potato crop arrives at greater perfection than any where else.

3 The Pea.—The pea thrives best in a temperate climate, not too warm but yet dry. In this country the seasons are often moist, and sometimes extremely dry and hot in June and July; so that in our climate there is no field crop more uncertain than the pea. In wet weather, in the harvest time, it creates a great loss by shedding and otherwise. It is a strange fact, however, that the white Norfolk pea will actually ripen at an elevation of 950 feet in inland situations in Scotland, as far north as 57 deg., and in favourable situations before the bigg; and here the grey pea very often fails. The Norfolk white pea is a very valuable variety in such situations, and is deserving of a more extended trial, perhaps.

9. Bean.—The climate for the bean ought to be temperate; but neither too dry nor too moist, as the first brings on the aphis or black fly, or, as it is locally called variously, the bean dolphin, or the collier, in May; and the second prevents the setting of the blossoms, and, like the clover, indeed all the legumes moist weather favours the development of the haulm, or herbage: and a dry season insures a plentiful production of seed. There is often, in unfavourable weather, as we have said, a great loss in harvesting; and we have often seen a luxuriant crop, in unfavourable localities, so injured by wet as to be of little more use than as it aided in swelling the manure heap.

10. Grass.—The grazing counties in England are Leicester, Lincoln, Northampton, and part of York; Durham, and Somerset; the dairy counties, Chester, Salop, Gloucester, Wilts, Bucks, Devon, Dorset, Essex, Suffolk, Cambridge, and parts of Derby and York. This arises partly from locality,

partly from the adhesiveness of the soil, and the difficulty of working, and partly from climate; grass husbandry in larger proportion from one or other, or all of these causes, being in particular localities more profitable.

11. Hop.—The hop requires the best climate, and, although extensively grown in England, has never been cultivated to any extent in Scotland, or Ireland. The hop counties are Kent, Sussex, Surrey, and parts of Essex, Worcester, Hereford, and Nottingham.

(To be continued.)

ON RENT.

By Cuthbert W. Johnson, Esq., F.R.S.

Continued.

THE LEASE.

The opinion, once so common in England, that the land can be as well and as profitably farmed by yearly tenants, as by leaseholders, is now, I believe, generally exploded. It is a conclusion, indeed, which can hardly be correct, even when applied to the smallest class of cottage tenants, and I cannot but feel that the situation of that farm must be rather peculiar where an annual tenant, of sufficient capital, can farm it as well as an equally qualified leaseholder. If, indeed, it be an acknowledged fact, that the great general cause of bad farming is to be found in the absence of a capital sufficient for the most profitable cultivation of the soil, in what way can we hope for the supply of that capital but by affording a greater security of tenure to the cultivator than an annual tenancy affords.

The view taken by the farmers of Haddingtonshire is, I believe, correct, as expressed by Mr. George Barns (*Farm. Magazine*, p. 22, p. 268)—"That a tenant can afford a higher rent, and, at the same time, make more money himself during the currency of a twenty years' lease, than if he continues liable to be dismissed at six months' notice; taking it for granted that his lease is a fair one, and unincumbered with absurd restrictions, and that he possess skill and capital for the stocking and improvement of his farm." Of the covenants of the lease itself it is idle to attempt, as several persons have done, to give the form of a lease which shall suit all situations and soils. I will in this place, therefore, only touch upon one or two chief points upon which great difficulty commonly arises.

The Covenants directing the Mode of Cultivation.—These can hardly be too general. The best mode is to compel the tenant during *the last years of his holding* to cultivate the ground according to an agreed mode, and, at the expiration of his term, to leave on the ground a certain proportion of green and other crops. For the first and largest portion of his lease I would strongly recommend that the farmer should be left to his own good sense and to the custom of the country. It is true that the custom of the country is in some degree vague and uncertain; but still, in spite of all difficulties of this kind, the courts of law have always managed to decide with justice in regard to the great good customs of agriculture. Thus, as Mr. Mathews very truly remarks, in his valuable work "On the Law of Landlord and Tenant," p. 452—

"The rule of law, wherever the relation of landlord and tenant exists in the absence of express covenants, imposes an obligation on the part of the tenant to manage a farm fairly and in a husbandlike manner, according to the course of proper management in that part of the country where the premises are situated (*Powley* v. *Walker*, 5 *Term Rep.* 373,) upon the breach of which an action of assumpsit may be maintained; and this right is given and the remedy afforded in all cases where a tenancy, whatsoever its description, is in existence; indeed in one case the court held that the custom of the country must be insisted upon under a written agreement, unless it be expressly excluded by the terms of the instrument.—(*Wigglesworth* v. *Dallison*, 1 *Douglas*, 201; *Senior* v. *Armitage*, *Holt*, 197).

"In order to constitute this particular custom, it is not necessary that it should have been immemorially adopted, as a general system of cultivation applicable to farms of a similar description will be sufficient. Thus, in a late case, where a custom was set up that the outgoing tenant should receive a reasonable compensation from his landlord for the expenses of tillage and cultivation, in respect of which he had not received the benefit either from the previous tenant or in a due course of husbandry, *Dallas*, C. J., observed that this was a custom which afforded the strongest encouragement to good husbandry, as being beneficial to both landlords and tenants, the land of the former receiving a lasting benefit from the labour and expense bestowed by the tenant on payment of a reasonable compensation to the latter, and the tenant being thereby encouraged to pursue a good course of husbandry. (*Dalby* v. *Hirst*, 3 *Moore*, 536; *S. C.* 1 *Brod. & Bing.* 224). In an action against a tenant, upon promises, for not occupying his farm in a good and husbandlike manner, according to the custom of the country, the custom is proved by showing that he treated it contrary to the *prevalent* course of good husbandry in that neighbourhood, as by tilling half his farm at once, when no other farmer tilled more than a third, though many tilled only a fourth; and it is not necessary to show any precise definitive custom or usage in respect to the quantity tilled. (*Legh* v. *Hewett*, 4 *East*, 154.) So this implied obligation was held to be broken when evidence was given of dung and compost having been carried off the premises without any stipulation or agreemeent to that effect having been entered into. (*Powley* v. *Walker*, 5 *Term Rep.* 373). But it is presumed that in this case, the carrying away was contrary to the custom of the neighbourhood where the farm was situated; because in some counties where much hay is grown for the market it would be an extreme hardship upon the tenant if he were necessarily bound to consume all the produce of his farm upon his premises. Indeed, in a case some time since decided, but only recently reported, it has been held by

Lawrence, J., that there is nothing to prevent a yearly tenant, by the general rules of husbandry, from carrying away straw or hay from the premises; and the learned judge mentioned a case before Mr. Justice *Buller* (*Furbree* v. *Andrews*, *Winch. Sum. Assizes*, 1788), where the latter judge took a distiction between dung and straw, and said that the former, by the common course of husbandry in all places, ought to be used upon the premises; but the latter was part of the produce of the land, and if not permitted to be sold, none could be brought to market. (*Gough* v. *Howard*, *Peake Add. Cases*, 197, and see *Exparte Nixon*, 1 *Ross*, *Bank Cases*, 446). In some cases, however, contracts relative to the disposal of manure are entered into between the landlord and tenant which will give the latter, when he leaves the farm, a power of disposing of it to an incoming tenant, for it must be remembered that in all cases the usage of the country may be waived or controlled by express contract, if the intention to do so be clearly apparent. Where an outgoing tenant had contracted with his landlord to leave the manure on the premises, and to sell it to the incoming tenant at a valuation, it was held that it gave him a right of *onstand* for the manure on the farm, and that the possession and property remaining in him until the valuation was made, a removal or use of it by the incoming tenant before that was done would render him liable to an action of trespass by the outgoing tenant. (*Beatty* v. *Gibbons*, 16 *East*, 116). Where a tenant, who was bound to bring back dung for all hay sold by him to be carried off the premises at the time of his quitting, sold a part of a rick then standing to a purchaser, without mentioning his liability to bring back manure, it was held that the succeeding tenant had a right to refuse to permit the hay to be removed until the manure should be deposited. (*Smith* v. *Chance*, 2 *Barn. Ald.* 753). Neither can old turf land be broken up for tillage, and it is conceived that a tenant from year to year is not even entitled to plough up grass land which he himself has laid down, and suffered so to remain for a great number of years, as such a proceeding would be evidently against the rules of good husbandry."

Covenants to Repair.—With regard to covenants to repair, the lease can hardly too clearly define by whom, and to what extent, the repairs of the farm are to be done; for in the absence of an express stipulation there is still only the custom of the country to be referred to. Thus adds Mr. Mathews:

"The implied liability in the grant of the tenant to repair the buildings on his farm is also regulated by the custom of the county. Mr. *Harrison* observes, that, generally speaking, the tenant is bound only to repair the dwelling house, and that the burden of repairing the out-buildings, homesteads, and other erections on the farm must be sustained either by the landlord or the tenant, as regulated by express provisions in the lease, or by particular customs of the country. But it is much more usual, indeed it may be said to be the general custom, for the tenant to keep the whole of the buildings in fair and tenantable repair, so as to prevent waste or decay of the premises, but not to be liable to substantial and lasting repairs, as the law will not imply a contract on the part of a yearly tenant to repair generally, or to do any particular acts, but merely to use the farm and buildings in a tenantable and husband-like manner. The occupation of farms and premises, however, creates so much a duty in tenants to repair, that the courts are always ready to extend this obligation upon them as much as possible; thus an agreement by the tenant to leave a farm as he found it, has been held to be an agreement to leave it in tenantable repair if he found it so (*Winn* v. *White*, 2 *W. Black.* 840), and a tenant who had been let into possession under an instrument which did not amount to a present lease, and had paid rent under the agreement, was held liable in an action for the mismanagement of the farm, under a count stating the premises to have been demised to him. (*Tempest* v. *Rawling*, 13 *East*, 18)."

These, with proper covenants clearly defining the extent of unexhausted improvements to which the tenant shall be entitled to be repaid upon the expiration of his term, are the chief covenants to be regarded in the drawing of a farm lease. To these last I have already referred in a previous paper (see page 8, vol. xii.), and throughout the whole lease, the person who draws it, will do well to remember, as is well expressed by a Scotch writer (*Quar. Jour. Ag.*, v. 2, p. 134), "that the great error in drawing leases consists in vain precautions and attempts to provide against every possible contingency from which the nature of the transaction, and the unforseen events to which it may give rise, it is impossible to do. All that can be done is to make as precise as possible the conditions which experience shows to be necessary. The terms of the contract should be few and simple, and easily understood and complied with. Not only are hurtful covenants to be avoided, but such as are unnecessary, since to increase the number of them too much serves but to perplex the farmer, and give birth to quarrels; and besides, all experience shews that the interest of either party may be sufficiently guarded without multiplying too much conditions, penalties, and restrictions."

THE LEICESTER MONUMENT.

We subjoin an abridged report of one of the most interesting ceremonies that any person connected with agriculture—nay, any lover of his country—can possibly contemplate, namely, that of laying the first stone of the Leicester Monument; a structure which we should rather consider as raised for the purpose of recording the sense of the nobility, gentry, and yeomanry of Norfolk, of the merits of the late Thomas William Coke, than as intended to perpetuate the recollection of his great and good acts, of which the county of Norfolk is at once the most complete, and we trust will continue to be, a lasting monument.

We regret that space does not admit of our giving a more lengthened account of the proceedings which, as reported in the *Norwich Mercury*, must have been most striking and effective. In order to shew the principles—the practice of which obtained so much respect for the late proprietor of Holkham—we give insertion here to the order of procession. These principles were emblazoned on the banners; and, in the words of one of them, we say to all landlords, "Do likewise."

A RICH BANNER,
on which were
The Arms of Lord and Lady Leicester emblazoned, and very handsomely ornamented.

Flags and Banners, borne by some of the workmen in the employment of Mr. Watson, the contractor for the work, dressed in white jackets and trousers, with straw hats.

Body of Tenantry on Horseback
Three a-breast.

Mr. J. OVERMAN.	Mr. HUDSON.	Mr. WRIGHTUP.
A Flag.		A Flag.

A Body of Tenantry on Horseback.

Banner.
"In the Virtues of the Past
we read
the Hopes of the Future."

Banner. The Plough, and a good use of it.	Howlett's Brass Band.	*Banner.* Agriculture, Manufactures, and Commerce.

Stewards of the Déjeuner,
on Horseback.

A Flag.	A Flag.

Members of the General Committee,
on Horseback.

Banner. Long Leases to Good Tenants.	*Banner.* Speed the Plough.

The Hon. and Rev. T. KEPPELL,
The Rev. R. ACKROYD,
The Rev. P. GUREON,
The Rev. R. COLLYER,
The Rev. W. NAPIER,
The Rev. J. BLOOM, &c.

Banner. Peace to the Nation! Plenty to the Poor!	*Banner.* The Respectability of the Crown. The Durability of the Constitution. The Prosperity of the People.	*Banner.* Happiness to those who wish Happiness to others.

Wright's Band.
Gentlemen of the County,
on Horseback.

Sir W. FOSTER, A. HAMOND, ESQ., F. ASTLEY, ESQ., M. FOLKES, ESQ., &c.

Banner. Prosperity to the House of Holkham.	A Flag.	*Banner.* Not for Himself, but for the County.
Banner. His Memory survives.	*Banner.* He lived an example of what a Man might become, accompanied by liberality and perseverance. Go thou, and do likewise.	*Banner.* He was the Farmers' Benefactor.

Masters Craven and Beck,
Two Young Gentlemen of the Christ's Hospital School.

Lord Colborne, in his carriage,
Accompanied by Sir WILLIAM FOLKES, Bart.

The Chairman (Mr. LEAMON), and Mr. NEAVE, a Member of the Committee.

Flag. Stewards of the Ladies' Booth.	Carriages.	Flag. Stewards of the Ladies' Booth.
Banner. The Husbandry of Norfolk.		*Banner.* Liberal Landlords and Grateful Tenants.
Banner. A Fine Fleece and a Fat Carcass.	Carriages.	*Banner* Breeding in all its Branches.
	Horsemen.	
Flags.		Flags.
Banner. Success to Agriculture.	Carriages.	*Banner.* A Good Understanding between Landlord and Tenant.
	Workmen.	

The *Norfolk Chronicle* states that—

"The monument stands on a base of forty-four feet square, and will be one hundred and twenty-five feet in height. The following is the description:—

"This design is composed of a pedestal, on which is erected a fluted column, surmounted by a wheat sheaf. Three sides of the pedestal are bas reliefs; one representing the late Earl granting a lease to a tenant; the second representing the Holkham sheep-shearing, through which the great stimulus was first given to agriculture; the third to indicate irrigation. The fourth side of the pedestal is left for the inscription.

"The four corners of the pedestal shew the means by which cultivation and production were improved and increased by the late Earl. At the first corner a Devon ox, with the inscription under it—'Breeding in all its branches.' At the second corner Southdown sheep, with the inscription under them—'Small in size, but great in value.' The third corner the Plough, with the inscription—'Live, and let live.' The fourth corner the Drill, with the inscription—'The improvement of agriculture.'"

Fortunately for himself, as well as for those with whom he was connected, the late Earl of Leicester perceived early the advantages which must result from establishing the relative position of landlord and tenant on a proper footing; and we are gratified at seeing the sense of the farmers of Norfolk recorded, upon this point, by devoting one side of the pedestal of this monument to a representation of the late Earl in the act of "granting a lease to a tenant." He did not wait till the evil day came, and then seek how he could himself meet, or enable his tenantry to meet, the difficulties they might have to encounter. He enabled them to place themselves in that position which would render them capable of withstanding the changes which the purblind and the shortsighted are just beginning to perceive. The most striking argument used against leases at the present day, amongst farmers themselves, is, that there is no knowing what changes may be made in the standard of value or in the Corn Laws; and that, comparatively, no man could safely take a lease in such an uncertain state of things. We hold it to be utterly impossible that any so great changes can take place in the next twenty years as have taken place in the last twenty years. The alterations in the currency occasioned by Sir Robert Peel's bill and an admitted reduction in the amount of protection—presumed, by law, to be requisite—of upwards of 30s per qr., cannot again take place. The late Earl of Leicester's tenants have, *with* leases, surmounted these difficulties, have gone through a most trying period, and yet we believe they will be found in a condition quite as prosperous as those who, being without leases, have been in a situation to receive the per centage return which the kindly feelings of the landlord might consider them entitled to. It somehow or other happens that, where leases are granted, or where without leases the terms of agreement between landlord and tenant are based upon a sound principle of mutuality, a great deal of the lecturing about the necessity of farmers being "wide awake," and being "up to all the new methods and discoveries," is spared; and hence, we presume, not wanting. The first stone of the Leicester monument was laid by Lord Colborne, who addressed the assemblage, by whom he was surrounded, with much feeling and effect. After the ceremony was concluded, upwards of a thousand of the subscribers and their families partook of a sumptuous entertainment; and, upon their retirement, upwards of three hundred labourers and their families were regaled in the self-same booth; the noble Earl of Leicester himself superintending with the same kindness and attention that characterized his hospitality to those who had preceded. Thus is the well-known Holkham sentiment of "Live, and let live" likely to be perpetuated by the present noble owner of Holkham.

The ceremony of laying the first stone of the monument, to be erected by subscription, to the memory of the late Earl of Leicester, better known in his day as "Coke, of Norfolk," took place on Tuesday, July 12, in Holkham, in that part of the extensive park which stretches before the north front of the house, and a distance of perhaps a quarter of a mile or thereabouts from it. The announcement of the committee, and Mr. Robert Leaman, the chairman, in the Norwich papers, &c., that the ceremony was to come off on Tuesday created a great deal of interest throughout Norfolk and those portions of the adjacent counties connected with it, and accordingly all the admirers of the late nobleman, and all those who remembered his hospitality in by-gone times, felt anxious to pay the tribute of respect to his memory by being present on the occasion, and made preparations to attend. The programme or directions, which were published, appointed the meeting of the subscribers, &c. to the monument to be held at 12 o'clock in the morning, at Longlands, a farm-house about two miles from Holkham, and accordingly by that time a vast concourse of people was assembled at that spot. All the towns and villages round contributed their quotas to the meeting, and beside the actual subscribers, who amounted to several hundreds, and their families, there were several thousands of farmers, yeomen, labourers, workmen, and many others, attracted by curiosity, the sake of a holiday and merrymaking, or by respect. The towns and villages of Wells, Burnham Market, Burnham Thorpe, Docking, Snettisham, North and South Creek, Swaffham, Deerham, Fakenham, Holt, Cromer, Brandon, Walsingham, Rainham, Norwich, &c., poured out a portion of their inhabitants, great or small; and no doubt many more would have attended had not the previous night and the early part of the day been most unpropitious for journeying from any distance or the enjoyment of any *fete*. However, all along the road leading to Longlands were to be seen carriages of all classes, the barouch, chariot, phaeton, gig, farmers' carts and farmers' waggons, besides many rural vehicles, little in usage in London or near it, but sufficiently commodious on such an occasion to convey numbers with safety if not with speed. The procession was some time in being formed; indeed, it was no very easy task to arrange so many and so heterogeneous a group. It was, however, at last got into good order, and began to move. The weather cleared up at this time, and although the day was dull, cold, and lowering, still no rain fell to spoil the ladies' bonnets and dresses, and soak those who were not in covered vehicles. The train was of great length, scarcely less than a mile and a half, and made a gay and gallant show. First came the Norwich band of musicians, under the direction of Mr. Howlet of that city; then came 150 stonemasons, employed by Mr. Watson, the gentleman who has undertaken to build the monument, dressed in the costume of their calling, namely, straw hats, flannel jackets, and aprons. Then came Lord Colborne, heading a numerous cavalcade of country gentlemen, all well mounted, and advancing in excellent order; next followed the committee of the subscribers' carriages, and so forth, and the Fakenham band of musicians, and closing up the rear a band of bricklayers and labourers in flannel jackets and red caps. The whole, having reached the spot on which the first stone of the projected monument was to be laid, deployed in as good a style as the nature of things would allow, were received by the present Earl of Leicester and his brother, the Hon. Mr. Coke. The Countess of Leicester was not present, in consequence of the recent calamity which has happened in her family; her absence was certainly a great drawback to the *fete*, and no doubt was a reason why many more persons did not attend. The ladies were accommodated in a temporary gallery close to the spot; and all things being ready, the stone was laid with the usual ceremonies, Mr. Donthorn, the architect, presenting the trowel, a silver one, to Lord Colborne, and that nobleman acting the part of founder of the monument. His lordship also addressed a short speech to the company, eulogising the character of the deceased nobleman, in honour of whose memory they were assembled, and speaking under evidently strong feelings of his recollection of him. The stone having been lowered, and the ceremonial concluded, the company made their way to the south side of the house, where were erected seven tents or marquees, and amongst them the superb marquee lately used at Cambridge, on the occasion of the opening of the railway to that University; all of them were supplied by Mr. B. Edgington, of the Borough, whose judicious arrangements were appreciated by the numerous host which were assembled beneath them. Into the larger marquee, over which floated the standard of England and the flags of various nations, were first admitted those who had the honour, not to say the convenience, of the *entrée* by means of tickets; of this number there might be about 1,200 or 1,300; nevertheless there was room for all, and champagne and other wines, refreshments of the best sort, and, in short, all the creature comforts that the most dainty and the most hungry could require to tickle the palate or appease the appetite. All this part of the arrangements was under the management of Mr. Salmon, the house-steward to the noble earl, at whose expense so many were feasted, and certainly the whole of the arrangements were in the best taste and on the most liberal scale. But this was not all. Lord Leicester, like the good old English gentleman, in the song, who

"Tho' he feasted all the great,
Yet ne'er forgot the small,"

as soon as the most aristocratic portion of his guests had retired to look about the park, &c., ordered all who had attended the ceremonial to be admitted to the good things beneath the marquee. There might be seen a right jovial meeting; there was such a profusion of viands and such a flood of drink, that no one was left out of his or her share of the banquet, whilst in another part of the park the workmen for Mr. Watson, a very large company indeed, sat down to a substantial dinner in the old English style. Nevertheless, there was no confusion; a little crushing, a good deal of good humour, some share of the excitement which wine and strong beer produces, but no intoxication, no brawls, and no violence. The county police were in attendance, but their presence was scarcely required, though it was said a gang of London thieves were in the grounds. Meanwhile the bands were playing, and all was a scene of joviality and rustic enjoyment. It should be mentioned that the healths of the Earl and Countess of Leicester were proposed in the earlier part of the day by Lord Colborne, and drank with enthusiasm. This scene of revelry lasted till dusk. The noble owner of the domain entertained Lord Colborne, Lord Hastings, and a small select party to dinner in the house. The park was not emptied of the numerous guests till past 10 o'clock in the evening. Along the roads, as the more boisterous returned home, was to be heard the usual amount of hurrahs, singing, blowing of horns, and other noises by which a village wake is distinguished. The neighbouring inns were all filled with occupants, and it was with some difficulty that at Wells and in the immediate neighbourhood of Holkham accommodation could be obtained for the sudden influx of arrivals. We did not hear of any accidents in the park or in the roads leading to it; but a shocking calamity overtook four men on Monday night, who had gone out in a lugger with a pilot to a ship off the harbour; in returning, owing to some mismanagement, the boat was upset by a wave or breaker striking against her, and the four unfortunate seamen perished. One of them has left a wife and nine children to deplore his loss.

TREES.

PREPARATIONS FOR PLANTING.

As the season approaches when trees of all kinds may be planted with every prospect of success, under circumstances most favourable to their success, it has been judged fitting to make some allusion to the preparation of land in general, referring to a future opportunity any notice of the soil peculiarly suitable to each.

Trees—agriculturally considered—are great enemies to the crops of the farm, and, as such, many writers of the day have successfully laboured to show, that, however ornamental they may be in themselves, and to the landscape of the country, their existence, in hedge-rows above all, is an evil, unless it be in exposed situations, where they may act as screens of defence against the violence of prevailing winds.

There are two or three writers of recent date whose works will be referred to, and recommended as guides to readers interested in the culture of ornamental and timber trees. These writers are Mr. Withers, of Holt, Norfolk, who has written *con amore* upon this his favourite topic; and Mr. Stephens, of Edinburgh, author of "*The Book of the Farm*," a work which ought to be in the hands of every agriculturist of the new school who is emulous to meet the emergency of the times by the relinquishment of ancient prejudices, and the adoption of new and improved modes of culture.

They who have candidly perused "*The Woodlands*" of the late William Cobbett, must acknowledge that his directions, whether in all cases correct or not, are precise, and intelligible to all. Its style is clear, its rules simple and perspicuous, and, as the author really begins at the beginning, any one who is desirous to do the work of planting effectually, may confide at least in the rules which are there laid down for the preparation of the land, because there is no mystification in them.

It is certain that the beauty of English scenery is mainly dependent upon the multitude of its hedges and hedge-row trees; but, as was proved by a late writer on the agriculture of Devonshire, the country suffers severely by these ornaments; utility and productiveness are thus sacrificed; and, therefore, as we would have things put in their right places, we at once urge the abandonment of all those harbourers of vermin, which cause the waste and deterioration of agricultural grain crops in more ways than one, without any redeeming qualification, insomuch as the timber and underwood about a farm are, in themselves, of no remunerative value whatever.

But timber is a source of wealth; trees are glorious objects; and plantations adorn a country: therefore we would place them in appropriate situations, and grow them when there to perfection; but to do so, the preparation of the land is a consideration of first-rate importance.

Trees ought, in fact, to be grown in woods, also as screens or belts for protections, and in groups, or positions, where, placed singly, they may constitute a prominent and striking feature of park scenery. The late Rev. William Gilpin, in that interesting book, "*The Forest Scenery*," has afforded many striking examples of the effects of grouping, chiefly with a view to *picturesque beauty*, and we recommend the perusal of it to every one interested in the art of planting, for that express object.

But beauty cannot consist with stunted deformity; therefore we must, in the first place, study the soil, and its effectual preparation; and upon these points our best writers are perfectly agreed.

Cobbett insists chiefly upon the thorough trenching of the land to the depth of at least two feet, reversing the surfaces if the soil be good to that extent; but he justly qualifies this position by observing that the soil may be such, in respect to its subsoil, "as to bring to the top something in which hardly any thing will ever strike root—as, for instance, clear chalk, or pure sand, or gravel, or clay." When this is the case the top mould must be kept at top; "but still *the trenching is always to be performed*, for the ground must be moved and turned to the depth of two feet." Mr. Withers is not content with trenching or deep ploughing; he adds manure to the amount of twenty loads per acre, and says that "when *you manure*, you never want to fill up, for all the trees are sure to take, and instead of filling up you may, after the third year, take out and transplant at least a tenth part of them." (Memoirs 1827).

Mr. Wither's "Letter to Sir Henry Steuart, Bart., on the Improvement in the Quality of Timber"—1829—is a very valuable treatise, and worthy of being better known.

It is perhaps needless to revive the subject of a controversy which once was carried on most strenuously between the advocates of effectual preparation of land by deep trenching, and others who were content to open holes in the ground for each individual tree. "The cheap, hole-digging, short-sighted Scotch system," as it was called some twenty years ago, was "calculated to bring upon those who adopted it only loss and disappointment" that in this day of philosophical inquiry and chemical research, we have little cause to make further allusion to that which experience must have disqualified. But it cannot be wrong or invidious to inquire into the causes by which deep comminution of soil will contribute to the permanent advantage of every species of vegetation.

Without further entering into the mechanical processes of trenching already described in the first part of the articles upon "*Orchards*," it will be relevant to insist upon the agency of those chemical constituents of soil—loams especially—which never entered into the calculation of the earlier writers. Our forefathers knew nothing of analysis; they had no idea of the existence of the phosphates, silicates, and alkalies, which modern chemistry has brought to light. But now we know, and the knowlege is widely diffused—thanks to the enlighted German chemist, Liebig,—that, by the breaking up, and the pulverisation of earths, a volume of salts—usually termed the *inorganic* constituents of land—is distributed through the staple earth, and afford to timber those salts, the presence of which was deemed inexplicable.

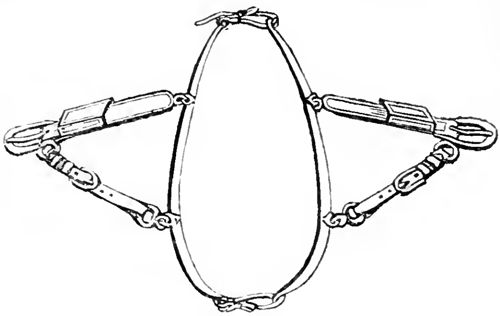
Thus the thousands of tons of pearl and pot ashes that have been articles of commerce to an extent almost unlimited, are now understood to be derived from the soil and distributed only through (not formed or created *in*) appropriate vessels of the vegetable tissue. The laboration of the ground, therefore, is now proved, beyond question or doubt, to be indispensable, not only, as was supposed, to the first advances of young trees, but to their future progress towards perfection.

Trenching is in no case labour lost, and even where a single tree only is to be planted to produce a particular effect, the hole to receive it ought to be prepared upon the principles of trenching; that is, by opening and comminuting the earth to a very considerable extent and depth, so as to insure good drainage, and the free tracings and extension of the roots, laterally, through a number of feet around the bole of the tree.

They who have travelled extensively, and witnessed the wretched progress of young trees that have been planted in holes so small as to require their roots to be, as it were, screwed into the ground, will want no other monitor to impress the great, undeniable truth, that early and effectual preparation is the only guarantee of success. Let any one try the experiment upon a couple of gooseberry bushes, by planting one in a narrow hole, and the other by expanding its roots in a soil worked and made permeable to the extent of a square yard, and the difference of the results will be sufficiently established before the lapse of two entire seasons. The soil shall be the same—a free unctuous *loam*—and the sites contiguous; yet one tree will be stunted, while the other shall produce luxuriant and healthful young wood; one will bear early a few starved berries—the other, though not so soon in maturity, will maintain a high state of fertility for perhaps fourteen years. J. Towers.

BENCRAFT'S PATENT HAMES.

Our attention has been drawn to this newly invented Hames, the object of which is to increase the power of the horse, by securing to him the free use of his fore legs (hitherto impeded by the point of draft being placed in front of his shoulder joint) and to protect him from the sufferings of galled shoulders. The inventor considers that he has succeeded in transferring the draft to the withers, or front of the spine (the seat of the horse's



greatest muscular power), by means of the upper trace; the lower strap being intended to keep the collar in its proper position, or, in case of galling on the upper part of the neck, to relieve the draft from pressing on the wounded parts, until they are healed. We give a sketch, explanatory of the details of the invention, which is patronised by the Society for the Prevention of Cruelty to Animals.

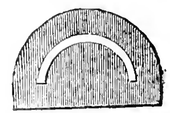
EFFECT OF OILCAKE ON THE MANURE OF ANIMALS FED ON IT.—A friend of mine has lately adopted a plan which, under the same circumstance, I should strongly recommend: it is that of giving a small quantity of oilcake to animals grazing, for the sake of improving an ordinary pasture, and its effects are astonishing. The pastures I allude to are small, and one or two bullocks more than they are calculated to carry are put into each; the lot are then allowed 4lbs. of cake per day per head; this, at a cost of about 2s. per head per week—which, I believe, the stock well paid for—has entirely altered the face of pastures from what they were three years ago, when the plan was first adopted by him, and, I believe, without any loss to himself.—*G. Dobito*—*English Agricultural Society's Journal.*

WELLER'S PATENT HAND TILE AND PIPE MACHINE;

Invented by Richard Weller, *Capel, near Dorking, Surrey, and manufactured by* R. Garrett & Son, *Leiston Iron Works, Saxmundham, Suffolk.*

The accompanying engraving represents a new Hand-power Tile and Pipe-making Machine, as seen at work between the hakes.

Without committing ourselves to an opinion on the value of any peculiar points which may distinguish this machine from the great variety now in use (and many excellent ones there are), we have pleasure in presenting our readers with a representation of the latest perfected invention for the manufacture of drain-pipes and tiles, and also in appending such a description as will enable those who are interested to judge of its fitness to perform the work required.



The receptacles for clay are half cylinders, so that large tiles, being of a similar form, are expressed from the centre of the mass of clay (as shown in the annexed figure), and consequently are not liable to so much distortion as when the quantities of clay around the die are unequal. In the construction of small tiles or pipes this objection is not so obvious. Another point of novelty is the advancing the piston to its work by a simple instead of a compound lever, by which one man is enabled to perform the double operation of expressing the tile to exactly the required length, and cutting it off. The semi-cylinders are oscillating, and are alternately in use, either in projecting tiles or receiving clay, and are both available for cleansing it from stones &c. It is furnished with a bracket shelf for depositing the lumps of clay for use. The entire of the machine is constructed of iron, runs on four 12-in. wheels, occupies a space of only 8 feet by 2 feet, and is worked with facility by a man and a boy.

ON FARM BUILDINGS.

TO THE EDITOR OF THE FARMER'S MAGAZINE.

Sir,—The old adage of "Ne sutor ultra crepidam" has not been more fully verified in any case than in the attempts of architects to lay down plans of farm-buildings. No person doubts their professional skill in erecting walls and in laying on roofs, in making Gothic windows and spiral columns; but in devising convenient plans of farm-buildings, experience has shown them to be most wofully deficient. It has been my lot to have been practically concerned in the management of several very large arable farms, where the buildings were partly planned and arranged by architects, and where many blunders existed; and on looking into the plan in your magazine of July last, I find the very same errors shown. Simple as it may appear, no person is capable of arranging farm-buildings who has not practised the art in the most minute details, and has experienced the blunders he intends to correct; whereas architects have never studied the art they wish to assist, nor have experienced the wants they pretend to supply. "Let us have the ground plan," said the late Mr. Loudon; "the walls and the roofing will soon be managed:" and the great desideratum in farm buildings is the juxtaposition of the edifices, so as to produce the greatest possible convenience with the least possible labour.

In the plan prefixed to your magazine of July, the cart-shed and tool-house are placed at extreme opposite corners; and as carts and tools are used together, these two accommodations should in every case be adjacent, and under the same roof. A farm-bailiff or manager goes to the stable in the first place, in the morning, and gives the orders; he goes in the second place to the cart-shed, to see the orders verified, and tools are wanted; and he would reckon a most miserable arrangement, to have to go to the extreme corner of the farmery to the tool house, to seek picks and spades.

Next we have a straw-house; a place for making oil-cake, &c.; space for thrashing-power, and for chaff; and a second straw-house is placed further to the right. But we are not shown nor told how the straw is got to the houses; if thrown by machiney; nor where the machinery is placed. No dressing barn is shown, nor any granary. The latter should always communicate with the dressing barn by an inside stair, so that the transportation of grain may go on in any weather. I was not a little surprised to see so eminent a practical judge as Mr. Grey, of Dilston, affix an outside stair to a granary, in some plans he sent the English Agricultural Society, and published in their Journal. The exposure is inconvenient during inclement weather. The bailiff's house has a cold situation in the north-east corner; but his bedroom must be warm enough—attached to the boiling-house. The riding-houses' stable is placed in the diametrically opposite corner from the dwelling-house, to which it should be contiguous for the sake of convenience; or they should be wholly disjoined from the farmery, and erected near to the dwelling-house. The covered manure tanks might be more conveniently placed behind, or laterally to the farmery; as in front they may create obstruction and inconvenience. Sheds and yards are shown in the plan, for the work horses; but we are not told when they are used—if wholly, or only partly, during the year. I have always recommended that farm-horses, saddle-horses, and hunters, should all run in open sheds; and once got a most hearty sneer and laugh for my advice to this effect to a hunting nobleman, while he had thermometers in the stables to show a temperature of 80 deg. The fee ding-house for 52 cattle is much too large: the number is too great for feeding together—the air is contaminated. The advantage of respiratory animals breathing in a large volume of uncontaminated air seems not yet understood, though experience shows that both feeding and keeping animals for store do best in open sheds, and in small numbers together. There is only one shed and yard shown for cattle and sheep; and the only road to the cattle house must lie through this yard,—a very great objection in any farmery. Each yard and every house in a well-planned farm-building, should have an opening from itself to a road, and without intruding on any other yard or department. The pigsties and the poultry-house are crammed into a corner of the cow yard, where the latter must be very much annoyed; and their tender nature requires ease and repose. These two departments should have each of them a separate encampment. The boiling house should adjoin or be included in the piggery, as that kind of live stock are most benefited by cooked food. The whole area of the building is much too small for a farm of 600 acres; and consequently the accommodation is too limited.

The railway under cover of the houses is a novelty, and must be a very great improvement; but it should in all cases run in front of the animals, and not behind them, as it will get clogged with their excrements.

The editor of the *Agricultural Gazette*, some short time ago, told us that Professor Low, of Edinburgh, first showed the absurdity of having only one wet yard in a farmery, and suggested the shape of the long parallelogram for a farm-building, and the great advantages to be derived from the admission of sun and air into the yards. That one yard was fashionable at one time is certain, and yet prevails; but I am much inclined to think that sun and air were admitted to yards before the days of Professor Low; for in his last work, "Landed Property," where some plans of farmeries are shown, the buildings are divided into two parts, and one is placed before the other, apparently for the purpose of excluding sun and air from the part behind. The carpenter and blacksmith's shops, are placed in front, and they need no sun: the piggeries are behind, and they need it much. But our northern agriculturists are so conceited of their fame, that everything must proceed from them; as old Dennis, the actor in the reign of Queen Elizabeth imagined all the acting and every imitation on the stage, even of thunder, to proceed from him—'twas his thunder. Just so with our northern farmers; 'tis all their thunder. Great as their merit is, it should not be overstated.

The bailiff's room and his bedroom, stuck up in a corner of this farmery, seems to be copied from the Scotch erections, in which everything concerning the labourers is so besmeared with "pottage milk ideas," that one room, or a hovel like a pigsty is hardly allowed them. If Professor Low claims the first idea of admitting sun and air to the yards, the room is still open for the first idea of admitting common decency into the habitations of the labourers, which should have preceded the cattle yards.—*August* 20, 1845. D.

AGRICULTURAL REPORT.

GENERAL AGRICULTURAL REPORT FOR AUGUST.

During the greater portion of this month the weather in nearly all parts of England, especially in the first three weeks, proved extremely unfavourable to the wheat and other crops. This circumstance, as might be expected, was productive of considerable anxiety not only on the part of the agriculturists themselves, but also on that of the community at large, respecting the fate of the corn in the fields, the progress of which towards maturity—arising from the unusually large quantities of rain with which we were visited—was slower than almost ever before remembered: hence has resulted a very late harvest time. The high winds and heavy showers with which we were visited during the first fortnight of the month, caused extensive breadths of corn to become lodged and beaten down; yet we are happy to say that the expected losses in this particular are not of a serious nature. From all quarters numerous accounts were received to the effect that considerable damage had been sustained by the wheats, and that many of those diseases to which that grain is subject had made their appearance. Since, however, the late beneficial change in the atmosphere has taken place, and which has allowed cutting and carrying to be commenced in nearly the whole of our forward districts—though as yet comparatively little wheat, the time of year considered, has reached the stack yards—our advices are of a by far more favourable tenor. Still it is conceded, by one and all engaged in agriculture, that the present year's produce of wheat will not exceed an average one, even should the weather, from the present date up to the close of September, prove fine.

In many parts of the country, and even in Scotland and the Channel Islands, a most unfavourable change has taken place in the potato crop. This change appears to have been caused by the long saturated condition of the land, which, we all know, is a great enemy to potatoes, and it is likely to prove extremely detrimental to them this year. Those taken up at the beginning of August were tolerably good in quality; but since then, the rot has made its appearance to a most serious extent, and which is likely to cause really fine parcels to rule high for some months to come. This disease does not appear to be confined to the United Kingdom, but is very general throughout France and Belgium, as well as Holland. It is, therefore, fair to presume that the imports from those portions of the Continent will be very small during the remainder of this and the whole of next year.

Foremost in importance may be considered the operation of the new tariff, more especially that portion of it allowing the importation of live stock for our markets. Since the date of our last report, the arrivals from the continent have—as we have long since predicted would be the case—considerably exceeded those of any former period, they having been as under:—

LONDON.

	Head.
Beasts	715
Sheep	1183
Lambs	140
Calves	111
Total head	2149

About two-thirds of the above stock have reached us per steamers from Rotterdam—the remainder from Hamburgh. Respecting the quality of these arrivals, we may observe that it has been by no means first-rate, though several well made-up beasts have been received, particularly from Holland. At the outports, the numbers have been again good—466 beasts and 300 sheep having been received at Hull from Rotterdam, 75 oxen and cows at Glasgow from the same port, and 30 oxen at Southampton from Vigo, forming a total importation of 3,020 head, exclusive of the arrivals previously this year. The last Government returns give the annexed totals for the first six months of 1845, compared with those at the same time in 1844 and 1843:—

	Oxen.	Cows.	Calves.	Sheep and Lambs.	Swine.
Imported in six months in 1845.	3566	1667	102	1304	260
Do. in June, 1845.	1112	639	58	170	52
Imported in six months in 1844.	602	318	37	110	114
Do. in 1843....	422	155	17	95	153

Nothing could more fully test the accuracy of the views we have taken of this measure than the above decided increase in the importations. Some rather severe losses have been sustained at sea in the course of the month; but this will not deter those who are feeding for our markets from forwarding the supplies which we learn are now awaiting shipment hither. Still, these extensive exports are beginning to be severely felt in Holland, where we learn that the prices of meat—both live and slaughtered—have considerably advanced within the last two months. Looking at the arrivals, we find an increase in them this year of *five hundred and twenty per cent. upon those of* 1844, *and nearly eight hundred per cent. on* *those of* 1843—a staggering proof of what may be accomplished by such alterations in our import trade. We have made very strict inquiries respecting the slaughtered condition of the foreign animals, and we find that the Hambro' beasts, from their age, carry a larger internal weight of fat than those from Rotterdam, hence are more in favour with the butchers. As to that of the sheep little can be said, only a limited number of that description of stock coming to hand in a fat state. The beasts lately landed in Scotland were disposed of for grazing purposes, at present they are doing well in their pastures: but they are not progressing so rapidly as was expected, arising, we presume, from the change in food.

The plentiful supplies of pasture and other herbage have tended materially to benefit both beasts and sheep, which have rapidly improved both in weight and condition since our last. It is, therefore, by no means improbable that a further decline will take place in the value of mutton all over the kingdom within a few weeks from this time. As to that of beef, veal, and pork, we see no reason to expect much alteration in it.

The second crop of hay is likely to prove abundant, owing to the present fine condition of the pastures. Generally speaking, the hay does not appear to be well got in this season, from the long continuance of wet during the period it was on the ground.

From Scotland our advices are favourable. Less rain appears to have fallen there than with us; consequently, though the temperature has been comparatively low, the crops have gone on extremely well. The corn trade appears to have ruled steady, yet prices have somewhat fluctuated.

In Ireland harvest work is progressing rapidly, several parcels of new wheat and oats having been disposed of in Dublin market in fair condition. The yield of the wheats is well represented.

The principal hay markets have been very scantily supplied with old hay, the demand for which has ruled steady, at prices quite equal to those paid during several preceding months of the year. The supplies of new hay have been abundant; yet a large business has been doing at fair currencies.

The following is our usual statement of the supplies and prices of fat stock exhibited and sold in Smithfield cattle market during the past month The former have been as under :—

	Head.
Beasts	16,228
Cows	525
Sheep and lambs	151,330
Calves	2,205
Pigs	2,511

The following were the returns for the corresponding month in 1844 :—

Beasts	12,010
Cows	620
Sheep and lambs	195,412
Calves	1,290
Pigs	1,462

The above comparison exhibits an *increase* in the number of beasts this season of nearly *four thousand;* but a falling off in those of sheep by *thirty-six thousand head.* The prices this year and last—and which have ruled a trifle lower than advised in our last report—have been thus :—

Aug. 1845.

Per 8lbs., to sink the offals.

	s. d.		s. d.
Beef .... from	2 8	to	4 2
Mutton	3 4	,,	5 0
Lamb	4 8	,,	5 8
Veal	3 8	,,	4 8
Pork	3 2	,,	4 4

Aug. 1844.

Per 8lbs., to sink the offals.

	s. d.		s. d.
Beef .... from	2 4	to	4 0
Mutton	2 6	,,	4 0
Lamb	3 8	,,	4 8
Veal	3 4	,,	4 6
Pork	3 2	,,	4 0

For nearly every description of prime stock—but more particularly the best Old Downs—the demand has ruled steady, and good clearances have been effected. Otherwise, the trade has proved dull.

The bullock supplies have been derived from the following districts:—

	Head.
Norfolk, Suffolk, &c.	3,250
Northern counties	1,300
Western and Midland	2,400
Other parts of England	1,850
Scotland	2,085
Ireland	400

The remainder of the supplies has been received from abroad and the neighbourhood of the metropolis.

For the time of year, the receipts of slaughtered meat up to Newgate and Leadenhall, from Scotland and various parts of England, have been liberal, as will be seen by the annexed return.

Arrivals during the month.

	Beasts.	Sheep.	Calves.	Pigs.
Scotland	81	1,200	..	610
Yorkshire	104	1,180	..	650
Lincolnshire	105	340	..	..
Norfolk	37	140	..	60
Suffolk	20	60	..	50
Essex	98	220	230	460
Cambridgeshire	90	160	..	20
Surrey	97	310	420	620
Devonshire	104	130	..	50
Wiltshire	128	530	300	240
Other parts	180	750	570	820

Although the trade has not ruled very brisk, the demand may be considered steady, at about previous rates.

At the yearly meeting of the Nottinghamshire Agricultural Society, at Nottingham, on the 13th inst., Mr. Parkinson, of Ley Field, exhibited four animals of the improved Shorthorn breed, for which be obtained four first prizes, and a medal for the best bull exhibited.

METEOROLOGICAL DIARY.

Barometer.			Thermometer.			Wind and State.		Atmosphere.		
Day.	8 a.m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a.m.	2 p. m.	10 p. m.
	in. cts.	in. cts.								
July 22	29.97	29.97	57	65	57	E.byN. N.byE.	variable	fine	sun	cloudy
23	29.97	29.97	55	58	55	N. by East	gentle	cloudy	cloudy	cloudy
24	29.97	29.97	53	57	56	Northerly	gentle	cloudy	cloudy	cloudy
25	29.97	29.97	52	62	58	E. by South	calm	cloudy	cloudy	cloudy
26	29.97	29.97	57	65	58	N. West	gentle	cloudy	cloudy	fine
27	29.90	29.85	56	64	57	West	brisk	cloudy	cloudy	fine
28	29.79	29.65	48	62	53	S. West	gentle	cloudy	cloudy	fine
29	29.65	29.80	47	59	53	West. by N.	gentle	fine	sun	fine
30	29.80	29.62	48	60	53	S. Westerly	lively	fine	cloudy	fine
31	29.65	29.60	47	61	53	S. Westerly	lively	fine	cloudy	fine
Aug. 1	29.65	29.65	51	64	56	S. S. by East	variable	fine	sun	cloudy
2	29.46	29.52	54	59	55	S.E. N.W.	variable	cloudy	cloudy	cloudy
3	29.62	29.70	50	61	55	W. S. by W.	brisk	fine	cloudy	cloudy
4	29.70	29.71	54	65	57	Westerly	brisk	fine	cloudy	fine
5	29.66	29.69	56	65	58	Easterly	gentle	cloudy	cloudy	fine
6	29.82	29.83	55	65	57	W. W. by N.	variable	cloudy	sun	fine
7	29.83	29.80	53	63	55	W. by North	gusty	cloudy	cloudy	fine
8	29.86	29.86	50	65	57	N.W. S.W.	gentle	fine	sun	cloudy
9	29.54	29.57	55	63	53	S.W. N.W.	strong	cloudy	cloudy	cloudy
10	29.59	29.60	52	58	56	West	brisk	cloudy	cloudy	cloudy
11	29.64	29.77	54	63	56	W. N.W.	gentle	cloudy	cloudy	cloudy
12	29.85	29.97	53	63	58	N. West	gentle	cloudy	sun	cloudy
13	29.99	30.05	51	61	55	N. West	gentle	cloudy	sun	cloudy
14	30.01	29.90	55	59	54	N. West	gentle	cloudy	cloudy	cloudy
15	29.80	29.81	50	58	50	N. West	gentle	cloudy	cloudy	fine
16	29.86	29.90	45	51	51	N. by West	gentle	cloudy	sun	cloudy
17	29.91	29.88	49	61	52	Westerly	gentle	fine	sun	fine
18	29.87	29.66	47	62	55	S. West	variable	fine	sun	cloudy
19	29.38	29.40	52	60	53	S.W. West	strong	cloudy	cloudy	cloudy
20	29.55	29.77	49	60	52	N. Westerly	strong	fine	sun	fine

ESTIMATED AVERAGES OF AUGUST.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.26	29.350	82	41	61.6

Real Average Temperature of the period.

High.	Low.	Mean.
61.5	51.77	56.635

North and N. East Winds..	3¾	days.
East and to South	4½	
South and South West......	8¼	
West and to North	14½	

Weather and Phenomena.—*July* 22nd. Fine till evening. 23rd. Rain—gloomy—wet evening. 24th. Overcast. 25th. Gloom—rain—sultry, sun for a short time. 26th. Gloom—here ceases that singular motionless state of the barometer which commenced on the 21st. 27th. Rain—changeable. 28th. Rain—fine cloudy masses. 29th. Rain—cold showers—red fiery sunset. 30th. Rain incog. 31st. Rain—no quantity falls, but sufficient to keep every thing wet. *Aug.* 1st. Rain—fine day till evening—heavy showers. 2nd. Rain nearly all day. 3rd. Rain—heavy showers. 4th. Fine day and warmer. 6th. Rain early—then warm and finer. 7th. Rain in brisk showers—massy clouds—fitful wind. 8th. Pretty fine. 9th. Rain in quantity—rough weather. 10th. Rain—very damp. 11th. Rain—occasional gleams. 12th. Improved. 13th. Rain—cold dark morning—fine afternoon till six. 14th. Changeable. 15th. Rain morning—fine red sunset. 16th. Very cold—a little sun. 17th. Quite fine. 18th. Rain—very fine till evening. 19th. Extremely rainy. 20th. Clearing—a fine windy day.

Lunations.—Last quarter, *July* 26th, 3 h. 20 m. morn. New moon, *Aug.* 3, 7 h. 25 m. morn. First quarter, 10th day, 10 h. 41 m. afternoon. Full moon, 17th day, 1 h. 17 m. afternoon.

Remarks referring to Agriculture.—It has been too wet, not so as to quantity of rain, but by the ever-recurring frequency of trifling showers. Three fine days are all our locality can register. Oats and much wheat have been cut and are cutting; but none of the latter was carried on the 20th. Oats first ricked on the 17th or 18th. No injury appears, no discolouration; but the season has been most tantalizing, and far too cool to compare with the ordinary registered averages.

J. Towers, Maiden-head Thicket.

CALENDAR OF HORTICULTURE.—SEPTEMBER.

Retrospect.—A more singular summer has not often been noticed. July began with rain, several thunder storms occurred, and there followed a great tendency to wet weather. Blow the wind from what quarter it might, there was little melioration, and still less sun. August maintained the same characters, and to the 18th there were twelve days on which rain fell to a greater or less extent. It is always hazardous to speak of weather, for its condition depends upon local meteoric disturbances; and this ought to become daily more evident, as by provincial reports we are assured that the weather, in two or more localities not remote, may be altogether dissimilar.

So far as our own observations extend, there is an absolute deficiency of ground moisture; and, notwithstanding the fickle and perplexing state of the weather, there have been few soaking showers—no fall of rain in any degree sufficient to compensate for the protracted aridity of 1844, which was extended to Lady Day of the present year. Besides the proof obtained by trenching only to the depth of fourteen inches, when we have found clods hard, and dry almost as dust when broken up, we discern signs of low-seated drought in the flaccid state of deep-rooting perennial vegetables. These remarks may afford subject of inquiry and investigation, but otherwise, however, are of little utility. As to crops in general, the cabbages and broccoli—indeed all plants of *brassica*—have abounded with clubby defective centres; these have shown no tendency to grow, or produce healthy shoots, but curl, and are abortive in the middle. Fruit is late; currants and gooseberries were very fine and plentiful at the middle of August, though the white sorts of the latter, and that delicious berry, "Pitmaston Greengage," cracked and became worthless. Plums are very scarce; apples and pears very uncertain; peaches in places abundant, in others a short crop.

OPERATIONS IN THE VEGETABLE GARDEN.

Sow small salads, corn-salad and cresses at several periods as required; radish early, for a late crop; lettuce in a frame; winter spinach for the last time.

Transplant seedling cabbages or others from nursery beds; by becoming strong early in autumn, such plants stand the winter much better. Transplant cauliflower into their winter quarters, either for hand-glasses or in frames. This vegetable when finely grown is deservedly admired; but, generally, the white broccoli is better, for it is of extremely fine flavour, and rarely fails to heart well; nothing but intense frost destroys it, and the variety called "Miller's Dwarf" is very likely to stand even *that*.

Potatoes—the champions, and most others called "mediums" or middle-early, are ready; do not wait till the haulm be dead, but choose a dryish state of the ground, and take them up effectually when the plant becomes yellow.

To save seed stock, collect tubers of good form, sound, but not large, and expose them to the air and light till they be green; then store in a cool, dry place.

In the state of our present knowledge, when analytic chemistry has detected many certain facts containing the inorganic constituents of plants, leaving much to be yet discovered, every man of forethought should follow in the wake of science. Thus in the instance of potatoes, the haulm has hitherto been thrown away or misused. It is inconvenient to bury it, and yet its inorganic components ought to be given back to the soil. We would therefore burn the haulm, by which process the saline matters are collected in a small volume of the ashes; these should be scattered over the surface prior to re-digging the plot, and laying it up in ridges. Dung would supply the hydro-carbonous, decomposable substances required, and any intermediate crop might be planted without depriving the earth of those specific saline matters which a future crop of potatoes would require. Thus, in every instance—either by digging in green vegetable matter, or by burning such as cannot be so treated—the earth would receive back what it had contributed, at least to a considerable extent.

Celery will require nice earthing up; half the injury done is occasioned by allowing soil to fall into the hearts.

Gather seeds; cut and collect cucumbers for pickling—onions for the same purpose, and also as store bulbs. Trench and ridge dig every vacant plot, choosing the dryest weather; remove litter; kill weeds effectually, for they progress with the greatest rapidity at this season; and bring every part of the garden into neat autumnal order.

FRUIT DEPARTMENT.

Strawberries.—Plant all the main beds and rows early in the month; let the ground be deep and well dressed; we believe that wood-ashes furnish alkaline, and earthy *inorganic* substances very available to this fruit. Pot, or rather re-pot into 32's and 24's the prepared runners for forcing.

Peaches and *nectarines* ripen; suspend nets, gather the fruit tenderly, and train the shoots in open order, to ripen the wood of next year's bearers.

Store in dry weather such *apples* and *pears* as are ready. Train carefully the fig trees whose fruit has been gathered.

Vines, we fear, will entirely fail this year; but wine can be made of the green berries, and after gathering these, the young bearing wood should be pruned back, and exposed to the sun as much as possible, to cause it to ripen, as thereby a tree may be rendered more early fertile.

FORCING DEPARTMENT.

The late or autumnal vinery ripens its Hamburg grapes, and brings the West St. Peter's very forward. Damp is now to be guarded against, especially in a season like the present. Fires, to bring the flue into lively action by seven or eight o'clock in the morning, are necessary; and when the heat radiates front and back, *dry air* ought to be put on till afternoon. The flue being warm, no fire will be required at night. The pine pits are kept in full action, abating water; the plants grow rapidly at this season. The full grown plants, now in their largest pots, pass into the fruiting house, and are plunged in very gentle tan, or sand beds; water is withheld, and a low temperature created to bring the plants to a state of rest, prior to their final excitation. Thus a winter house of spring fruiters is prepared.

Melons still bear, and demand air by day, and closed sashes at night.

FLOWER GARDEN.

Plant evergreens, prune others, cut box-edgings at the commencement of the month: roll and mow the lawn, and regulate gravel walks. Cut away with scissors seed vessels and old flower stems. Take up from the *parterres* the smaller pelargonia, and other plants intended to be preserved, and let them be carefully potted in appropriate moulds.

After painting and white-washing the green-house, replace all the plants, having previously dressed and cleansed the surface soils and washed the pots.

FLOWERING-PLANT HOUSES.

Look to the repair and good order of the water-channels; for the safety of the plant depends on these circumstances. It has been hinted that when the gutters, as they are called, are made of paving tiles or bricks, jointed and coated with Parker's cement, they are subject to crack and leakage when out of use. It may be so, provided the water is removed after they are out of use in summer; but we have ocular proofs that the cement and tiling remain perfectly secure, when kept always full of water. Nothing can be more satisfactory than the operation of this mode of heating, but we greatly dislike the common coke cylinder furnaces, believing them to be expensive and troublesome. A furnace should always be employed which will keep alight, consume any rough material, and thus economize labour and fuel.

Frost is the agent most seriously to be guarded against; the channels should never be suffered to freeze, otherwise a most serious loss at a critical period would be incurred. We once knew a conservatory of plants ruined by the water being frozen solid in iron pipes.

AGRICULTURAL QUERIES.

FINGERS AND TOES IN TURNIPS, &c.

TO THE EDITOR OF THE MARK LANE EXPRESS.

SIR,—I wish, through the medium of your valuable publication, to obtain information respecting a singular phenomenon which has appeared throughout the crop of turnips of Mr. George Burgess, an eminent farmer, at Check-Hill, near Enville, and partially on some adjoining farms, and shall feel obliged to any of your numerous correspondents who can explain the cause, and suggest any means of preventing the evil in future.

The first appearance to which my friend's notice was attracted was the withering of the leaves, and on drawing the roots from the earth, he found small bulbs about the size of walnuts, to which excrescences are attached longitudinally of three or four times the size. From the sides of these also proceed smaller ones, somewhat in the shape of fingers and toes, tapering to points, and twisting over each other like the folds of a long worm stuffed into a phial bottle. The tap root is entirely gone, and the turnips valueless.

I at first thought a maggot inside may be the cause, but, on examination, do not find that to be the case; then I supposed it may be owing to bad seed, or to some particular kind of manure, but find that various manures were used, principally from the stables and fold-yard, and that the disease, if so it may be called, extends to four or five sorts of turnips, even the Swedes being affected by it, though in a less degree. I therefore conclude it arises from some peculiarity in the weather, and may possibly have been prevented by the application of salt or lime.

The farm last year produced almost the best turnips in the neighbourhood, and consists of light turnip soil.

Yours respectfully,

Kidderminster, Aug. 9. WILLIAM HOPKINS.

SIR,—Being a young farmer and a subscriber to your paper, and having taken a farm last Michaelmas, which is very subject to the common field thistle, and through neglect of my predecessor they have become quite injurious, being in large patches on my fields, I should feel greatly obliged, through the medium of your paper, if either yourself or one of your subscribers would let me know the best means of eradicating them at the least expense.

My neighbours being in the same predicament as myself in many instances, and even in one case after a summer fallow last year, they cannot give me the required information.

I know of one method—that is, to salt them heavily; but that will injure the crop for several years afterwards

I remain, sir, yours respectfully,

FRANCIS KIDNER.

Sunbury, Aug. 4th.

SIR,—Permit me to inquire, through the columns of your very valuable journal, the best and most advantageous mode of applying the refuse of fellmongers' and ganners' yards, consisting, as I presume, of lime, wool, flesh, sumac, &c.? Perhaps some one of your numerous and experienced readers will render me the necessary information, whether it is best to apply it to *pasture* or *arable land*—if the latter, to what crop it should be applied, the quantity requisite per acre, and the season for applying it—also if the article called sumac is pernicious to vegetation. A reply to the above inquiries will greatly oblige, yours,

St. Neots, Huntingdon, August 14. A SUBSCRIBER.

SIR,—I shall feel greatly obliged if any of your readers will inform me where I can purchase the rye-grass seed spoken of by Wm. Dickinson, Esq., at the Beverley meeting, which produced *ten crops* in one season. Also, what quantity per acre should be sown, and at what season? By inserting this question in your valuable journal, you will very much oblige

Your obedient servant,

Aug. 20. A SUBSCRIBER.

SIR,—Will any of your readers have the goodness to inform the writer of this, through the medium of your paper, where a good *portable* four-horse thrashing machine may be had, that will do its work effectually, and *not in the least break the straw*, but must come from the machine as straight as if threshed by the flail. A machine that breaks the straw is of no use in the neighbourhood of London. Q. E. D.

West Barnes, Surrey, Aug. 1.

SIR,—A friend of mine wishes to know how long the Italian rye-grass will stand in the ground after the first crop; but, as I have not sown any before the present season, I cannot satisfy him upon that point. Perhaps some one of your numerous correspondents, who is competent to give the requisite information, will be kind enough to forward me, through the medium of your excellent paper, the result of his experience upon the subject. If so, he will greatly oblige

Yours, &c.,

Simonsbath House, South Molton, H. H.
Devon, Aug. 18, 1845.

SIR,—Can any of your subscribers tell me whether the scarifier will eradicate thistles better than the plough? It is not generally used in this part, nor will my foreman use it. We plough and plough for ever, as the saying is, and the thistles increase twenty-fold every year upon us.—Yours, A VERY OLD SUBSCRIBER.

Suffolk, Aug. 21.

ANSWERS TO AGRICULTURAL QUERIES.

Our old Subscriber, J. H., must give proper notice to his neighbour that the trees overhanging his land are detrimental to him, and desire him to remove the overhanging branches in a given time, which if he does not do, Subscriber will then be justified in lopping them off himself.

TO THE EDITOR OF THE MARK LANE EXPRESS.

To the question of our correspondent, "S. L., of Hitchin" (received too late for the paper of the 29th), we offer it as our decided opinion—founded upon twelve years' experience, and also upon information derived from extensive observation—that LUCERNE *can not only be grown*, but will thrive perfectly, bringing luxuriant crops, on a strong loamy soil, which many would consider clayey. As to pure stiff clay, such as the blue clay of London, we know of no trial; but, on a marl, or loam so strong as to bind and clod hard under the sun's influence, after being wet by rain, we see no cause of doubt or hesitation, provided the *subsoil* be chalk, or even gravel over chalk. The Isle of Thanet proves the efficacy of, and security during the driest summers obtained by, such a subsoil of chalk; but a pure clay, forming a tenacious bottom, should be deprecated. As to "galt," we must plead ignorance, after searching in vain for the term in three or four competent works; one of which is Mr. Stephens's admirable "Book of the Farm," where thirty pages of the first volume are devoted to the consideration of soils.

Whenever a sound staple, however strong, rests upon a good drainage bottom, it can be meliorated by labour, particularly in the case of Lucerne, where *coal ashes* might be applied at the first preparation; and subsequently as top dress, prior to the hoeing, which should be given after the crop is mowed for green fodder.

SIR,—For the information of your correspondent, Q. E. D., at West Barnes, Surrey, who wishes to know where he may purchase "good portable four-horse power thrashing machines, to work effectually, and not in the least to break the straw;" we beg to say that we have been for many years makers of such machines, and shall be happy to afford your correspondent every particular respecting them upon receipt of his name and address.—We are, sir, your most obedient servants, RICHARD GARRETT AND SON.—*Leiston Works, near Saxmundham, Suffolk, Aug.* 8.

SIR,—In answer to a correspondent in your paper of the 4th instant respecting thrashing machines, I beg to say that I can furnish the writer with a portable one, of four or five horse power, that will thrash cleaner and not injure the straw so much as if thrashed by hand.

The proprietor will warrant the machine, and if not approved of may be returned after a month's trial.

By inserting the above you will oblige, yours, &c.,

THOS. HUMPHRIES,
Agricultural Machinist.

Pershore, Worcestershire, August 6.

AGRICULTURAL INTELLIGENCE, FAIRS, &c.

CREDITON FAIR was remarkably well supplied with cattle of every description, particularly sheep, which, however, the butchers say were in very bad condition, and which declined in price, although some good lots sold at 6d. per lb. Bullocks also were disposed of at lower prices, except those adapted for feeding, on which there was a good sale.

BEDFORD FAIR.—There was an unusually large supply of stock. There were more sellers than buyers, and consequently the trade was dull and heavy. The prices were from 2s. to 3s. lower in sheep than were quoted a fortnight back, and beasts were lower in the same proportion.

BEDALE FORTNIGHT FAIR.—There was a good show of both beasts and sheep, and a good attendance of buyers. Fat beasts sold from 5s. 6d. to 6s., and prime 6s. 6d. per stone. In-calvers met with ready sale, with a little advance in price. Lean stock was also in demand. Fat sheep sold from 5½d. to 6d. per lb. There was a good sale for lambs: country-bred lambs sold at about 25s.; Scotch do., 13s.

SAXMUNDHAM LAMB FAIR was numerously attended by all the principal farmers and dealers in the neighbourhood, and there were present also several dealers from Essex and Norfolk. There were several flocks of sheep and lambs penned, and the trade commenced brisk and continued so throughout the day; nearly all the lambs were sold, at prices varying from 15s. to 25s. per head. Shearlings fetched 28s. to 35s., according to their condition. Crones sold at 17s. per head. Fat bullocks and sheep met a ready sale at 8s. per stone of 14lbs. There were a few lots of young store beasts, which were all sold.

FALKIRK AUGUST TRYST.

TUESDAY, Aug. 12.

This is the first great market in Scotland for Argyleshire, Angus, Aberdeenshire, and Morayshire cattle.

There are no sheep at this (August) Tryst; consequently the sales did not commence till Tuesday. The day was fair throughout the whole day, and the ground was in fine order for the occasion. Sales were long in commencing, few having been effected before eleven o'clock, holders of stock standing out for high prices, and intending purchasers firmly declined to give the prices asked, consequently this may be designated "a dull and dear market."

Upon our entering the ground, it struck us as having more the appearance of a September or October tryst than of an August one, there being from a third to a fourth more cattle on the ground than has appeared for some years past at the August tryst. There was a great want of stir and animation throughout the whole day, and sales continued languid till the close of the market.

As compared with last year's August tryst, we have to quote Argyleshire and north country cattle, black cattle, one and two years old, at an advance of from 10 to 18 per cent. up: whilst for Aberdeenshire, Angusshire, and Morayshire beasts, of two and three years old, being fat and half fat, the rise in price was not nearly so great—in general about 5 per cent. There were above an average proportion of the supply from Buchan and Garry. Holders of stock gradually gave way as the day advanced; and, to a certain extent, purchasers also advanced their offers in the afternoon; the market, however, continued languid throughout, and a good many remained unsold, and we should suppose that a number will appear on the ground to-morrow (Wednesday).

We may mention that the description of stock brought forward to-day could not, either as to breed or numbers, be properly considered as known stock, generally speaking, much of it being (in the railway sense of the term) merely brought forward as *feelers*. As compared with the usual Falkirk trysts, only a few English dealers were present, which, together with a scanty supply of second crop grass, partly damped the demand for beasts; however, if they could have been had worth the money in the southern markets, there were a number present sufficient to have cleared the market; but those from the south maintain that the prices asked were such, that they could not venture to purchase for the southern markets. The only English dealers we noticed were the Messrs. Carmichael and the Messrs. Stobbs, from Northumberland; the Messrs. Brown, from Carlisle; Mr. Midsley, Yorkshire; and Mr. Bray, from Lincolnshire. There were also five or six from Dumfriesshire, for small beasts.

A rather novel feature has sprung up in the market this year, from a considerable number (600 or 700 to-day) of Irish cattle having been brought forward; the presence of this sort of stock in the Falkirk tryst may be accounted for partly from the facility of transmission, and perhaps more particularly from more attention as to breed, the Irish cows being crossed by fine shorthorn breeds.

What tended to make the holders of stock stand out more firmly was the fact of a number of sales having been effected last evening at higher prices than what could be obtained in market to-day. The first sale we heard of was for a lot of very good stirks (stots) from Mr. A. M'Arthur, Lochaber (six quarters old of course), at 3*l.* 10s. a head; they were purchased by Mr. Gray, Balmaclelan. A lot of two and three year old queys, from Argyleshire, Mr. M'Naught's, Dumbartonshire, fetched 4*l.* 15s.; and a lot of Argyleshire, two years old, at 3*l.* 15s.: this last lot was from 5s. to 7s. 6d. a head up from last August tryst. Forty head of two years old stots, from Skye, fetched 4*l.* 4s.—last year 3*l.* 10s.; they were sold by Mr. Donald Cameron, Euchrea, Lochaber; this gentleman sold twenty head of the same breed, two years old, at 4*l.*; and another lot at 3*l.* 5s. This last lot was bought by Mr. Anderson, of Dumfries. A lot of forty head of two years old, from Morven, Argyleshire, fetched the second top price, 6*l.* 10s. Mr. Alex. M'Farlane sold the top priced two years old west Highland stots at 6*l.* 14s. a head. A lot of spotted cattle in very good condition fetched 13*l.* 15s. A lot of Lewes two years old fetched 3*l.*—last year 2*l.* 15s., and same condition. A lot which had been purchased yesterday month from Mr. Fraser, banker, Dornoch, at the Kyles of Sutherland, for 4*l.* 4s., were sold yesterday for 4*l.* 10s. a head, being a loss of fully 2s. 6d. each; indeed, we may mention that in several cases dealers complained that they had sustained loss on recent purchases, while we understood in other cases, especially from the West Highlands, good profits had been realized. This stock gave 4*l.* and 4*l.* 5s. at the August tryst last year. A lot of three years old Mull queys fetched 6*l.*—last year 5*l.* 8s. and 5*l.* 10s. A lot of two years old Lewes cattle fetched 3*l.* 12s. 6d.—last year 3*l.* 5s.; they were for the county of Essex this year. Another lot of Lewis two years old stots fetched 2*l.* 15s.; this lot was also for Essex. Other lots were bought by Mr. Bray, of Lincolnshire; Mr. Bray also bought a lot of small ponies at 3*l.* 5s. each. Mr. Flockhart, salesman, Edinburgh, sold mixed Highlanders at 5*l.* 10s. and 5*l.* 15s., two years old. A lot of small West Highland stirks fetched 1*l.* 10s. a head; they were from Dumfriesshire. A lot of three years old Aberdeenshire, half fat, fetched 13*l.* 15s. for Overtown, Kirkliston. Generally good two years old West Highland stots fetched from 5*l.* to 6*l.* 10s. Mr. Cameron, of Corrychoilie, sold a lot of two years old Argyleshire at 5*l.* 10s., and a lot of three years old ditto, queys, at 7*l.*, to Mr. Riddell, of Cumberland.

Heavy Cattle.—Mr. Fife, Kirnemuir, a lot of Angus, half fat, three years old, fetched 11*l.* 10s., and a lot of three years old Ross-shire at 11*l.* 15s., and a third lot of Angus three years old at 10*l.* A lot of fat Angus fetched 14*l.*, being about 7s. 6d. per Dutch stone. A lot of two and three years old Angus fetched 8*l.* 15s., to winter in Fifeshire. A lot of two and three years old Perthshire queys fetched 7*l.* 10s.—last year 6*l.* 15s. and 7*l.* Twenty head of two years old Angus for graziers fetched 5*l.* 5s.—last year 4*l.* 7s. 6d.; and twelve head of half fat cross Angus two years old, for feeding out, at 7*l.* 10s. Mr. Campbell, salesman, bought three years old Angus at 12*l.* 10s., strong-boned, to put on turnip in Mid Lothian. Mr. J. Archibald, dealer, Edinburgh, bought a large lot of Angusshire half fat at 11*l.*, three years old.

Fife Breed.—There were none of the Fifeshire breed shown.

Irish Cattle.—Mr. M'Alroy sold year-olds at 6*l.* 6s., strong boned, and two years old at 10*l.* a head, and several other lots at proportionate prices, but all at a shade below Edinburgh prices.

Fat Cattle.—A lot of 42 head of prime fat cattle were bought by Mr. Bell, flesher, Glasgow, at from 7s. 9d. to 8s. per Dutch stone; other lots of fat cattle realized about 7s. 9d. Dutch, and all sold.

Horses.—There were a good number of horses shown, but all of an inferior sort; in fact there was only one really good, a draught horse, which sold at 44*l.* There was neither hunter, harness, riding, coach, nor other draught horse, fetched a price worth quoting; consequently, any sales effected form no criterion as to the price of horseflesh. There was a demand for good horses, but they were not to be had.

Milch Cows.—A good number of milch cows appeared, for which there was a dull sale, owing to dealers having bought at higher prices at Rutherglen than they could realize at this tryst.

Wednesday, Aug. 13.

To-day there appeared a great part of yesterday's unsold stock. Up to twelve o'clock scarcely a sale was effected. There were very few buyers on the ground, the principal ones having left early yesterday afternoon, in order to be in time for other markets to be held this week. After five o'clock last evening, beasts were selling from 5s. to 7s. 6d. per head less than was offered for them in the former part of the day. Before sellers will get their beasts sold to-day, they will have to submit to considerable sacrifices. From the appearance of the market there will be a great many left unsold of both West Highland and north country cattle. To those who sold on Monday evening, or early on Tuesday morning, the tryst has proved a good one; but those who hung back from twelve o'clock yesterday, have either lost money on what they have sold, or have not sold at all.

REVIEW OF THE CORN TRADE

DURING THE MONTH OF AUGUST.

Though the early part of the summer was not particularly favourable, there were no just grounds for uneasiness as to the probable result of the harvest till about the middle of June; the very inauspicious weather since experienced has, however, given rise to serious apprehensions, and there is too much reason to fear that both the quantity and quality of this year's crop of wheat will prove defective. It has been ascertained beyond doubt that the cold rain which fell about the blossoming time caused the grain to set imperfectly; the defect thereby occasioned would of itself have been sufficient to prevent a very large yield, however auspicious the weather might afterwards have become. So far, however, from subsequent events having occurred to counteract the ill effects of the injury complained of, the general character of the summer has been the reverse of propitious. Abundance of rain, days without sunshine, and nights so cold that the thermometer frequently fell to 45 and even 42°, both in July and August, were certainly not calculated to remedy the original defects; indeed, it may be regarded as surprising that the prospects are not far worse than they are.

The absence of genial warmth, whilst it has retarded the crops, has, in one respect, been fortunate, for had the wet been accompanied by heat, one of the worst evils which can at any time befal the crop must have occurred, viz., that of the grain vegetating in the ear. Since the 20th inst. the weather has been very fine, previous to the auspicious change which then took place, most parts of the Kingdom were visited by a heavy fall of rain accompanied by a violent gale of wind, by which extensive mischief was done to the growing corn. The storm was much more severe in the northern and eastern counties than in the south, and the reports from some of the districts over which it passed are of a very distressing nature.

Harvest operations were partially commenced in the earlier localities the first and second weeks in August, but reaping was by no means general even in the southern counties till the 18th; for two or three days subsequent to that date the work was totally suspended in consequence of the rain, but latterly it has been proceeded with under more auspicious circumstances.

Hitherto, comparatively little new wheat has been brought forward at any of the markets in the agricultural districts, and the test of thrashing has not as yet been tried on a sufficiently extensive scale to admit of an accurate estimate being formed relative to the yield per acre. It is almost universally admitted that there is a decided deficiency; but to what extent, it is at present impossible to determine. At one time it was believed that the falling off in the home growth would be so great as to render a large importation absolutely necessary, and even now many well informed parties adhere to that opinion. Had there not been a very large stock of old wheat in the hands of the growers to meet the extra demand caused by the lateness of the season, (the harvest being at least a month later than last year,) we should ere this have been under the necessity of importing; hitherto, however, the farmers have been enabled to keep the markets plentifully supplied, and notwithstanding the enormous quantities brought forward of late, a considerable stock is still, we believe, in the hands of the growers. To enable our readers to form a correct notion of the extent of the supplies, we beg to submit to them the following comparative table of the quantities sold at the towns from which the returns are collected for compiling the averages during June, July, and August, this year, and in 1844. The difference between the two periods is, it will be seen, upwards of fifty per cent.

Week ending	1845. Qrs.	Price. s.	d.	1844. Qrs.	Price. s.	d.
June 7..	120,143 at	47	7 ..	95,399 at	55	6
14..	108,254	48	2 ..	103,354	55	9
21..	109,041	47	10 ..	96,865	55	8
28..	102,358	47	11 ..	86,823	55	9
July 5..	98,243	47	11 ..	83,193	55	8
12..	105,629	48	10 ..	84,387	54	10
19..	117,093	50	0 ..	83,728	54	1
26..	118,666	51	7 ..	86,756	52	9
Aug. 2..	139,009	53	3 ..	78,491	51	0
9..	165,574	55	3 ..	62,105	48	10
16..	172,628	57	0 ..	66,010	49	1
23..	162,977	57	0 ..	85,814	50	4
Total..	1,519,615			Total.. 1,012,925		

Notwithstanding the abundance of the supplies the prices continued to advance until they had actually risen from 10s. to 12s. per qr. from the lowest point: this occurred in the early part of the present month; then, however, buyers began to act on the reserve, and the deliveries from the growers having, in the meanwhile, rather increased than fallen off, a reaction to the extent of from 3s. to 5s. per qr. took place. Whether the downward movement will continue must depend, in some measure, on the ability of farmers to keep the markets fully supplied. Should the demand once overtake the supply, prices would immediately rally. This, however, is by no means to be desired; present prices are sufficiently high to remunerate the producer, without being so high as to occasion serious inconvenience to the consumer; any material rise on the existing rates would cause distress among the poorer classes, without being of ultimate benefit to the agriculturist. In that case the averages would speedily rise, so as to cause a low duty; speculators, who have long been on the look out, would immediately clear in the bonded stocks for consumption; and our foreign neighbours would not be slow to take advantage of the event, to send us as much of their surplus stock as they could manage to spare: the foreign merchant and the speculator would therefore be the parties most likely to be benefited. We are inclined to think that our farmers have acted wisely in thrashing out and supplying the markets freely; by these means they have rendered any tampering with the averages difficult, realized good prices, and prevented the outcry against the corn-laws which would unquestionably have been raised had anything like scarcity been experienced.

The arrivals of English wheat into London have been the largest we ever recollect in the month of August. During the three weeks, ending the 23rd instant, the amazing quantity of 42,005 qrs. has been received, independent of good supplies of country manufactured flour. Prices were, nevertheless, well maintained till Monday the 11th, and even then the decline did not exceed 1s. to 2s. per qr.; the abatement then conceded caused an improved inquiry, and large sales were made during that week; on the 18th, however, there was again an enormous display of samples at Mark Lane, and the day being comparatively fine, factors lost confidence: a further reduction of 2s. to 3s. per qr. was the result. The heavy rain of the following day caused a partial reaction to the extent of 1s. to 2s. per qr., but the fine weather since enjoyed has rendered it impossible for sellers to make further sales at the improvement, and the business done on Monday last (25th), was at rates quite 2s. per qr. below those current on that day se'nnight.

It is not to be supposed that the whole of the 42,005 qrs. wheat received this month have gone into consumption. The millers are certainly better stocked than at any previous time for some months past, and even should the receipts now become moderate, no immediate want is likely to be felt. A considerable proportion of the supply has been taken by speculators, some of whom are likely to wish to effect re-sales, which may also be expected to act as a check to an early advance. At the same time, we feel fully pursuaded that the value of old wheat will not fall materially, and that it will, later in the season, be in much request for mixing with the damp and inferior samples of new. No wheat of this year's growth was exhibited for sale at Mark-lane till the 25th instant, and then the quantity was insignificant; a few of the lots shown were of fair quality; none really fine, and the greater proportion very inferior. The best white brought 58s. to 60s., and for the ordinary kinds only from 48s. to 55s. per qr. was obtained.

The abundance of English wheat has caused free foreign to be neglected, and though the quantity of the latter remaining in warehouse is trifling here as well as at the outports, prices have gradually tended downwards since the first week in August. The actual decline has not, it is true, been great, as holders have refrained from pressing sales; but had any anxiety to realize been manifested, it would have been necessary to have submitted to rather an important reduction to have placed large quantities. As compared with the quotations at the close of July, prices are, however, still high, the advance subsequently established having been only partially lost. Superior high-mixed Danzig could not at any period of the month have been bought below 65s. to 66s., nor are there yet sellers under those rates. Fine Rostock and similar descriptions of red wheat continue to be held at 60s. to 62s. per qr.; but it must be remarked that these terms have become almost nominal, our millers having given the preference of late to wheat of home growth, which they have been enabled to purchase relatively cheaper.

A good deal of speculation has taken place in bonded wheat during the month, and rather considerable orders have been forwarded to the Baltic on British account. For parcels already here, as well as for cargoes to arrive, extravagantly high prices had been demanded, and in many instances obtained. The best qualities of Danzig have been sold under lock at 50s., and superior red at 45s. to 46s. per qr., whilst for free on board Danzig cargoes 42s. to 44s., and for Rostock, Stettin, and other favourite varieties of red, 38s. to 42s. per qr. have been realized. How the speculation will ultimately turn out remains to be proved. To realize a profit on these rates, it will be necessary for the duty to fall to a low point, of which, at present, we see no great prospect. The averages have certainly got up very considerably; but it will be found a much more difficult matter under the present than under the previous corn-law to reduce the duty to a low point. Hitherto the first rest in the scale has not been got over; and unless a fresh impetus be given to prices by untoward weather, or some other unforeseen cause, we much question whether wheat will be admissible for home consumption for some time to come below 17s., or perhaps 16s. per qr. Add the lowest of these two rates to the prices paid on the other side, with 5s. to 7s. per qr. for charges, and it will at once be observed that the chances of a profitable result are not very great.

Spring-sown corn not being so easily injured by a wet summer as wheat, promises a much better return. In respect to barley the reports are on the whole of a satisfactory character, the only complaint being that of its having been a good deal lodged by the rain, in consequence of its extreme luxuriance. Should September prove auspicious for the ingathering, the yield of this grain would undoubtedly be very great. As regards the quality we cannot speak with the same confidence: much of the produce must be expected under any circumstances to be coarse; and we are inclined to think that really fine malting samples will be comparatively scarce.

The old stocks appear to be quite exhausted in all parts of the kingdom; at many of the markets supplies have for weeks past totally ceased, and the arrivals into London have for the last month or two been unusually small; had the demand, therefore, been at all active, the value of the article must inevitably have risen materially. Such, however, has not been the case; beyond a trifling inquiry for feeding purposes, and an occasional speculative purchase of the finer sorts, very little has been done; but, moderate as has been the sale, some trifling improvement has taken place in prices, good distilling sorts having latterly commanded 30s. at Mark Lane, and grinding parcels from 24s. to 26s. per qr., according to weight, sweetness, &c.

The high duty (9s. per qr.) has prevented any entries of foreign for home consumption, but the stocks in bond have recently been decreased by shipments to Holland and Belgium, where, in consequence of a great deficiency in the potato crop, all articles likely to be used as substitutes for that important root have risen materially in price. It may not be amiss to notice, in this place, that the same disease which is reported to have attacked the potatoes so extensively on the continent has made its appearance in a modified form in the Channel Islands, as well as in some of the southern and western counties. From what we have been able to learn of the subject, it appears to be a species of blight, manifesting itself first by the discolouration of the haulm, but afterwards extending to the roots. In some parts of Kent the complaints are very general; but we are happy to say that neither from the north and east, nor from Ireland, have we as yet heard any mention made of the disorder, and we are therefore inclined to hope that it may not prove serious in Great Britain.

Oats, like barley, have been rather benefited than injured by the prevalence of showery weather, and if well secured, the produce, taking the whole of the British islands together, is likely to exceed an average. Where reaping has been commenced, and this has been pretty generally the case both on this side of the Channel and in Ireland, the quality and quantity are described as extremely good. At Liverpool several small parcels of new Irish have been received, as well as meal made of the new produce, and report speaks very favourably of the mealing properties of this year's growth. In Scotland the crops are unusually backward, but in other respects the prospects are by no means bad there, and, on the whole, we feel disposed to believe that the produce of oats, provided no injury be done by unpropitious weather, will be satisfactory. The trade in this grain has remained quiet throughout the month : the scarcity of British grown corn would in all probability have caused a small advance in prices, had not good supplies of foreign been received. Even with the assistance of the arrivals from abroad, the finer sorts have rather risen in value. At Mark Lane the best English and Scotch feed oats have commanded from 25s. to 27s. per qr., prices which were barely obtainable in July; secondary sorts have, on the other hand, rather receded than advanced, owing to the comparatively low terms at which free foreign have been offered. Danish, Swedish, and similar descriptions of oats have been selling at from 20s. to 22s., and Archangel at 21s. to 21s. 6d. per qr., duty paid. Of the latter the receipts have been important within the last fortnight, and a further large quantity is believed to be close at hand. The quantity of this year's shipments from that port is very good, many of the cargoes averaging 40lbs. weight per bushel. Archangel oats are always a favourite sort with the London dealers, and whilst they can be had on the moderate terms named, Irish, are likely to be neglected. At one period there appeared some chance of the duty on this grain falling a step or two, but latterly the averages have not come so high as expected, and, from the fact of the existing rate (6s. per qr.) being freely paid by the importers, it would seem that they have given up the idea of any decline occurring later in the year.

The outstanding crop of beans is, on the whole, tolerably well spoken of. At one time its appearance was splendid, but the excess of moisture seems to have encouraged the growth of the haulm at the expense of the pods ; and we do not think the yield will be equal to what was expected earlier in the season. Of old beans there are very few remaining, and, as the new cannot for a considerable time be fit for use, the present value of the article, high as it is, seems likely to be maintained. In the London market the current price has become 40s. for fine quality, and in other parts of the country even higher rates have been paid ; the averages have consequently continued to tend upwards, and the duty to recede. On the 15th instant it fell to 2s. 6d. per qr. ; and from the present aspect of affairs it is by no means improbable that it may decline to the minimum point. Under these circumstances, Egyptian and other foreign sorts have brought high prices in bond. The stock under lock is by no means large : by the last official returns it appears that, on the 5th of August, there were only 55,580 qrs. in the kingdom, of which 17,164 qrs. were in the London warehouses.

Respecting the crop of peas, the accounts vary materially. Some of the early varieties have unquestionably suffered extensively from the wet ; in many places the pods are said to have opened, and allowed the peas to escape ; and by this means alone the productiveness of the crop is likely to be detracted from. The reported injury has, however, failed to produce any effect on prices, and, with very scanty supplies and a strictly retail demand, quotations of the article have remained very nearly stationary. The transactions in the London market have been on a strictly retail scale ; white boilers, of which there are still a few parcels of foreign in warehouse, have scarcely been inquired for ; the nominal price has been and still continues 36s. to 38s. A few small lots of new English have come forward, which have sold at 40s. to 42s. per qr. No new nor old grey or maple peas have for some weeks been exhibited, and the first arrivals of the present year's growth are likely to command high rates.

Early in the month the town millers succeeded in fixing the nominal top price of flour at 53s. per sack, being a rise of 4s. on the former quotations : other sorts rose in the same proportion, and for some weeks the enhanced terms were pretty freely paid ; latterly, however, the bakers have declined entering into further contracts ; and on Monday, the 25th inst., Norfolk and other ship marks were in vain offered at 40s. per sack in the river, being a decline of fully 2s. per sack from the highest point. The arrivals of flour from Canada have not been so large as was expected this season, and full prices have consequently been obtained for the article. From the United States very little has come to hand, and the few parcels of sweet in the market have commanded high rates.

Before bringing our remarks on the trade to a close, we deem it right to take some notice of the probable result of the wheat harvest abroad, the stocks held at foreign ports, and the fluctuations which have taken place in the value of the article in those countries from which, in case we should hereafter require a supply, we are most likely to receive it. With the exception of Holland, Belgium, and part of France, where even a greater amount of rain appears to have been experienced during the summer than in Great Britain, the weather seems to have been more auspicious on the continent than with us. From many of the large wheat-growing countries, where early in the year we received unfavourable reports as to the crops, the advices recently received represent the prospect as much improved. July, which was a cold, wet month here, was comparatively warm and dry in many of the countries bordering on the Baltic, and there can be no doubt that sufficient wheat will be grown in Poland, Prussia, and other parts of Germany, to afford a considerable quantity for exportation. At Danzig there is, besides a large stock of old, not far short of 400,000 qrs.; but at the Lower Baltic ports little or no Wheat remains on hand. The advance which took place in this country in July was immediately followed by a corresponding rise at the principal continental markets, whilst the recent reaction in prices here has not been so readily responded to. The highest price paid for wheat at Danzig, in August, has been 46s. per qr., and, by the latest accounts, really fine high mixed, the growth of 1842, continued to be held at that rate, though the news of a fall of several shillings per qr. in the British market had been received there. The firmness of holders had, no doubt, been increased by the accounts from Holland, where, in consequence of the failure of potatoes, wheat was known to have risen 7s. to 8s. per qr. The shipments from Danzig to England do not appear to have been on an extensive scale, owing partly to the exorbitant demands of holders, and partly to the scarcity of vessels. Many of the ships chartered to load wheat to London had been taken up at 4s. to 4s. 3d. per qr., being a higher freight than that paid at any previous time this summer.

At Rostock, Stettin, and the neighbouring Pomeranian and Mecklenburg ports, very little business has been done, in consequence of the almost total exhaustion of the stocks of old. The harvest, which was rapidly being brought to a close, would, it was expected, prove very satisfactory in those localities. We have ourselves seen samples of the new produce from Stettin and Rostock; the wheat is of fine quality, and the barley fully as good as grown in those countries in average years. The last sales of old wheat made at Rostock were at 40s. to 42s. per qr., and the same prices were asked at Stettin on the 19th August.

At the Mediterranean ports the value of wheat has, in anticipation of England requiring supplies, risen even higher than in the Baltic. The crop in Italy is described as defective; and though there are rather large stocks of Black Sea wheat at Leghorn, as well as at Marseilles, the high terms asked at those places will, we think, prevent any speculative purchases of importance being made there on British account.

From Odessa we learn, under date of 4th August, that some extensive transactions had taken place, partly for shipment to this country, but principally in execution of orders received from different places in the Mediterranean; ordinary qualities had sold at equal to 19s. to 21s. and the best samples at 25s. to 28s. per qr. free on board.

From the United States, as well as from Canada, the reports relative to the wheat harvest are on the whole favourable. In some of the states the crop is said to be rather deficient, but the falling off in one place appears to be about balanced by the superior yield in another. As a proof that the total produce is considered good, we may mention that prices of both wheat and flour had receded at several of the principal ports.

By the latest accounts from Canada we learn that the crops had not then been secured, but they were described as promising, and quotations at Montreal had consequently tended downwards, though stocks were by no means large there; we expect, however, that the advices which left this country about the latter end of July and the beginning of the present month have, ere this, wrought a material difference in the position of affairs on the other side of the Atlantic, and are fully prepared to hear, by the next accounts, that an advance has taken place, not only in the Canadian, but also in the markets of the United States.

CURRENCY PER IMPERIAL MEASURE.

AUGUST 25.

WHEAT, Essex and Kent, new, red	56	58	White 60	62	66
Old, red	58	60	Do.	62	64
RYE, old	32	34	New	36	—
BARLEY, Grinding, 28 30 Malting	30	32	Chevalier	33	—
Irish	24	26	Bere	25	—
MALT, Suffolk and Norfolk	58	63	Brown	56	60
Kingston and Ware	60	—	Chevalier	65	—
OATS, Yorksh. & Lincolnshire, feed	23	24	Potato	24	26
Youghall and Cork, black 20	21	—	Cork, white 22	—	
Dublin	21	22	Westport	22	23
Waterford, white	21	22	Black	21	22
Newry	23	—			
Galway	20	21			
Scotch, feed	24	26	Potato	25	28
Clonmel	22	23	Limerick	22	24
Londonderry	22	23	Sligo	22	23
BEANS, Tick, new	38	40	Old, small	40	42
PEAS, Grey	38	40	Maple	38	40
White	38	40	Boilers	38	40

SEED, Rape 27*l.* 28*l.* Irish .. 22*l.* 26*l.* per last.
Linseed, Baltic .. 38 44 Odessa 45 47
Mustard, white 12 15 brown 10 12 per bush.
FLOUR, Town-made 51 53 Suffolk 42 — per sk. of 280lbs.
Stockton and Norfolk 42 — Irish 42 44

FOREIGN GRAIN AND FLOUR IN BOND.

WHEAT, Dantzic	46	—	fine	48	50
Hamburg	38	40			
Rostock	42	44			
BARLEY	19	23			
OATS, Brew	17	18	Feed	14	17
BEANS	28	29			
PEAS	28	32			
FLOUR, American, per brl.	24	—	Baltic	21	—

IMPERIAL AVERAGES.

Week ending	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.	
July 12th	48	10	29	0	22	6	31	11	39	8	38	11
19th	50	0	29	6	22	4	32	8	39	9	40	2
26th	51	7	29	2	22	5	31	7	40	8	38	10
Aug. 2nd	53	3	29	8	22	5	34	6	40	5	41	0
9th	55	3	29	7	22	8	33	10	41	0	39	0
16th	57	0	29	4	22	2	34	4	41	2	39	7
Aggregate average of the six weeks which regulates the duty.	52	8	29	4	22	5	33	6	40	4	39	7
Duties payable in London till Wednesday next inclusive, and at the Outports till the arrival of the mail of that day from London	18	0	9	0	6	0	9	6	2	6	3	6
Do. on grain from British possessions out of Europe	4	0	0	6	2	0	1	6	2	0	2	0

COMPARATIVE PRICES OF GRAIN.

WEEKLY AVERAGES by the Imp. Quarter, from the Gazette, of Friday last, Aug. 22nd, 1845.	s.	d.	AVERAGES from the corresponding Gazette in the last year, Friday, Aug. 23rd, 1844.	s.	d.
WHEAT	57	0	WHEAT	49	1
BARLEY	29	4	BARLEY	34	6
OATS	22	2	OATS	20	0
RYE	34	4	RYE	35	11
BEANS	41	2	BEANS	35	7
PEAS	30	7	PEAS	33	7

Account shewing the Quantities of Corn, Pulse, and Flour imported into the United Kingdom, in the month ended the 5th Aug., 1845; the Quantities upon which Duties have been paid for Home Consumption during the same month, and the Quantities remaining in Warehouse at the close thereof.

Species of Grain.	Quantity imported.			Quantity entered for consumption.			Quantity remaining in warehouse.		
	qrs.	bush.		qrs.	bush.		qrs.	bush.	
Wheat, from British Possessions	5372	2		5384	5		92	5	
Oats, do.	3976	2		3809	4		106	6	
Peas, from do.	4201	0		4656	4		—		
Beans, do.	2	0		2	0		—		
Indian Corn, do.	1004	0		314	4		689	4	
Wheat, foreign	55093	1		884	3		11294	2	
Barley, do.	9008	6		1306	5		57714	7	
Oats, do.	65759	4		60830	2		98589	6	
Peas, do.	3260	3		3297	7		12607	1	
Beans, do.	20143	7		11039	1		55580	4	
Indian Corn, do.	1478	3		251	1		8125	0	
Buck Wheat, do.	467	5		—			467	5	
	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.
Flour from British Possessions	95190	0	20	95693	2	17	2717	2	13
Flour, foreign	642	0	2	80	1	12	221914	2	24

PRICES OF SEEDS.

AUGUST 25.

There was not much doing in Seeds. Canaryseed, of which the yield is expected to be rather short, was held for quite as much money as on Monday last.

In Coriander, Carraway, &c., there was little passing. Rapeseed found buyers at £25 to £26 per last.

Cloverseed nominal at present.
Linseed, English, sowing 52 58
Baltic — — crushing 40 45 per qr.
Linseed Cakes, English.. 11*l*. 0s. to 11*l*. 5s. per 1000
Do. Foreign.. 7*l*. 7. to 7*l*. 10s. per ton.
Mediter. & Odessa 40 44
Carraway 42 44 new .. 46 48 per cwt.
Coriander 12 18 per cwt.
Mustard, brown, new.... 8 12 white..12 14 p bush
Rapeseed, English, new.. 26*l*. 28*l*. per last.
Hempseed 35 38 per qr.
Trefoil 17 24 old.. — new —
Tares, Spring 0s. 0d. to 0s. 0d.
Tares, old .... — — new — — per qr.
Rye Grass, English — — Scotch — — nominal.
Canary, 48 51 per qr. fine 54s.

PRICES OF HOPS.

BOROUGH, MONDAY, Aug. 25.

The market for Hops has been steady, and the rise of last week seems to be maintained; although in some respects, the accounts from the plantations are better. The duty is called 170,000*l*. to 175,000*l*. We quote Weald of Kent pockets, 5*l*. 6s. to 6*l*.; Mid. Kent, 5*l*. 10s. to 8*l*.; and East Kent, 6*l*. 10s. to 9*l*. 5s. Sussex are about 5*l*. 10s. to 6*l*.

WORCESTER, Aug. 23.—Our Hops are gone from bad to worse this week, and the crop is now likely to be very deficient, the continued cold wet weather having been too much for them; added to which, the vermin has in many places increased to an alarming extent, and completely destroyed the hopes of the planters. The duty is now currently estimated at 12,000*l*.; and the market continues brisk at an advance since last Saturday of 10s. per cwt., fine samples being readily sold at 6*l*. to 6*l*. 10s. per cwt.

HOPS, OLD DUTY, &c., 1845.—A short and ready reckoner, showing the amount of old duty from one to ten cwts. per acre, on a series of numbers of acres; within which range the extent of the hop plantations for the present year is likely to fall:—

Growth per Acre.	Numbers of Acres: Fractions omitted.					
	45548-9 Acres.	45962-3 Acres.	46376-7 Acres.	46790-1 Acres.	47204-5 Acres.	47619-20 Acres.
Cwts.	£	£	£	£	£	£
1	22000	22200	22400	22600	22800	23000
2	44000	44400	44800	45200	45600	46000
3	66000	66600	67200	67800	68400	69000
4	88000	88800	89600	90400	91200	92000
5	110000	111000	112000	110000	114000	115000
6	132000	133200	134400	135600	136800	138000
7	154000	155400	156800	158200	159600	161000
8	176000	177600	179200	180800	182400	184000
9	198000	199800	201600	203400	205200	207000
10	220000	222000	224000	226000	228000	230000

From the above it would appear that the difference between a moderate increase of acres from last year, and one to the extent that many suppose it will reach for the present year, will amount upon an average crop to £6,000 and upwards in old duty. It is therefore obvious that strict attention should be paid to the probable increase or falling off of the plantation, before a correct estimate can be formed of the duty for the present year.—*Sussex Express.*

WOOL MARKETS.

BRITISH.

LEEDS, August 22.—This market remains much the same as stated in our last week's report, and last week's prices were fully maintained.

WAKEFIELD, August 22.—The unfavourable weather of the early part of the week had again cast a gloom over the Wool trade, and very little has been done; the favourable change of yesterday has inspired better hopes, and prices are nominally the same.

YORK, August 21.—There was not much business done in this market to-day, there being only a small show of Wool and few buyers. Prices continue much the same as they have been for some time past. Mixed lots of hog and ewe, 14s., 14s. 6d., to 14s. 9d.; Moor Wool, 7s. to 7s. 6d. per stone.

LIVERPOOL, AUGUST 23.

SCOTCH.—There has been only a moderate demand for laid Highland Wool this week, at barely late rates; the continued unsettled weather prevents people operating with any thing like confidence. White Highland is still neglected. There has been a few fresh arrivals of crossed and Cheviot, which have found buyers from the quay at late rates.

		s.	d.		s.	d.
Laid Highland Wool, per 24lbs		9	3	to	9	7½
White Highland	do	12	0		13	0
Laid Crossed	do.. unwashed	10	9		12	0
Do.	do.. washed	11	6		13	6
Do. Cheviot	do. unwashed	11	6		14	0
Do.	do.. washed	13	6		17	6
White Do.	do.	24	0		28	0

FOREIGN.—The public sales of foreign Wool have gone off with considerable spirit; the colonial and Cape about 1d. per lb. above the late London sales. The low Wools only partly sold, there not being time after the fine were sold to get them fairly brought forward.

FOREIGN.

From Port Philip, under date of April 5, we learn that an enormous number of sheep continued to be boiled down for the sake of their tallow.

The following has come to hand this week:—

"The production of wheat in the United States in 1843 amounted to 100,310,856 bushels, equal to 20,062,371 brls. of flour, of which about one million brls. were exported. The production of wheat in 1844 was equivalent to 19,121,400 brls. of flour, of which 1,438,574 brls. were exported—leaving a balance in the country equal to about one brl. per head per annum. This surplus is of wheat alone, the production of which is only equal to one-fifth that of corn. Nearly one-tenth of the agricultural production of the United States is annually exported, leaving nine-tenths for home consumption. All we want is markets for our productions to stimulate cultivation, and we could supply all Europe with breadstuffs. Since 1838 the wheat crops of Ohio, Michigan, Indiana, and Illinois, have nearly doubled; and the productions of the soil increase ten-fold more rapidly than consumers. According to the census of 1840, 3,711,000 individuals in the United States were employed in agriculture, and only 909,356 in commerce and manufactures. A very great change has no doubt taken place in the employments of the people of this country since then. The revival of trade and rapid increase of manufactures have required a greater number of labourers in most branches, and many may have been withdrawn from the cultivation of the soil, to supply the demand for operators in manufacturing establishments. The agricultural class has been by no means reduced by the withdrawal of those required in this branch of business. The influx of foreigners has increased the number of producers full as fast as consumers, and every employment is fully supplied with labourers. In 1840, when the census was taken, there were more engaged in agricultural pursuits than for many years previous. The revulsions that just previous to that time had taken place in commercial affairs induced many to turn their attention to agriculture who were previously engaged in mercantile and manufacturing operations. Since then matters have improved, and every branch of business has become active, and the productions of the soil and of every other industry, within the present year, have without doubt been greater than in any previous year. The increase in Great Britain is very large in the number engaged in commerce and trade. Within ten years, from 1831 to 1841, the number engaged in agricultural pursuits decreased.

COMPARATIVE TABLE OF EMPLOYMENTS.

	1831.	1841.	Incr.
Agriculture..........	1,251,751	1,215,264	—
Commerce and trade..	1,572,292	2,039,409	467,117

The changes that occurred in the interim are not great, and as the numbers employed in any particular industry fluctuates, from time to time, as the policy of the government and the movements in the currency may make them profitable or otherwise, we may take it for granted that this is a very favourable view, taken at a very favourable time. In this country, where the existence of the commercial interest depends upon the policy of the government and the state of the currency, the number employed in the different branches of business fluctuates enormously, and in no one more than in manufacturing establishments."

LEEDS, August 22.—There has been a partial improvement in the demand for foreign Wools this week, as compared with the preceding one, but, owing to the continued ungenial state of the weather, buyers are still very cautious in their operations, suiting their purchases generally to their immediate requirements. In prices we have no variation to notice.

LIVERPOOL WOOL SALES.

The public sales of Wool, which commenced on the 21st instant, and closed this day, were as numerously attended as usual, and the number of the smaller manufacturers who give such support to the sales was larger than we ever remember. For the fine Wool there was a spirited competition throughout, particularly for the finer kinds of Australian and Cape clothing, which have been sold at a decided advance on the prices of last sales, and fully equal to those lately held in London. With regard to the Australian Wools, we are glad to be able to confirm the improvement in condition and general mode of management we have before noticed, which were more particularly apparent in the Wools from Port Philip and South Australia, which bid fair in time to rival those from Sydney. The Cape Wools were, for the most part, a fair assortment, although inferior to several former imports we have seen this season. There still remains, however, much to be desired, both as regards more even classification and greater care in packing; and when this is not properly attended to, it is difficult to estimate their full value; and, as it would act very much against them in a dull market, these points cannot be too strongly pointed out. Several bales of Entre Rios and Buenos Ayres Wool attracted considerable attention from their superior condition and the absence of burrs, and realized full rates. It is much to be regretted that this improvement is not more general; and we believe the growers would be amply repaid for any trouble and attention. The finer kinds are very much required by our manufacturers; but, from the unmarketable state they are at present sent in, and the expense and difficulty in getting them cleaned, they remain comparatively neglected, and an article of precarious sale. For the lower kinds of Wool there was a fair demand; but the quantity brought forward being unusually large, and the time allowed being inadequate for their inspection, a large quantity had to be withdrawn, which otherwise might have been avoided, as there was a very ample attendance of the trade, both home and foreign. The hurried way in which the sales are managed here is a source of great complaint; and if a little more system were adopted, and they were brought on earlier in the week, so as to afford more time for examination, it would not only be a convenience to the buyers, but of advantage to the importer, and would also lead to more extensive sales by private contract. We beg to refer to the annexed prices:—2,031 bales Sydney, good, 1s. 11d., 2s. 1½d., and 2s. 3d.; middling to fair, 1s. 9d. to 1s. 10½d.; locks, &c., 11d. to 1s. 5d. 1,281 bales Port Philip, good, 1s. 8d. to 1s. 10½d.; middling to fair, 1s. 7d. to 1s. 9d.; locks, &c., 10d. to 1s. 3d. 258 bales South Australia, good, 1s. 7d. to 1s. 8½d.; middling to fair, 1s. 5d. to 1s. 7d.; locks, &c., 10d. to 1s. 3d. 245 bales Cape of Good Hope, good, 1s. 7d. to 1s. 8½d.; middling to fair, 1s. 4d. to 1s. 6d.; locks, &c., 7½d. to 10½d. 72 bales Spanish, withdrawn. 226 bales Portugal and Oporto, chiefly low qualities, 9½d. to 11½d., and 6½d. to 8½d. 2,436 bales Entre Rios, Buenos Ayres, and Cordova, fine merino, 1s. 6d. to 1s. 10½d.; do. do. burry, 11½d. to 1s. 2d.; do. mixed do., 7d. to 10½d., chiefly withdrawn; coarse and ordinary, little or none sold. 1,078 bales Smyrna and Turkey, washed, 6¼d. to 8½d.; ordinary unwashed, 2½d. to 3¼d.; chiefly withdrawn. 618 bales East India, fair white, 8d. to 9d.; yellow, 6¾d. to 7d.; ordinary and grey, 3d. to 5d. 390 bales Russia, withdrawn. 176 bales Italian, &c., withdrawn. 369 bales Iceland, white, 7d. to 7½d., a few lots, 7¾d.; grey, 5½d. to 6¾d. 208 bales sundries, chiefly withdrawn. Total, 9,342 bales.

HUGHES AND RONALD,
Wool-brokers.

PRICES OF SHARES.

Shares.	Div. last half year	RAILWAYS.	Price per Share.
		Aberdeen.... 2½l pd	3⅛ a 3
24,000	2l 0s p sh	Armagh, Coleraine, Portrush 25l sh 1⅜l pd	1⅞
9,500	10s	Birmingham and Gloucester 100l sh pd	133
10,000		Do. New, iss. 7½ dis... 25l sh 17½l pd	
		Ditto Half Shares.... 50l sh 8l pd	
30,000		Birmingham & Oxford Junct. 20l sh 2l pd	5 a ⅛
9,500		Brighton, Lewes, & Hastings, 50l sh 20l pd	26¾
15,000	1l 8s p sh	Bristol and Exeter .... 100l sh 70l pd	93 a 2
		Ditto New.... 2l pd	11⅜ a 10½
6,640	12s p sh	Bristol and Gloucester .. 50l sh 30l pd	60 a ½
36,000		Caledonian.... 50l sh 5l pd	0¾ a ⅝
		Do. Extension.... 50l sh 2½l pd	2⅝
50,000		Cambridge and Lincoln.... 25l 1½l pd	3½ a ⅜
		Canterbury and Dover .... 1⅜l pd	1⅞
		Cheltenham and Oxford .... 2l pd	
42,000		Chester and Holyhead... 50l sh 15l pd	22¼ a 1¾
		Chichester and Brighton.... 20l pd	3½
		Clydesdale Junction.... 5l pd	
		Cork and Killarney .. 50l sh 2½l pd	
40,000		Cork and Waterford.... 25l sh 1½l pd	
4,800		Coventry, Nuneaton, Bir. & Leicester, 25l sh 1¼l pd	2¼ a ⅛
		Cornwall.... 50l sh 3l pd	3⅞ a ¾
		Direct Northern.... 50l sh 2½l pd	1⅞ a 2
35,000		Direct Norwich.... 20l sh 1l pd	0½
10,000		Diss, Beccles, & Yarmouth. 25l sh 1½l pd	
21,600		Dublin & Belfast Junction 50l sh 2½l pd	7½
19,000		Dublin, Belfast, & Coleraine, 50l sh 2½l pd	
12,800		Dublin and Galway.... 50l sh 2½l pd	¾ a ⅞
17,000		Dundalk and Enniskellen 50l sh 2½l pd	
144,000	4s p sh	Eastern Counties .. 25l sh 14l 16s pd	19⅞ a 20
		Do. New.... 25l sh 4l 16s pd	⅝ pm
144,000		Do Perpetual, No. 1.. 6l 13s 4d sh pd	⅞ pm
144,000		Ditto ditto, No. 2 .. 6l 13s 4d 13s 4d	⅜ pm
		East Dereham and Norwich ... 1l pd	1 a ¼
4,000		Eastern Union.... 50l sh 20l pd	
		Ditto Extension.... 25l sh 1½l pd	3 a 2⅞
18,000	1l 2s 6d p s	Edinburgh & Glasgow .... 50l sh pd	90 a 89
18,000	5s 7½d p s	Ditto Quarter Shares.... 12½l sh pd	
26,000		Ditto New ¼ Shares .... 12½l sh 5l pd	14½
26,000		Edinburgh and Northern, 25l sh 1½l pd	
		Edinburgh and Perth.... 1½l pd	
10,800		Ely and Bedford .... 25l sh 1¼l pd	4⅜ a ¾
		Enniskillen and Sligo .... 2½l pd	
		Exeter, Yeovil, and Dorchester, 2¾l pd	3
		Goole and Doncaster.... 25l sh 1⅜l pd	
10,918	5l per ct	Grand Junction .... 100l sh pd	
10,918	5l per ct	Ditto Half Shares .... 50l sh pd	
10,918	5l per ct	Ditto Quarter Shares .... 25l sh pd	
		Grand Union (Nottingham and Lynn) 1⅜l pd	1⅞
12,000		Great Grimsby & Sheffield, 50l sh 2¾l pd	
20,000		Gt. Southrn & Westn. (Irelnd) 50l sh 15l pd	
		Ditto Extension. .... 50l sh 2½l pd	11½ a ¼
		Great Munster.... 2½l pd	
10,000	3l p sh	Great North of England.... 100l sh pd	220 a 19½
	10s p sh	Ditto New .... 40l sh 5l pd	53
		Ditto New .... 30l sh 2l pd	32 a 1⅜
		Great North of Scotland .... 2½l pd	
25,000	4l per ct	Great Western .... 100l sh 80l pd	18 ex-d.
25,000	4l per ct	Ditto Half Shares .... 50l sh pd	118 a 16½
37,500	1l per ct	Ditto Fifths.... 20l sh 20l pd	46½ ex-d.
		Guildfd, Farnhm, Portsmth, 50l sh 2½l pd	2⅜
20,000		Harwich .... 20l sh 1l pd	1½
12,000		Hull and Gainsborough .. 25l sh 1⅜l pd	
8,000	1l 15s p s	Hull and Selby .... 50l sh pd	106
8,000	8s 0d p sh	Do. Quarter Shares.... 12½l sh pd	
8,000		Do. Half Shares .... 25l sh 2l pd	24½ a 4
15,000		Inverness and Elgin ... 20l sh 1l pd	
5,000		Kendal Windermere ... 25l sh 1½l pd	
16,000		Lancaster and Carlisle... 50l sh 25l pd	55½ a 6
8,000		Leeds and Bradford ... 50l sh 15l pd	
		Leeds & West Riding Junctn., 1⅜l pd	
		Leicester and Birmingham .... 22s pd	
		Leicester and Bedford.. 20l sh 22s pd	2 pm
		Limerick and Waterford .... 2½l pd	
		Lincoln, York, and Leeds .... 1⅜l pd	
5,100	4½l per ct	Liverpool & Manchester.... 100l sh pd	
7,968	4½l per ct	Ditto Half Shares .... 50l sh pd	
11,475	4½l per ct	Ditto Quarter Shares .... 25l sh pd	
4125000l	5l per ct	London & Birmingham.... Stock	226 a 5
41,250	5l per ct	Ditto Thirds .... 32l sh 10l pd	46 a ½
54,450	5l per ct	Ditto Quarter Shares .... 25l sh 2l pd	28 a ½
48,000	3s	London & Blackwall .. Av. 16l 13s 4d	10⅞ a ¾
		Ditto New .... 1½l pd	5 a 4⅞
36,000	30s p sh	London and Brighton .... 50l sh pd	76⅜ a 7½
4,500		Ditto Consolidated Eighths 50l sh 35l pd	
33,000	8s 0d p sh	London & Croydon .... Av. 18l 15s 9d	25¼ a ½
		Do. New .... 13s 4d pd	¾ pm
35,000		Do. Guaranteed 5 per Ct.. 9l sh 6l pd	7¼ a ⅜
43,077		London & Greenwich .. Av. 12l 15s 4d	10⅞ a ¾
11,136	10s	Preference or Privilege.. Av. 18l 17s 2d	
46,200	2l 0s p sh	London & South West... Av. 41l 6s 10d	77½ a 8½
	5s p sh	Ditto Consolidated Eighths, 40l p sh 20l pd	
		Ditto New.... 50l sh 2½l pd	16⅛ a ½
		Ditto New.... 40l sh 2l pd	
90,000		London and York .... 50l sh 2½l pd	5⅝ a ⅝
20,000		London and Windsor.... 25l sh 1l pd	0⅞
		London, Salisbury, and Yeovil.. 2½l pd	
10,000		Londonderry & Coleraine, 50l sh 2½l pd	3½ a ¾
10,000		Londonderry & Enniskillen 50l sh 2½l pd	2½ a ¾
8,000		Lynn and Ely .... 25l sh 2½l pd	7½ a ¾
		Lynn and Dereham .... 25l sh 1⅜l pd	4½ a ¾
13,000	2l 16s p s	Manchester & Leeds .. 100l sh 76l pd	201 a 0
13,000	21s 6d p s	Ditto Half Shares .... 50l sh 34l pd	94 a 3
13,000	2s	Ditto Quarter Shares .... 25l sh 2l pd	34 a 6
22,750		Ditto Sixteenths.... 6l 5s sh 4¼l pd	12⅜ a 13¼
30,000	1l p sh	Manchester & Birming .. 40l sh 40l pd	62 a 3
30,000		Do. ¼ Shares .... 10l sh 4l pd	10
		Do. New ¼ Shares .... 10l sh 2l pd	8
		Manchester, Buxton, and Matlock, 20l sh 22s pd	7¼ pm
4155000l	3l per ct	Midland .... Stock	174 a 5
12,500		Ditto Fifths .... 20l sh 2l pd	
		Ditto New.... 40l sh 2l pd	26¾ a ½
978500l	46s 3d p c	Ditto Birmingham & Derby .... Stock	133 a 2½
15,000		Midland Grt. West. (Irish) 50l sh 2½l pd	3
20,000		Newcastle & Berwick. 25l sh 1l 10s pd	23⅛ a 4¼
	2l p sh	Newcastle and Carlisle .. 100l sh pd	
		Newcastle, Durham, and Lancashire Junction .... 1⅜l pd	3⅞ a ⅜
20,000	10s p sh	Newcstl & Darlingt Junc... 25l sh 25l pd	53 ex-d.
	17s 5d p s	Ditto New (Brandling).. 25l sh 10l pd	36
		Newport and Abergavenny.... 2½l pd	
		Newry and Enniskillen, 50l sh 2½l pd	2⅜
24,000		Newark and Sheffield .... 25l 1½l pd	3¾ a ½
36,000		North British .... 25l sh 15l pd	31⅛ a ¾
		Ditto New.... 1l pd	9¼ a ½
10,256	1l 10s	Northern & Eastern .... 50l sh 45l pd	73½ a 2
3,136	22s 6d	Do. Scrip .. iss. 5 dis... 50l sh 35l pd	
12,208	7s 6d	Do. ¼ Shares .... 12l 10s sh pd	
		North Kent.... 50l sh 2¾l pd	
		North Staffordshire.... 20l sh 22s. pd	4 pm
12,000		North Wales.... 25l sh 1¼l pd	3¼
19,000		Norwich and Brandon .. 20l sh 14l pd	23½ a 2½
19,000		Ditto New.... 10l sh 1l pd	6 a 5⅞
		Nottingham, Erewash Valley, & Manchester .... 1⅜l pd	
		Oxford and Worcester.... 2½l pd	7½ a ⅜
		Perth and Inverness .... 2½l pd	
		Portsmouth Direct.... 50l sh 2½l pd	4¼ a 5½
2,600		Preston & Wyre .... 50l sh pd	40½ a 1
		Richmond .... 20l sh 1l pd	6⅛ a ½
125,000		Rugby, Worcester, and Tring 20l sh 1l pd	2⅞ a ⅜
		Scottish Central.... 25l sh 2½l pd	7½ a 6⅜
12,600		Scottish Midland.... 25l sh 1½l pd	2 a ⅛
26,000		Sheffield and Lincoln.... 25l sh 1¼l pd	
7,000		Sheffield and Manchester 100l sh 95l pd	
		Ditto ¼ Shares .... 25l sh 8l pd	
18,000		Shrews., Wolverham., Dudley, Birm., 50l sh 2½l pd	4¾ a ⅝
		Shrewsbury and Trent Valley Union, 20l sh 22s pd	2⅛ pm
		Shrewsbury, Hereford, & North Wales 2½l pd	3⅜ a 4
22,000		South Devon.... 50l sh 20l pd	30⅜ a 1
		Sligo and Shannon	
56,000	15s 6d p s	South Eastern and Dover.. Av. 33l 2s 4d	46 a ⅜
28,000	1s 11d p s	Ditto New, iss. at 32l No. 1, 50l sh 12l pd	21⅜ a ½
42,000		Ditto New 33l 6s 8d.. No. 2, 50l sh 7l pd	15 a 14½
126,000		Ditto New 30l .... No. 3, 50l sh 2½l pd	8½ a 7⅞
		South Midland .... 20l sh 22s pd	6⅜ pm
50,000		South Wales .... 50l sh 2½l pd	5⅜ a ¾
		Staines and Richmond .. 20l sh 1l pd	1¾ a 2
43,000		Trent Valley.... 20l sh 2l pd	18½
		Trent Valley & Holyhead Junc. 1⅜ pd	1⅞ a 2
		Warwick and Cheltenham .... 1⅜l pd	1⅜
		Waterford and Kilkenny, 20l sh 1l pd	2¾ a ½
		Waterford, Wexford, Wicklow, and Dublin.... 1½l pd	1½
9,000		West Cornwall .... 20l sh 1¼l pd	
15,000		West End and Southern Counties 50l sh 1½l pd	
7,500		West London, Old Shares.. 20l sh pd	
		Welsh Midland .... 2½l pd	3⅜ a ¾
20,000		West Yorkshire.... 50l sh 2½l pd	
		Wexford and Carlow.... 2½l pd	
30,000		Wilts, Somerset, and Weymouth, 50l sh 2½l pd	4¾ a ½
		Worcester, Shrewsbury, and Crewe Union, 1⅜l pd	3⅜ a ⅝

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London.

THE FARMER'S MAGAZINE.

OCTOBER, 1845.

No. 4.—Vol. XII.] [Second Series.

PLATE I.

PORTRAIT OF THE LATE JOHN PRICE, ESQ., OF POOLE HOUSE.

PLATE II.

THE NORFOLK COB; a Celebrated Trotting Horse.

MEMOIR OF THE LATE JOHN PRICE, ESQ., OF POOLE HOUSE.

The detail of the exertions, the long-continued labours, and the success which the subject of the following brief and imperfect memoir attained in the improvement of the great and valuable breed of Herefordshire cattle, cannot but be interesting to the farmers of the United Kingdom—nay, to every portion of the earth where agriculture and the importance of its improvements are only even partially regarded.

Living in a district where the Herefordshire cattle to a very great extent are preferred, it was natural that Mr. Price should have his attention directed to their improvement. This breed, perhaps, have never had their superior merits (especially for some soils) so generally allowed as they are justly entitled, although the true Herefordshire breed have had their claims powerfully advocated by Marshall, and by Professor Youatt, in a work on cattle, well known to every accomplished English farmer.

It is certain that they fatten to a much greater weight than the Devon breed, and quickly at an early age. For labour they are excellent on the heaviest soils, for they have certainly all the docile honesty of the oxen of Devonshire, with greater strength, although they certainly have not their activity. And if the cows of this breed are rather worse milkers, they are hardier, and will readily grow fat where the more southern breed would starve.

These were the opinions of the late John Price. He early saw their merits. He set about their development, and persevered with a skilful energy, with whose reward Herefordshire may be justly proud. He tried, he tested—he succeeded; and he was not one of those who were content to let the merits of his favourite cattle remain unknown and unappreciated; he speedily, therefore, sought the field of friendly contest with other great breeders, and he succeeded on most of these occasions; he publicly challenged, in fact, at last, all England to show against him.

The late John Price was the eldest son of Job and Elizabeth Price, who with great industry occupied a farm at Earlscroome, in Worcestershire. It was at this place that the subject of this sketch was born in 1776. The son of an industrious farmer who brought all his sons up to the same pursuit, with one exception. John Price was from an early age engaged in all the manual operations of the farm. Thus employed, he had little opportunity for receiving any other than a plain village-school education. He was taught to read, to write, and the use of figures. Whatever disadvantages, however, he experienced from the want of a more extended education, was amply compensated by the possession of great natural abilities, of a mind powerful and original in its conceptions and its conclusions. And as soon as he commenced business on his own account, he let slip no opportunity of improving his education, by reading, and seeking the society of gentlemen of high respectability. He early in life became a favourite with the Earl of Coventry, the father of the late Earl, and at whose table there were always a knife and fork at his service.

He was from the first distinguished as an excellent farmer, but his great efforts rendered him most remarkable as a breeder of Hereford cattle; and of him, in fact, as is well remarked by an excellent correspondent, "it may not be too much to say that he soon became the most eminent breeder of Hereford cattle in the kingdom."

It was when living at Ryall, near Upton, a farm at which he went to reside about the year 1814, that his first labour in the breeding of stock commenced; and it was here that about the year 1820 he first generally attracted the attention of his brother farmers, by winning a bet of twenty guineas with Mr. Meek, "to show twenty Hereford cows against twenty of his long-horns." We believe (but we are not sure of the fact) that he obtained his first stock from Mr. Tomkins, who farmed near Hereford, and who was the first great breeder of that sort of Herefords. "He bought," says a relative, in a recent obliging communication, "at various times, a number of Benjamin Tomkin's Herefords, until he obtained a herd entirely of pure Tomkin's blood. B. Tomkins lived at Willington Court, in the County Hereford, and of whose judgment as a breeder I have heard Price repeatedly declare to have been of the first-rate description, and superior to any man's he ever met with."

It must not be supposed by the distant breeder that the farm of Mr. Price possessed any peculiar natural advantages, or that he fed them at the reckless expense in which some exhibitors have indulged. He thus described his farm, and the difficulties of keep under which he laboured, in a letter to the editor of this Magazine, dated in November, 1841. (See vol. xv. p. 446.)

"The important point for persons to consider is to breed and keep those cattle and sheep that will pay the most money for the food they have to give them; this has always been my opinion, and have as far as it was practicable acted upon it by breeding the cattle I did, and Leicester sheep bred purely from Mr. Buckley's flock: and I will leave the public generally to decide, after having received the statement I am about to make of the size of the farm I have occupied for the last twelve years, the quality of land, and the buildings thereon, together with the number of stock I have usually kept, as my late sale will prove, whether I have not cause to be satisfied with the result.

"The farm that I have occupied since 1829 has not at any time much exceeded one hundred and fifty acres; twenty of which are arable, totally unfit for the growth of turnips, and nearly one hundred and twenty acres, part of the Croome demesne, belonging to the Earl of Coventry, in one ground, and rather below second-rate quality of land, greatly covered with ornamental timber, and neither buildings or fold-yards on my farm sufficient to hold twenty beasts; yet on this land I have usually kept one hundred head of cattle, together with a flock of two hundred and fifty sheep, forty of which were rams, beside my cart and other horses. These are facts well known to the whole of my neighbours, who have always given me full credit for being the worst keeper of stock in England. I have seldom made use of oilcake, and on no occasion have I given corn or meal to any of my stock."

At Ryall he continued to reside until 1829; where, after an occupation of fifteen years, he sold the estate, and removed to Poole House, near Upton, where he died, after a lingering and painful illness, on the 20th of June, 1843, aged 67 years.

It was at Ryall that, in 1816, his first great sale of cattle took place. The prices obtained at this period for his stock, indicate pretty clearly the high estimation which his splendid herd had even then attained. Many were the noblemen and gentlemen who thus gladly availed themselves of the opportunity of adding to their stock some of the finest specimens of the purest-bred Herefords of the day. This sale consisted of 126 head, and these averaged fifty-four pounds eight shillings and twopence each.

The valuable stock which he raised with so much care soon became well known and dispersed over most portions of the kingdom; for he not only instituted his speedily celebrated sales, but he exhibited his cattle and sheep at a great number of agricultural shows in various parts of the United Kingdom; winning prizes at Bath, Cirencester, London, Worcester, Gloucester, Hereford, Bristol, and at many other places. At the great sales also, to which we have before referred, most of those noblemen and gentlemen who are well known as breeders of "Herefords" availed themselves of the opportunity to purchase extensively from his stock. Of these may be named Sir Francis Lowley (who to the last warmly and constantly was the patron of Mr. Price), Earl Talbot, Sir F. Goodricke, Captain Walters, and many others, well known admirers of the Hereford breed. These sales were not annual; he had, however, for several years, an annual ram-letting. He attended one of the (then) Lord Althorp's annual sales in Northamptonshire, where, after dinner, he challenged to show the next year a bull against any short-horn one. He ultimately succeeded in getting up a sweepstakes of five pounds each, which he won with his bull "Lundyfoot," which was allowed to be the completest animal any of the company ever saw.

Previous to his last sale (for Price's enthusiasm in favour of his splendid Herefords continued to the last), he publicly advertised a challenge (for, we believe, one hundred guineas) open to all England, to show one bull and twenty cows against the like number of any other farmers of the Hereford breed against an equal number of any other breed. But it was in vain that he threw down the gauntlet: no one was found daring enough to take it up.

The last sale which Mr. Price held was in October, 1841—a sale which a few days afterwards he thus described, in a letter addressed to the Editor of this Magazine (see vol. xv. p. 444).

"Sir,—As I am very desirous that an authentic statement of the late sale of my herd of Hereford cattle should appear in one, at least, widely circulated agricultural paper, I herewith transmit you for insertion a correct account of what each lot sold for, and the name and residence of the purchasers.

"The document I have sent you will give to those who were not buyers all the information they require; and those who were, and doubtless provided themselves with catologues containing the short pedigree I therein gave of my stock, have only to procure one of your papers to make their catalogues complete.

Lot.	Age.	Names of Cattle.	Sum.	Purchaser and Residence.
1	—22	Toby Pigeon..	£14	Sir F. Lawley, Bart, Middleton Hall, Warwick.
2	—10	Browny......	25	Mr. Stallard, Redmarley, Worcester.
3	—10	Young Lovely.	29	Mr. Hobbs, Mark's Hall, Essex.
4	— 9	Prima Donna .	26	Sir F. Lawley, Bart.
5	—	Her martin celf	7	Mr. Moore, Ham Castle, Worcester.
6	— 9	Burton Pigeon	40	Sir F. Lawley, Bart.
7	—	Her bull calf..	30	ditto.
8	— 8	Peg Murphy..	42	Samuel Peploe, Esq., Garnstone, Hereford.
9	— 8	Wood Nymph	50	Sir F. Lawley, Bart.
10	— 8	Wood Lark ..	45	Earl Talbot, Ingestre Hall, Stafford.
11	—	Her bull calf..	24	Mr. Jukes, Kearne, Salop.
12	— 8	Duchess	44	Sir F. Lawley, Bart.
13	—	Her cow calf..	33	ditto.
14	— 7	Helen	41	Rev. W. P. Hopton, Bishop's Froome, Hereford.
15	— 7	Countess	71	Sir F. Goodrick, Bart, Studley Castle, Worcester.
16	—	Her bull calf..	36	Mr. Gravenor, Hereford.
17	— 7	Victoria......	33	Sir F. Lawley, Bart.
18	—	Her bull calf..	26	Mr. Hayward, Weston Turvil, Bucks.
19	— 6	Wood Pigeon .	150	Mr. Bird, Hampton Court Hereford.
20	—	Her bull calf..	80	ditto.
21	— 6	Dove........	77	Rev. J. R. Smythies, Lynch Court, Hereford.
22	— 6	Blue Pigeon ..	74	Earl Talbot.
23	— 6	Woodbine....	50	Sir F. Goodrick, Bart.
24	—	Her ox calf ..	6	Mr. Jukes.
25	— 5	Red Rose	30	Sir F. Lawley, Bart.
26	— 5	Strawberry ..	50	Earl Talbot.
27	—	Her cow calf..	40	ditto.
28	— 5	Laura	73	ditto.
29	— 5	Silver........	40	Rev. W. P. Hopton.
30	—	Her cow calf..	35	Earl Talbot.
31	— 5	Stock Dove ..	52	Mr. Pratt, New Field, Warwick.
32	— 5	Prunella	80	Sir F. Goodrick, Bart.
33	—	Her cow calf..	28	Earl Talbot.
34	— 5	Woodrose	38	Sir F. Lawley, Bart.
35	—	Her cow calf..	42	Earl Talbot.
36	— 5	Nutty	50	Mr. Hearn, Broome Hall, Warwick.
37	—	Her bull calf..	67	Sir F. Lawley, Bart.
38	— 5	Wood Lass ..	50	— Shepherd, Esq., East Wood House, Devon.
39	—	Her bull calf..	34	ditto.
40	— 5	Miss O'Connel	37	Capt. Walters, Barnwood House, Gloucester.
41	— 5	Rosamond....	44	Mr. Hearn.
42	—	Her cow calf..	33	Earl Talbot.
43	— 4	Lavender	51	— Shepherd, Esq.
44	— 4	Philomel	36	Sir F. Lawley, Bart.
45	—	Her bull calf..	33	ditto.
46	— 4	Young Diana..	80	Capt. Walters.
47	—	Her cow calf..	40	Sir F. Lawley, Bart.
48	— 4	Flora	42	Earl Talbot.
49	—	Her bull calf..	80	ditto.
50	— 4	Beauty	50	Capt. Walters.
51	—	Her bull calf..	20	ditto.
52	— 4	Carmelite	63	Sir F. Lawley, Bart.
53	—	Her bull calf..	40	— Newbury, Warwick.
54	— 4	White Pigeon .	60	Mr. Pratt.
55	— 4	Jay	30	Sir F. Lawley.
56	—	Her bull calf..	40	Rev. J. R. Smythies.
57	— 4	Dahlia	30	Earl Talbot.
58	— 4	Dainty	33	Mr. Yeomans, Hereford.
59	— 3	Pied Pigeon ..	55	Sir. F. Lawley, Bart.
60	—	Her cow calf..	30	Earl Talbot.
61	— 3	Plover	40	Sir F. Lawley, Bart.
62	—	Her cow calf..	40	ditto.
63	— 3	Matchless	66	Capt. Rayer, Hillworth, Worcester.
64	— 3	Pretty Maid ..	66	Mr. Pratt.
65	— 3	True Love....	37	Sir F. Lawley, Bart.
66	—	Her ox calf....	5	ditto.
67	— 3	Prudence	30	ditto.
68	—	Her cow calf..	8	Mr. Sharratt, Lichfield, Stafford.
69	— 3	Nonsuch	70	Sir F. Lawley, Bart.
70	— 3	Rock Pigeon .	48	Capt. Walters.
71	— 2	Tuberose	100	Earl Talbot.
72	— 2	Sappho	52	Sir F. Lawley, Bart.
73	— 2	Cora	40	ditto.
74	— 2	Lily	50	ditto.
75	— 2	Rosa	40	Sam. Peploe, Esq.
76	— 2	Aurora	52	Sir F. Lawley, Bart.
77	— 2	Vesper	46	— Wickstead, Esq. Shakenhurst, Worcester.
78	— 2	Ceres........	115	Sir F. Goodrick, Bart.
79	— 2	Giantess......	70	Sir F. Lawley, Bart.
80	— 2	Valentine	45	ditto.
81	— 1	Crucifix	63	Mr. Pratt.
82	— 1	Kate Kearney .	52	Sir F. Lawley, Bart.
83	— 1	Venus	60	ditto.
84	— 1	Violet	42	— Wickstead, Esq.
85	— 1	Cowslip......	30	— Adderley, Esq., near Coleshill, Warwick.
86	— 1	Sunflower	34	ditto.
87	— 1	Daisy........	31	ditto.
88	— 1	Primrose	50	Sir F. Lawley, Bart.

Lot.	Age.	Names of Cattle.	Sum.	Purchaser and Residence.
1	—10	Trusty......		Not sold.
2	— 8	DanO'Connell		Not sold.
3	— 8	Woodstock ..		Not sold.
4	— 7	Woodpecker ..	56	— Morris, Esq., Salop.
5	— 5	Blenheim	70	Mr. Pratt.
6	— 5	Satirist		Not sold.
7	— 4	Tramp	100	Mr. N. Smith, Martley, Worcester.
8	— 3	Blandford	70	Mr. Homes.
9	— 3	Patriot	72	Mr. Jukes.
10	— 3	The General ..	55	Mr.Walker,Burton Court, Worcester.
11	— 3	YoungTrueboy	140	Sir F. Lawley, Bart.
12	— 2	Victory	100	ditto.
13	— 2	Faithful	40	W. Barnaby, Esq., near Bromyard, Hereford.
14	— 3	The Duke	84	Sir F. Goodrick, Bart.
15	— 1	Washington ..	166	Earl Talbot.
16	— 1	Murphy Delany	110	Sam. Peploe, Esq.
17	— 1	Goliah	80	Rev. J. R. Smythies.
18	— 1	Forester......	30	Mr. Walker.
19	— 1	The Rejected .	110	Mr. Evans, Pendeford Hall, Stafford.
			£5354	

£5354 sum realized
26 deduct for lots 5, 24, 66, 68, being ox calves or martins, and one not got by my bull.

£5328

The remaining 99 lots averaged 53*l*. 16s. 4¼d.

"I deem it no more than an act of common justice which I owe to those noblemen and gentlemen who were purchasers of the above stock, the greater number of whom have for many years past bred from and patronised my sort of cattle, to give a few further particulars relating thereto :—

"On the 17th and 18th of October, 1816, I had sold by auction at my late residence, Ryall, near Upton-on-Severn, 126 head of Hereford cattle comprising 14 bulls of various ages, 6 bull calves, and 106 breeding cows, heifers, and calves, which, together realized 6850*l*. 12s. 6d., giving an average of 54*l*. 8s. 2d.

"Now, although this average is a little above the average price of my last sale, it will, I think, appear evident on taking into account the length of time (25 years) that has elapsed between the two sales, the great reduction which has taken place during that time (and since the sales of the Messrs. Collins' herds of short-horns) in the price of first-rate herds of cattle, and also of other herds of cattle, together with circumstances too well known to both landlords and tenants to need any comment from me, that the average of my last sale is much the best; thereby placing the herd that gave it on much higher ground, compared with all other, than they heretofore occupied; and I do sincerely hope, that the hands these animals have fallen into will take care that they keep their present high position. Should they not continue to do so, and lose caste, the fault will not be in the cattle. I further beg to make known to the public, that during the interval between my two sales, I sold to Earl Talbot, Sir F. Lawley, Bart., J. Gerrard, Esq., of Gibstown, Navan, Ireland, Mr. N. Smith, Martley, Worcester, Mr. Jukes, of Kerne, Salop, the late Mr. Ravenshaw, of the same county, and also to my late and much respected friend, Mr. Jellicoe, of Brighteston, a great number of cows and bulls: the former in lots of two, four, five, six, and eight each—the lowest price for any lot being fifty pounds a head; and two lots five and six—the former one hundred pounds each, the latter for eighty pounds each; and several bulls, varying from fifty to one hundred pounds each; and my bull Toby, for two hundred guineas. My sole motive for giving the latter part of my statement is for the purpose of letting the breeders of Herefords know where in future they are most likely to find bulls, &c., of the best sort."

At this, his last sale, it was resolved by some of the gentlemen who attended it, that a portrait should be painted of him. This resolution was speedily carried into effect; and the excellent likeness painted by Mr. Frederick Tatham, thus procured, has since been lithographed; impressions of which are in the possession of about seventy of his friends, who are numbered amongst the original subscribers.

The judgment and strong perception which the subject of this memoir displayed, in seizing upon the desirable points of animals of all kinds, was remarkable, not only in cattle, but in most kinds of stock.

An enthusiastic lover of the chase, a bold, an excellent, and a successful rider, it was natural that the horse should engage his earnest attention; hence he possessed, at various times, many excellent and celebrated hunters, which, with their rider, were well known in the Warwickshire Hunt. Of these gallant horses we may only refer to "Cecil," the favourite hunter of Lord Jersey, for which he gave £500; although Mr. Price sold him previously to Mr. Wilson Roberts, of Bewdley, for £200. He obtained a better price for his splendid horse "Judgment;" for which he received of the late Lord Coventry, then Lord Deerhurst, the sum of eight hundred pounds.

"He bred," adds an intelligent correspondent to whom we are indebted for many of the facts contained in this paper, "many valuable horses, which he sold for sums varying from two to four hundred pounds each. He was a beautiful rider, and the success of his horses was naturally, to a considerable extent, attributable to his discreet treatment of them as their owner and their rider. He long hunted with the late Major Bland, of Ham Court; with Mr. Meynell, of Leicestershire; Colonel Berkeley, the late John Corbett, of Stratford-on-Avon, and with many others of hunting celebrity; and was generally "in at the death.

"So ardent," says the relation to whom we have fore referred, "was the zeal of this renowned sportsman that it once led him very near to the terminus of his own existence, and that of a valuable hunter, by endeavouring to save a fox from being torn to pieces on the side of Malvern Hill. Hunting one day with Major Bland's hounds, they found a fox near the south of the hill, which took along the side of the hill to the northern extremity, and Price being well in at the find he kept on the summit and opposite to the hounds all the way, and half a mile before any one of the field; he saw the hounds gaining ground of the fox (which was also in sight) until they ran into him; and, thoughtless of his danger, he rode down a sheep track to rescue the fox from being torn to pieces before the Major arrived, in which attempt his horse slipped and fell, but fortunately threw him on one side, or he must have been crushed as flat as a pancake; for his horse rolled down the hill for more than forty yards, but at length came against a heap of rugged stones, which stopped him, not materially injured, though much cut and bruised. Price rolled further, but fortunately caught hold of something which stopped him, but so badly bruised and shaken that he was obliged to keep his bed for a week.

"I once rode from Cirencester to Ryall to see him, when, on my arrival my sister informed me he had that morning left home to meet the Duke of Beaufort's hounds at Farmington Grove, a cover near Northleach, but promised to dine with her, as he expected me there. He did so, and informed me they had had a splendid run of an hour and a quarter, and killed their fox without a check. I once saw him, when hunting with Corbet's hounds, take a leap into a gravel pit which he had no knowledge of, when his horse fell and pitched him against the side of the pit, which broke his collar bone; he mounted again, and rode with his whip and reins in one hand until the end of the chase; his servant drove him home in his gig the next day, and returned for his horses."

As a proof of the kindness with which Mr. Price treated his labourers and servants, it should be recorded to his credit, that in 1841 he certified to the Secretary of the Worcestershire Agricultural Association, which gave premiums for long and faithful services to labourers and servants, that his carter had been in his service 45 years, shepherd 32, groom 24, and servant maid 11; for three of whom he obtained premiums, and the other was beaten only one year; those four formed the whole of his regular establishment (except an occasional ploughboy), and they all remained in his service until his death.

Such is a brief outline of the successful career of the late John Price, of Poole House; of whom his contemporary farmers will be glad to learn even the few facts contained in this imperfect memoir. His career, like that of most other of the celebrated breeders who are ranked, and so justly too, in the class of England's benefactors, was remarkable for only peaceful and successful exertions; triumphs, it is true, not so much heeded by the world at large, as other more brilliant, though far less nationally profitable, exploits, for which it is more wont to award its plaudits. Yet they were of a higher order than any of those to which we have glanced; for where many of those produced misery and desolation, these more happy achievements caused no one to lament; and far from impoverishing, they adorned, they enriched, the soils of the land of his birth.

ON THE IMPROVEMENT OF THE BREED OF HORSES.

Impressed with the opinion that a great radical change is requisite in the breeding of horses, more so than in any other class of our domesticated animals, I have ventured to offer the following essay on this branch of rural economy to the notice of your readers.

From the earliest records "the horse" has been a theme for the warrior and the historian, the poet and the philosopher; so much so, that it must be confessed that the inquiry appears all but exhausted, did not every-day experience prove, that we have still much to learn both in our practical and theoretical knowledge of this noble animal.

Britain prides herself, among other excellencies, of possessing the finest breeds of horses in the world; and without detracting from this national pre-eminence, which dignifies our noble and illustrious land—for there certainly is no country in the world that can boast of producing so many different kinds of horses to such high perfection—still it becomes a question of very considerable importance, and every way worthy of inquiry, whether they cannot still undergo very considerable improvement. The ox, the sheep, and the pig are acknowledged by every one to be in a state of progressive amelioration. Is the horse improving in the same ratio? At the present time no kind is more difficult to obtain than a really useful hack or hunter, and so general is this complaint, that by many practical men an opinion is entertained that these valuable kinds are actually in a state of progressive deterioration. This opinion prevailed at the great meeting of the Yorkshire Agricultural Society, at Doncaster, last year.* Yorkshire has been long celebrated and "sung in song" "as the nursing soil for martial steeds;" but at this meeting, the boast of the Yorkshire men was, that their cattle and sheep were brought to such a high degree of perfection, that no other part of the country, nay, even of the world, could compete with them. This is I believe no idle boast; but they acknowledged at the same time their belief, that their breed of horses were annually deteriorating. The opinion which I have formed on this subject, and which is the result of twenty-five years' experience, is, that there are as

* The meeting of 1841.

many serviceable horses bred now as there were some fifty or seventy years since; but the relative number of indifferent and worthless horses is incalculably greater: they have increased in quantity, but most certainly not in quality. Many of my readers may suppose that the valuable prize offered from year to year by the Royal Agricultural Society at their different meetings, for the express purpose of encouraging a better description of thorough-bred stallions, or half-stock getters, would in some measure remedy the evil complained off; but, on the contrary, if we are to judge from those exhibited at the Bristol, Derby, Southampton, and Shrewsbury Meetings, in this class of stock, we should say, that they were getting worse and worse. Those particularly, exhibited at the two last meetings were of such a decidedly bad character, that the judges would have done their duty better by refusing the prizes altogether, than by taking so much pains as they did, to select the best of two bad lots.

The improvement of our horses at this particular period, when agriculture is making such rapid strides, in order to produce sufficient food for an annually increasing population, is a matter of very considerable importance, even in a national point of view. According to M'Culloch, we have in Great Britain about 1,500,000 of horses, employed for various purposes of pleasure and utility; and it has been assumed by many persons, whose opinions are really worthy of attention, that one-sixth part of them are not worth one quarter of the cost of rearing, and that if a better description of horses were generally introduced, an immense saving would be effected, as it has been frequently proved that even three moderate good horses will do the work of four inferior ones. This is a calculation which may very safely be relied on, for the man that employs bad instruments can never have his work economically done. The first important step, whether on a farm or in any other business, in order that the greatest possible profit may be realized from animal labour, is, that no more animals should be kept than are really wanted, and these should be kept in good condition. But in order to effect this, it is requisite that the labouring stock should be of the best description. An animal may be compared to a steam engine in this respect: the moving power, which is the food, like the coals to the engine, produces the steam which sets the whole in motion; but whatever quantity of force or energy may be applied in this manner, neither the vital nor mechanical machine will work with regularity and effect, unless the individual parts of which either is composed are properly adjusted. It is not enough that the animal machine is put in motion by the noblest spirit, or nourished by the most nutritious food—every bone must have its just weight and length, every muscle and tendon its proper pully, every joint the most accurate adjustment—all must have their relative proportions and strength, before the motion of the machine can be accurate, vigorous, and durable.

It may be easily believed that the only perfect form of the horse consists in that corresponding unison of the parts or proportion which is best adapted to the purposes for which he is intended to be used; and a horse possessing these qualifications, whether a cart horse, blood horse, or hackney, will not consume more food than one whose parts are disproportionate and unsymmetrical; although, as it has just been stated, "three well formed horses are equal on an average to the labour of four inferior ones."

But supposing, by a better system of breeding, that a reduction might be made of only one-eighth of the total number, and estimating the cost of rearing a horse to three years old at £15 only, the saving in the rearing would amount to the immense sum of £2,812,500. But the loss does not stop here, for upon the principle that seven good horses only are equal to eight inferior ones, and assuming that the age of this worthless lot to be eight years on an average—for, from their defective formation, like the machinery of an engine which is not properly adjusted, the wheels quickly become worn, and the springs soon lose their elastic force—so they are unable to undergo the fatigue which ordinary horses can easily perform, and they are generally short-lived. Thus, valuing the expenses of their keep for the remaining five years at £15 per annum only, it would amount to £14,062,500, making altogether the enormous sum of £16,875,000 in eight years, a sum of money which may be considered as a dead loss to the country.

This picture which I have attempted to pourtray is far from being highly coloured—so much so, that I believe the loss to be considerably greater than I have represented it, and most certainly shews the urgent necessity of an almost radical change in this branch of rural economy.

We will now examine the principal causes which have contributed to the multiplication of so many inferior horses. It is a very common opinion, that owing to the fashion which has prevailed within the last half century, of gentlemen riding and driving mares, which was not formerly the case, the farmers have been induced to part with these "hens that laid the golden eggs," and have been breeding from others of an inferior description. This is true enough: besides, numbers of our best brood mares have been exported to France and Germany, and the consequence is, we have been parting with the very machinery that manufactured the raw material, which not only give foreigners the means of manufacturing themselves, but at the same time of shortening our powers of production. But this is a subject of national policy, rather than an agricultural inquiry, so we will let that pass, and examine the principal cause.

The description of horses to which our inquiry extends are of that class constituting hunters and roadsters, both in saddle and harness, coachers and chargers being generally the produce of a thorough-bred horse with half, two-thirds, three-fourths, and four-fifths bred mares, and are frequently classed together under the term of *half stock*. Many of our hunters are found "full blood" or nearly so, for an inferior animal cannot live with modern hounds—modern hunting partaking much of the character of racing as far as the speed is concerned. The qualities which we require in our half stock generally, then, are speed and endurance, with the capability of carrying heavy weights, with varied pace, through deep ground or across a broken and stony country; and in order that they should possess these capabilities, they should have what are commonly termed in hunters' phraseology, "*bone, muscle,* and *compactness,*" by which is understood compactness of form, and the bone and muscle in their proper places. Are these qualities then to be met with in the thorough-bred stallions? Yes, in a few of them certainly, but scarcely even in the blood stallions that travel the country markets and fairs, from which the principal portion of our half stock are produced. Then is it not a folly to attempt to produce such qualities with a horse wanting them altogether, and more particularly, as it too frequently happens, where the mares are also wanting in those very indispensable properties? Many of the mares have plenty of bone and muscle in their heads and necks, but we require these requisites in their other extremities. Where these qualities are met with in the thorough-bred stallions, they generally prove most valuable "half stock" getters. It would appear that our blood stock formerly possessed these characters in an eminent degree, and by reference to former sporting publications, it will be seen that they were shorter in the leg, and capable of carrying heavy weights and running long distances; now they run with light weights and short distances, where bottom and stoutness are not so necessary. Our fleetest racers were then what are now called small horses, which means that they were not the tall, lengthy, leggy racers of the present day, but compact and muscular, and remarkable for their capabilities of carrying heavy weights and power of endurance.

This change in our blood stock has originated in consequence of alterations which has taken place on the turf. If the great stakes at present were two and three miles, instead of half or one mile distances, they would certainly be won by the "stoutest blood," though not perhaps the fastest horse. I am by no means an advocate for four-mile heats, with high weights, which was formerly so much the fashion, but a medium between that and the present system would be highly desirable. A mile is not sufficient to try the strength and endurance of any horse, although it may do to test its speed for the purposes for which he is now chiefly required, viz., *to win a heavy stake.*

By reference to the racing calendar, it will also be found, that in the earlier part of the last century, it was a very uncommon occurrence to run horses under four and five years old; this accounts for the durability and superior speed of Childers, Bay Malton, Old Crab, Eclipse, and a host of others which might be mentioned. Dr. Syntax was one of the few modern racers that have appeared at the post for ten consecutive years; he was descended from the son of Trumpator, as well as combining that of Snap and Regulus in his pedigree, animals characterized for strength, stoutness, and durability. But in the present system of racing, they run at two and three years old, and to enable two-year-old colts to come to the post with some credit at this early age, they are obliged to undergo very severe treatment. "At eighteen months they are broken in and trained, the principle being the same as with the older horses. They are taught how to use their legs, and made acquainted with the advantage of their stride and of exerting themselves to the full extent of it; and if they do not break down, and are cool and clean on their legs, and go cheerfully to their work, their task is regular and strictly exacted.*

It cannot certainly be surprising that by this system of early training, the capabilities and powers of a noble and useful animal are prematurely exhausted. Hence, how common it is to hear of an extraordinary instance of speed exhibited at two years old, in consequence of which the colt becomes a "little wonder" for the time, but is seldom or ever heard of as figuring at any other race, the rapid growth of the favourite's popularity being as sudden as his downfal. Still this is no fault of the horse; the growth of the youngster has been forced beyond his age—the deposit of bone has been prematurely hastened before the membranous parts have become fully developed, and the bones in consequence never attain their proper size, or the muscles their full power—like a hot-house plant, his growth and strength have been increased in an artificial manner, and he is no sooner ripe than rotten. It is well known that an immense number of colts, thus prematurely trained, are never brought to the starting-post. "They must have no unsoundness either local or constitutional, nothing approaching to a chronic affection of the lungs, not even a trifling cough, not the slightest possible disease, or enlargement of the tendons of the leg or the ligaments of the joints. To bring a horse to the post with one of these faults about him, would be to throw money away. But these faults have been produced in a considerable portion of the young stock by the premature exertion they have undergone, and are accordingly disposed of as soon as possible to horse jobbers, post-masters, or any one that will buy them."† Many of them are purchased for the purpose of being led about the country, for the improvement of hunters and roadsters; and there are very few counties in England, but that have been favoured from time to time with some of this hot-house breed.

The argument to be drawn from this part of my subject is a fair and reasonable one—that this difference in the style of racing has, by altering the former character of the race-horse, likewise altered the character of our half stock. This is a fact, and one I believe generally acknowledged, and which clearly accounts for such an immense number of worthless trashy horses that are now generally met with. I do not flatter myself by these remarks, with the hope of making any alterations in the present system of racing—indeed we have no right to expect it, or even to complain. The turf man has cultivated a plant in the most careful manner for his own peculiar purpose, and from it has organized a race that for speed for a short distance has not its equal in the world; whilst the hunter or the roadsman neither tilled nor sowed, but trusted to a supply from the gleanings of his neighbour's harvest, and he finds at last that it would have been

* Youatt on Humanity. † *Idem.*

better policy to have confided in his own resources. But it is not too late to prepare the land and sow for ourselves; and if so, depend upon it that the seed will soon germinate and grow, and we shall then see, "first the blade, then the ear, and then the full corn in the ear," and a rich and abundant harvest will be the reward of our united labour.

It has been advocated that since all the good qualities of our horses are derived from the Arab and his progenitors, we should go back to the primitive blood to commence with. There is not a doubt that the cross of an arab with the common average of half-bred English mares, would do much good, particularly with those possessing heavy fore-quarters. In a neighbourhood where the mares generally speaking, are of bad forms, having clumsy heads, and sometimes ewe necks, with indifferently-made legs, although, many of them, possessing plenty of action, I would have no objection as a first cross to try the Arab. It would reduce the size of their heads and necks, and inspire a spirit of endurance in the breed which would last for hundreds of years. This would also prepare the way for obtaining a larger breed if required.

Most of the attempts that have been made to breed from the thorough-bred mare and the Arab stallion, for racing purposes, have utterly failed; this was particularly seen in the Cole Arabian.* He had some of the best Irish mares put to him, but none of them could run with the common average of English and Irish race horses, except when receiving weight; and accordingly he was kept at Dublin for half stock, and his stock proved most excellent, sinewy and spirited, with extraordinary powers as hunters or roadsters, some of them distinguishing themselves as steeple chasers. We have another instance in a very fine grey Arabian, imported by General Brownrigg:† the best Irish and English blood were put to him for trial; but although he got some splendid hunters, as to racing it was altogether out of the question. Major Gwatkin, the superintendent of the East India Company's breeding stud at Bengal, alluding to the Arab blood, says—"A good hunter or a good roadster, which here, as well as at home, I fancy is by far the most difficult horse to meet with in perfection, will always fetch a handsome price, with profit to the breeder; and I must own with surprise, that for the distinct object of breeding hunters and roadsters, the Arab is not tried in England. All his points, combined with perfect good temper, would indicate his fitness—a beautiful head, a high generous spirit, graceful in his carriage, generally a light shoulder, with great elasticity of pasterns, rendering his paces easy, with silky short hair, wiry legs, feet good, hocks particularly clean, and generally carrying both ends well." He adds, that "the mare in this part of India is coarse and vulgar, both in shape and qualities, and I may add colour, and does not at first cross well with the English blood-horse; whereas the cross from the Arab tends materially to correct her natural bad qualities, to prepare her to receive the English blood."

But the system of crossing is at the best but a very fallacious principle of breeding although there cannot be a doubt that much good would be effected by the introduction of the Arab blood. A true breed is never made by casual crossing in this manner, but by a long perseverance in breeding from similar animals, until a uniform class of character is required and rendered permanent. The great advantage of having a breed of hunters and roadsters possessing a uniformity of character must be very evident, for then the breeder will have in such a case the assurance of being able to reproduce in the offspring the characters of the parents; whereas, by the method in which they are now generally bred, no uniform breed can be established.

The next question which naturally arises is, How is this to be accomplished? Not by any private individual certainly, for such an attempt would be altogether impossible. It can only be undertaken by such a body of men as compose the Royal Agricultural Society of England, and I would most respectfully solicit the attention of the council of this society to the following scheme:—

In the first place a committee should be appointed, and, after agreeing on the principle on which they intend to proceed for the purpose of establishing a new and *permanent breed of horses*, due notice of the same should be given to the agricultural public, setting forth the necessity of the improvement, and the means which they considered requisite to attain it. In the second place it would be requisite to obtain the services of 100 valuable half-bred mares,* which should be put to stallions purchased for the purpose by the Royal Agricultural Society of England; the mares to be kept and the progeny to be reared by their respective owners, but honourably considered at the disposal of the committee, as far as the breeding from either was concerned. As soon as a sufficient number was offered for the trial, a competent person should be selected, whose business it should be to carry out the objects of the committee. This individual, who might be called the director of the breeding stud, should be one familiarly acquainted with the natural habits of the horse, as well as those various states in which he is placed by art, either in the stable, upon the turf, in the field, or upon the road. To him should be entrusted the purchasing of two thorough-bred stallions, possessing every qualification likely to produce a progeny having *size*, *strength*, and *action*. No one respects high breeding in horses more than I do, provided it be accompanied by "substance;" the blood of Childers or Eclipse would be useless without it. There would not be the least difficulty in getting thorough-bred horses of the right sort, whose stock with half-bred mares could be previously seen and examined. This inspection is decidedly necessary, for the success of the experiment will chiefly depend on the qualifications of the stallion.

I do not apprehend that there will be any difficulty in getting a sufficient number of the most valuable half-bred mares in the kingdom for this purpose, but on the contrary, I believe there would be a great many more offered than will be required. It would be advisable to select some central district,

* "Sporting Magazine," Dec., 1833. † *Idem.*

* By half-bred mares is meant half-stock generally.

where the best horses are reared, as a residence for the stallions as well as the director of the breeding stud; in some parts of the North Riding of Yorkshire, for instance, where the advantage of sending the mares by railway would make such a locality highly desirable.

In no instance should a bad-formed mare be selected; nearly the whole success of the experiment will depend on this. The selection, of course, should be made by the individual before alluded to, and might be determined by *points*, which should be considered as standards of excellence.

1*st Point—Breed.*—It is real economy to breed from animals that have been carefully selected for several generations. The courage and capability of endurance entirely depend on this principle, any defect of which, particularly in an animal intended for great occasional exertion, must render it unfit to be selected to continue an improved breed.

2*nd Point—Symmetry.*—The meaning of this word is "adaptation of parts to each other, proportion, harmony, &c." That progressive motion is the result of mechanical organization, I believe every one will admit; and this motion will be found superior or otherwise, precisely in proportion to the form and quality of the mechanism by which it is produced. At present we have no absolute standard of beauty, in a practical point of view: varying from race to race, by homogeneous mixtures and crosses, such a standard would be impossible; but by the scheme which I am recommending, it would be just as easily accomplished and preserved as that of the new Leicester sheep by Bakewell, the short-horns by Collings, or the improved Herefords by Tomkins.

3*rd Point—Substance.*—I have before stated that I would not breed from the blood of Eclipse, if I could not obtain animals of sufficient size and power. But by the word "substance," it must not be understood to mean, "large, roomy mares," such as were recommended by the late Mr. Cline, who contended for size in the female compared to the male, from an opinion, that this capaciousness not only afforded more room for growth to the fœtus, but that more nourishment also would thereby be supplied to it; the consequence of which advice, coming from such high authority as Mr. Cline, led to the practice of crossing great cart-mares with thorough-bred horses, the object being to obtain carriage-horses. This heterogeneous connexion frequently produces a colt as bad as could possibly be generated, possessing the heavy forehand of the dam, supported by the slender limbs of the sire.

I am very much of the Earl Spencer's opinion in this matter, since Mr. Cline's theory is one "contra naturam," and experience proves that large mares are not absolutely necessary to the production of a large produce. But I am not an advocate for breeding from either large or small mares; for hackneys, every inch you exceed above fifteen hands one inch high, you deteriorate from their value. But hunters being required to carry heavy weights through deep ground and sometimes across a difficult country, stoutness and substance as high as 16 hands are desirable; but there is always a difficulty in breeding large size animals with true symmetry. Mr. Charles Collings, in improving the old Teeswater breed of cattle, found this out soon after he commenced establishing the short-horned race; and there is no doubt that he effected very considerable improvement immediately, by lessening their size, and thereby improving their form.

4*th Point.*—In every instance the mares should be the property of gentlemen who have not only the inclination, but the means of carrying out to its full extent the intentions and object of the committee, and would consider it a point of honour in doing so. It might be requisite that many of the first selected mares, if their stock proved valuable, should be served by the stallions a second or third time; at all events, the committee should have the power to do so, and the whole of their progeny must be considered as being altogether under their management. For although a great deal of the success of the undertaking will depend upon the first selection, yet much will remain to be accomplished in the second.

The person to be trusted with the first selection will have to examine the produce occasionally, and to select such as are considered worthy of distinction. These should be put, when three years old, to the thorough-bred stallions, as their dams were before them. There will be no occasion to breed *in and in*, in this instance, having two stallions at your command, unless it be considered desirable. Some may imagine that the half-stock might be coupled together, but this method of breeding has often led to disappointment: the first cross generally proves good; whilst in breeding from the progeny of the cross, the expectations are seldom or ever realized; for not only are the good qualities of the first seldom found in their progeny, but frequently there are found in it defects which cannot be traced to the parents; and to prevent this, it is found necessary to couple the produce with a superior male of the same breed, and so on until the good character of that breed become permanent in the progeny. This was the system produced by Charles Collings, in producing the improved short-horned breed, termed the "alloy." He put his short-horned bull Bolingbroke to a beautiful red polled Galloway cow, and the produce being a bull-calf, was in due time put to Johanna, a pure short-horn, she also producing a bull-calf. This grandson of Bolingbroke was the sire of the cow Lady, by another short-horned dam; from which sprung the valuable family, that at his sale in 1810, forty-eight lots, including the cow Lady, fetched £7,115 17s.

In about the fifth year from the commencement, a third stallion may be requisite; but this will altogether depend on the number of females selected, for it may happen that many of the old mares will be rejected in the second trial, and so likewise may their progeny.

In a few years, by breeding of animals on such an extensive scale, always keeping one particular character in view, a great many valuable ones would be obtained, and a permanent character of horses established at a trifling expense to the society. The first difficulty likely to be met with by the committee will be, when will the particular character which has been all along their object to obtain be considered as sufficiently established, and brought to that certain state of excellence, that it will maintain itself without having recourse to the thorough-bred stallion? I should imagine that this might be safely done in ten or twelve years from the commencement. It is important to know the degree of blood which the stock will possess at this period. Supposing that the mares first selected be only half-bred, and the value of the pure blood of the horse being represented by 1, and the negation of pure blood of the mare being represented by $\frac{1}{2}$, the value of blood in the first produce, foaled say in 1845, would be $\frac{3}{4}$; the second produce, foaled in 1849, $\frac{7}{8}$; the third produce, foaled in 1853, $\frac{15}{16}$; and the fourth produce, foaled in 1857, $\frac{31}{32}$. A trial, however, might be made before this period. The cow Lady, before alluded to, was the produce of the third generation. Great difficulties must be expected to attend the conservation of the new race, for, without incessant care, deterioration from the point attained will soon be evident; and in spite of the fine appearance of the new breed, unless the original mares have been of a very superior description, it will carry in its blood a maternal indestructible germ of debasement, always ready to develop itself by little and little under certain local influences, always under the power of divers agents impairing or modifying the general economy, until at length a certain alteration of form, an effacement of the paternal type, takes place, and a reproduction of the stock of the mother, with all its characters of inferiority.

Breeding the new breed as closely as possible to their natural affinities will be one of the surest means of establishing the permanent character that is required; but this of course will depend on the committee, and the judgment of the individual appointed to carry their wishes into effect. For my own part, I cannot see any real physical objections to the practice, when the male and female are perfect; besides, there will be no occasion, with so many mares, to continue breeding very closely, although I am inclined to think that, being once in possession of good blood, it is right to continue in it for one or two generations at least.

Such was the principle on which Bakewell established the new Leicester and the improved long-horned cattle, and Mr. C. Collings the short-horns; first selecting the most suitable individuals for breeding, and having produced by this means animals of the properties required, confined themselves afterwards to their own stock.

As soon as the new race is considered sufficiently established, a number of the different local agricultural societies will be, or ought to be, in a situation to purchase many of the stallions belonging to the improved breed, from their respective owners. I stated that a cross of the Arab with the generality of brood mares intended for the saddle in the country, would very materially assist in removing many of their objectionable points, and would prepare them to receive a larger breed; this would be a very desirable preparation previous to the introduction of the new brood, but could not be very easily managed. Arab horses of sufficient character are not easily obtained. However, where it can be accomplished, I would most strongly recommend its being tried.

The same system of selection ought to be adopted now by the branch societies as has been pursued by the Royal Agricultural Society, and if prosecuted with perseverance and attention, success will certainly attend their endeavours. In breeding from the female progeny of the new breed, if the party engaged in the local improvement of their horses were apprehensive of injurious consequences from coupling the sire with his progeny, exchanges could easily be effected between the different societies from year to year; but on no account must the progeny be immediately coupled together: the true system is, to take one cross, and then return to and adhere to the original breed.

There is nothing chimerical in this scheme, nor can there be any doubt as to the result. There is no expensive machinery required; the first outlay will be a couple of stallions and their keep, and attendance, with the income and expenses of the director of the breeding department, who may be selected by the committee to carry the whole into effect, whilst the owners of the mares will be amply remunerated by possessing a valuable stock of really useful and valuable animals.

I said that a great deal of the success of this experiment will depend on the owners of the mares, for to them must be entrusted the rearing of the young stock—means second to none in accomplishing the committee's object. This also should be conducted on a system, but varied occasionally by the situation or advantages on the farms.

It would be unnecessarily occupying the attention of the reader to inform him, that the interest of the breeder of this description of stock in particular is best consulted by a careful provision of shelter and a liberal supply of food during the first two years. Daily experience, indeed, fully proves the folly and impolicy of neglecting young stock of any kind; but especially is such neglect impolitic and injurious in the case of those animals whose value depends on their size, strength, and powers of endurance—qualifications mainly promoted by liberal feeding and careful treatment.

In conclusion, I would most respectfully solicit the attention of the Royal Agricultural Society to the foregoing scheme. There are many parts that may be no doubt altered for the better; but whatever may be your decision on the system which I have recommended, this much is evident—that in spite of railroads and steam ships, good serviceable horses were never more really valued than at the present time, nor so difficult to be obtained. How far the rules of this valuable society will allow of their undertaking a work of such importance, I do not pretend to know; but this I believe, that there is no single branch of agriculture connected with national prosperity, which so greatly requires the superintending care of this society as the improvement of the breed of horses.

CHEMISTRY FOR FARMERS.

Proximate Elements of Plants.

In considering the chemical constitution of vegetable substances, it is found convenient to distinguish their proximate from their ultimate elements, and before proceeding to give an account of the former it is necessary that such distinction should be explained.

Even to those least acquainted with the subject, plants are known to contain a variety of substances, the result of organization, widely different in their chemical properties, and usually obtained merely by mechanical operations, such as starch, sugar, gum, and many other matters; and to these, although compound substances, the term of *proximate elements* is applied. The ultimate elements constituting the organic portion of plants have already been seen to be very few, namely, oxygen, hydrogen, carbon, and nitrogen; and it is of various combinations of these that the proximate elements are formed, although the number of the latter is very considerable; and what is still more remarkable, they are for the most part composed of three of these ultimate elements only, nitrogen not being a general constituent. These proximate principles are further divided into two classes or sections; namely, such as may be called special products of certain particular plants, and sometimes only of particular organs, and such as are always present in every plant, and together make up the great bulk of the solid portion of its structure. To the first of these classes belong the vegeto-alkalis, morphia, cinchinia, quina, and many other substances which usually occur only in very minute quantities; and although exceedingly interesting in many particulars, especially for their application in the arts and in medicine, they do not require extended notice in a brief sketch like the present. The second group is, however, much more important, as forming the great mass of all vegetable subjects, and demands special attention. They conveniently admit of a still further classification into four sub-divisions, namely, neutral substances, acids, oils and resins, and albuminous matters. The latter of these only contain nitrogen.

The most important of the neutral substances are sugar, starch, gum, and lignin or woody fibre. The properties of these are highly interesting, on account of the curious transformations which they may be made to undergo by artificial means, and the great importance of some of them as articles of food. Their composition is also very remarkable: they consist of carbon, hydrogen, and oxygen, the two latter always existing in the proportion to form water. They are termed *neutral substances* on account of the little tendency which they exhibit to enter into a chemical union with other matters. Though so apparently similar in their composition, they differ widely in their physical characters, some being soluble, others insoluble, some being sapid, and others altogether tasteless. Of these principles woody fibre and starch deserve the most attention: the former by reason of its abundance in all plants, constituting, as it does, the great bulk of their substance; and the latter, on account of its extraordinary structure, which forms, as it were, a connecting link between strictly organized bodies and those which are crystallizable.

The term *lignin* or *woody fibre* is generally applied to the fibrous residue which remains after the various other principles are extracted by different solvents: hence insolubility is one of its most obvious characters. It is also recognized as the most desirable product of vegetation, and the extreme perfection in which it is occasionally found in mummy cases, in ancient buildings, and even in submerged forests, shows its powers of resisting decay. When, however, it is long exposed to the joint influence of air and moisture, it often becomes pulverulent, acquiring a brown or grey colour, as is seen in the rotten wood of very old trees. It is also liable to more rapid decay and disintegration under the influence probably of parasitic plants, especially when the place is damp, and air imperfectly admitted, as in cases of what is termed *dry-rot*. In some cases it is entirely decomposed, leaving only a carbonacous residue.

The action of heat upon woody fibre is extremely interesting. When wood is thoroughly dried at a temperature of about 220° it shrinks and splits, or if previously in powder it loses variably in weight, depending on its humidity. When it is carefully baked, so as to become of a pale brown colour, it acquires solubility in water to some extent, yielding a brown infusion, in some respects similar to toast and water; and, indeed, under proper management it may be converted into a palatable and nutritious bread, for which purpose it is occasionally employed by the peasantry of Sweden and Norway; and the process for preparing which is described in the *Philosophical Transactions* for 1827. Burned in air, it affords large quantities of inflammable gases, which produce flame, and under it a valuable fuel; and if decomposed with a partial access of air only, it affords common charcoal or carbon, already described.

Woody fibre has been said to constitute a large portion of the entire mass of vegetable matter produced during the growth of plants. That such is the case in the more gigantic vegetable productions of which forests consist is sufficiently evident. It is also true of the dried stalks of the grasses and the corn-growing plants, of which it forms nearly one-half the weight; but in roots and some plants which are raised for food, the quantity of woody fibre, especially in the earlier stages of their growth, is comparatively small. Thus, in the beet-root it forms only 3 per cent. of the whole weight when taken from the ground. If suffered to remain in the soil until it becomes old, or if the growth be very slow, the beet becomes more woody, as many other roots do, and the quantity of ligneous fibre increases. The following table shows the per centage of woody fibre contained in some common plants in the green state, and when dried in the air, and again when dried at a temperature of 212°.*

---

* Johnston's Lectures on Agricultural Chemistry, &c.

	Dried in the air. per cent.	Dried at 212°. per cent.	In the green state. Woody fibre. per cent.	Water. per cent.
Barley straw, ripe	50	—	—	—
Oat straw, ditto	—	47	—	—
Pea haulm	—	—	$10\frac{1}{3}$	80
Bean straw	51	—	—	—
White turnip	—	—	3	92
Common beet	—	—	3	86
Vetch plant	42	—	$10\frac{1}{2}$	$77\frac{1}{2}$

Regarding the ultimate composition of woody fibre little diversity is found to exist, though differing so much in its mechanical properties. Specimens of the box and willow, which appear to present the greatest contrast in this respect, on being submitted to analysis by Prout, were found to consist of carbon and water in the following proportions in 100 parts.

	Box.	Willow.
Carbon	42.7	42.6
Water	57.3	57.4

Starch, next to woody fibre, is probably the most abundant product of vegetation. It is found abundantly in nearly all the tissues of plants; stem, leaves, roots, seeds are occasionally charged with it almost, in appearance, to bursting. It is only necessary to instance the common potato, and grain of all kinds, as examples. When these are torn to pieces by grating, and placed in a little trickling stream of water, the starch is washed out of the cellular tissue which contained it, and on the water being allowed to stand it settles down as a white powder, which, under a lens, exhibits the appearance of rounded, transparent, colourless granules, the magnitude of which varies very much, according to the plant from which they were obtained.

The large quantities of starch produced by wheat and potatoes are well known to every one. *Sago, tapioca,* and *cassava* are also varieties of starch. Sago is produced from palms of the genus *Sagus,* and though possessing the leading characters of common starch, differs from it in being soluble in cold water. Tapioca and cassava are prepared from an American plant—the *Jatropha manihot,* the milky juice of which is poisonous, but diffused through water, deposits a harmless starch, nearly allied to sago.

Pure starch, from whatever source it may be obtained, is a white substance, of a specific gravity of about 1.5; insoluble in cold water, but readily soluble in a temperature of between 160° and 180°. When dried at 212° it is found to consist of

Carbon	44.0
Hydrogen	6.2
Oxygen	49.8
	100.0

One of the most interesting properties of starch, as regards its importance in the vegetable economy, is its capability of being resolved into sugar by artificial means, the same process taking place naturally during the growth of plants, as shall be afterwards seen. The artificial means employed for the purpose are digestion in water, and boiling afterwards with dilute acids. A pound of starch may be digested in six or eight pints of distilled water, rendered slightly acid by two or three drachms of sulphuric acid, and the mixture simmered for some time, fresh portions of water being occasionally added to make up for the waste caused by evaporation. After this process the acid is saturated with chalk, and the mixture filtered and evaporated to a syrup; its taste is then sweet, and by purification in the usual way it affords granular sugar.

The conversion of starch into sugar is seen in the germination of grain, and is familiar in the process of malting; and while this is going forward, a peculiar principle called "diastase" is generated from the azotized matter of the grain. This diastase has the remarkable property of occasioning, even when present in very small quantity, the conversion of starch into grape sugar, at all temperatures, from that of ice to near the boiling point of water.

The proportion of starch found to exist in some of the cultivated plants is shown in the following table, 100 lbs. of each substance being submitted to examination:—

Wheat flour..........	39 to 77	per cent.
Barley ditto..........	67 to 70	,,
Oats ditto............	70 to 80	,,
Rice	84 to 85	,,
Buckwheat	52	
Pea and bean meal	42 to 43	,,
Potatoes, containing 73 to 78 per cent. of water	13 to 15	,,

Gum.—Under this term are included several modifications of a distinct proximate principle of vegetables, which are of extremely common and almost universal occurrence. To some of them the term *mucilage* is occasionally applied. Gum occurs in the form of an exudation upon the bark of trees, and collects into drops, which gradually harden by exposure, and of which gum arabic furnishes a very perfect example. It may also be discovered more or less abundantly in the sap and juices of almost all plants and fruits.

Gum is slowly soluble in cold water, and more rapidly in boiling water, yielding a mucilaginous solution, which is more or less viscid or clammy, according to the proportion of gum, this solution being extensively applied in the arts. The ultimate composition of gum is as under:—

Carbon	45.1	per cent.
Hydrogen	6.1	,,
Oxygen	48.8	,,

Sugar, the remaining neutral proximate ingredient of vegetables, is found to exist in the juices of most plants. The sugar of commerce is obtained from the sugar-cane—*Arundo saccharifera,* a plant naturally thriving only in hot climates. In certain parts of North America sugar is plentifully obtained from the juice of the maple tree, and in the Caucasus that of the walnut is employed for the same purpose. In the juice of the carrot, turnip, and beet, it is also present in considerable quantity.

In France and Germany the latter plant is extensively cultivated for the production of sugar alone.

Sugar in a pure state is perfectly colourless and devoid of smell. It is also unchanged by air; and in the state of a syrup, which is merely sugar largely dissolved in water, it is not prone to change; but the addition of other vegetable substances, though in very minute quantity, materially influences the action of air on this solution, inducing fermentation to take place, a process to be afterwards noticed.

The composition of pure cane-sugar is almost analogous to that of starch, as will be seen from the following statement of its ultimate elements:—

Carbon	44.92	per cent.
Hydrogen	6.11	,,
Oxygen	48.97	,,

Vegetable acids are found in the juices of all plants, usually in a state of combination with potash, soda, ammonia, or some of the earths which remain behind (except ammonia) after the destruction of the plant by fire, in the state of carbonates. The most important of these are the acetic, oxalic, tartaric, citric, and malic acids. They abound chiefly in fruits, and do not otherwise form any large portion of the vegetable produce of the globe. These acids are readily formed by artificial means from the various other products of plants; but little is yet satisfactorily known regarding the purposes which they serve in the economy of vegetation. In combination with vegetable substances they contribute to resist the progress of decay. They rarely exist in plants in an uncombined state, but in combination with the various bases already mentioned. The bases evidently regulate the formation of the acids, for the diminution of the one is followed by a decrease of the other; thus, in the grape, for example, the quantity of acid contained in its juice is less when it is ripe than when unripe; and the bases, under the same circumstances, are found to vary in a similar manner. Such constituents exist in small quantity in those parts of a plant in which assimilation is most active, as in the mass of woody fibre; and their quantity is greater in those organs whose office it is to prepare substances conveyed to them for assimilation by other parts. The leaves contain more inorganic matters than the branches, and the branches more than the stem; hence in the former the organic acids will be found most largely to exist.

The *oily and resinous principles* of plants do not require extended notice, as they are chiefly to be regarded rather as valuable *products* of vegetables than as performing any important function in their growth. In the neutral substances first examined, the oxygen and hydrogen which they contained were seen to exist in precisely the same proportions as that in which they form water; in the organic acids, with few exceptions, the oxygen is in excess; and in the oils and resins which plants are found to contain the hydrogen predominates. These latter are further characterised by the readiness with which they burn with flame; and the production of light is accordingly one of the most important purposes to which they are applied.

Oils are divided into *volatile* or those which distil over unchanged, and *fixed*, or such as undergo partial decomposition when the attempt is made to convert them into vapour. The former have generally a powerful taste and smell—properties which the latter do not possess. The volatile oils are usually obtained by distillation, but sometimes by expression, such as those of the lemon, orange, and bergamot; but the fixed oils are invariably obtained by the latter means alone.

The resins closely resemble the oils in composition, and are usually regarded as products of the latter by still further oxidation.

The *nitrogenous principles* of plants, or those already mentioned as albuminous, play a very important part, and are deserving of more attentive consideration. Nitrogen exists in the vegetable structure in much smaller proportion than either of the other organic elements, and hence, until the investigations of Liebig were placed before the world, it was considered to be of inferior importance in the economy of vegetation. The importance of albuminous matters has, however, now been placed in its proper light by the discoveries of that distinguished chemist, as to the absolute identity of some, at least, of the nitrogenous compounds with the so-called proximate constituents of the animal frame—albumen, fibrine, and caseine. Nor can this be regarded as conjecture, as it is now established by the most unequivocal evidence. The origin of these substances in the animal structure is to be sought only in the plant on which he feeds, there being no other source whence it can be obtained; and, arrived in his stomach, they undergo simple solution in a peculiar manner, and are then directly absorbed into the system.

Gluten is an important nitrogenous compound of plants, so termed from its adhesive character. It is found in many of the esculent seeds, and especially in wheat, associated with albumen and starch. Its characteristic properties are insolubility in cold water, elasticity and adhesiveness when moist.

When a thick paste of wheaten flour is tied up in a piece of coarse canvass, and washed and kneaded in water till the whole of the starch is extricated, and the washings are no longer milky, it leaves a grey, viscid, adhesive, and elastic substance, which consists of gluten and albumen, with a little residue of starch. By boiling this substance in alcohol, it is separable into a soluble and insoluble portion—the soluble part is gluten; the insoluble, albumen. Gluten is then obtained by mixing the alcoholic solution with water and distilling off the alcohol; it separates in straw-coloured flocculi, which aggregate, on stirring them together, into an elastic mass, tasteless, and of a peculiar odour; exposed to the air, it becomes superficially brown and glossy, and gradually dries into a semi-transparent, horn-like mass.

Gluten is obtained by similar means from the flour of the other grains, but in them it exists in much smaller proportion. The quantity contained in the several cereal crops is as under:—

Wheat	contains from	12 to 35	per cent. of gluten.
Rye	,,	9 to 13	,,
Barley	,,	3 to 6	,,
Oats	,,	2 to 5	,,

Albumen is the orignal portion of wheaten flour insolubie in alcohol. In an uncoagulated state it is found in most vegetable juices, and when these are boiled, the albumen becomes insoluble, and separates from the other portion of the liquid. This is called *vegetable albumen*, to distinguish it from the albuminous matters found in animal substances, a familiar example of which, in a pure state, occurs in the white of eggs, which is exclusively composed of albumen. Vegetable albumen, when fresh and moist, has neither colour, taste, nor smell, is insoluble in water or alcohol, but dissolves in vinegar; when dry it is brittle, more or less coloured or opaque; it exists more largely in the fresh juices of plants than in the dried seeds. The different kinds of grain contain the following proportions:—

Wheat	contains from	$\frac{3}{4}$	to	$1\frac{1}{2}$	per cent.
Rye	,,	2	to	$3\frac{3}{4}$	,,
Barley	,,	$\frac{1}{10}$	to	$\frac{1}{2}$	,,
Oats	,,	$\frac{1}{5}$	to	$\frac{1}{2}$	,,

Gluten and albumen seem to bear the same relative proportions to each other as sugar and starch, being almost identical in composition, consisting of the same elements, united together in the same proportions, and, like the latter substances, being resolvable into each other. They are, further, precisely analogous to compounds existing in the animal economy, and hence the nutritive qualities which they impart to those plants in which they are contained is apparent. This is one of the most interesting departments of organic chemistry, and will be noticed more fully in the sequel.

Beans and many other seeds which contain oil, such as almonds, besides albumen, are loaded with a substance quite indistinguishable from the caseine of animal milk, and, still more strange to say, apparently in the same state of combination, and associated with the same inorganic substances, as are found to exist in milk inself.

Diastase has been mentioned as another nitrogenous compound, formed during the germination of seeds, and in the process of malting. If cold water is poured over malt ground into flour, and permitted to remain over it for a quarter of an hour, on pouring off and filtering the solution, and afterwards evaporating over hot water, and being then mixed with alcohol, a white tasteless powder falls, to which the name of diastase has been given by chemists. In unmalted grains this principle is not found to exist, but after germination or malting it is readily obtained; hence it is apparent that it is a product of these processes.

Diastase is supposed to perform important functions during the growth of plants. Like sulphuric acid, it possesses the property of transforming starch first into gum and afterwards into sugar; and so powerful an agent is it for this purpose, that one part of diastase will convert into sugar 2,000 parts of starch. The importance of such transformation in the nutrition of plants will be apparent when it is considered that starch is an insoluble, and sugar a soluble substance; and further, that it is only by means of matters in solution that the growth and development of vegetables are produced. When the young shoot is protruded from the seed, this singular principle is formed, and produces the transformation just mentioned, rendering the nutriment existing in the seed available for the support of the young plant until it is so far advanced in growth as to claim its food from the atmosphere and the soil.

Having examined the nature and properties of the substances influencing the growth of plants, the ultimate elements of which they are composed, and the proximate elements formed by various combinations of these in the vegetable structure, we are now prepared to consider the various chemical changes produced during their growth, from the deposition of the seed in the ground until maturity has been attained. In this department of the subject, the means at the command of the husbandman for accelerating or retarding these processes shall be fully noticed, and the knowledge acquired in the preceding pages practically applied.

GUANO AS A MANURE.

At the meeting of the Wakefield Club on August 15th, H. Briggs, Esq., opened a discussion "On the beneficial effects of Guano as a Manure." He began by observing—I shall make a few observations, which I hope will provoke a discussion. Farm-yard manure is thought to be the best manure; but this is certain, that kind of manure is best which has most of the nutritive properties of food for plants in it. Now let us compare the analyzation of manure and guano:—

A ton of	manure	yields	2 lbs.	4 oz.	of	potash.	
"	guano	"	66 "	8 "		"	
"	manure	"	1 "	10 "		soda.	
"	guano	"	36 "	15 "		"	
"	manure	"	5 "	1 "		phosphoric acid.	
"	guano	"	283 "	9 "		"	
"	manure	"	1 "	4 "		sulphuric acid.	
"	guano	"	93 "	8 "		"	
"	manure	"	1 "	9 "		chlorine.	
"	guano	"	62 "			"	

From which it will be seen that one ton of guano contains about as much potash as thirty tons of manure. One ton of guano contains about as much soda as 19 tons of manure. One ton of guano contains about as much phosphoric acid as 55 tons of manure. One ton of guano contains about as much sulphuric acid as 80 tons of manure. One ton of guano contains about as much chlorine as 45 tons of manure. Bones are said to be a valuable manure; the principal fertilizing ingredients in bones are phosphoric acid and lime. Now, a ton of raw bones gives 580 lbs. of phosphoric acid. A ton of guano gives 283 lbs. of phosphoric acid. So that bones give double the phosphoric acid that guano does, but bones give no potash, soda, sulphuric acid, or chlorine; in yielding lime they are but equal. *Rape dust* contains no potash, soda, or sulphuric acid; so that if the land does not contain these, rape dust would be an inefficient or only partial manure, so far as the above three ingredients are concerned. There are only four manures which will do to be applied alone, viz: yard manure, gu-

ano, night soil, and urine. The following are only partial manures:—soot, blood, bones, rape dust, and nitrate of soda. A comparison of night soil and guano is as follows:—

A ton of	night soil	yields	6 lbs.	7 oz.	of potash.
"	guano	"	66 "	8 "	"
"	night soil	"	4 "	10 "	soda.
"	guano	"	36 "	15 "	"
"	night soil	"	120 "		phosphoric acid.
"	guano	"	283 "	9 "	"

The comparative value of farm-yard manure and guano (leaving out the gaseous ingredients) appear to be this:—Guano is worth thirty times as much per ton as farm-yard manure, as far as solid fertilising matters go. Practice confirms this: we have in our farm as good turnips from less than five cwt. of guano per acre, as from twenty tons of farm-yard manure; but it may be asked, is it equally durable? I say more so—farm-yard manure, it is admitted, yields more gaseous ingredients, but being very valatile, much more flies off than can possibly do from guano. On the ground we tried with five cwt. of guano for turnips, and twenty tons of farm-yard manure, the crops of turnips were equal. The next crop, which was wheat, the part which was tilled with guano produced the best crop. There is a clear benefit to the farmer; he can raise more turnips by the aid of guano, which gives him more food for his cattle, and of course makes more manure for him afterwards.

THE NORFOLK COB,

A CELEBRATED TROTTING HORSE.

The Norfolk Phenomenon, late the property of Mr. Theobald, of Stockwell, where he stood for some seasons, was bred by Mr. Burgess, of Well Fenn, and was got by that justly-renowned horse Young Fireaway, a famous trotter, who challenged all England, after beating Mr. Slade's celebrated mare, in a match for four hundred, on Sunbury Common. Young Fireaway was, of course, by *Old* Fireaway, out of a very fast mare by Old Marshland Shales, one of the very best trotters ever known, and who accomplished the then unrivalled feat of seventeen miles within the hour, in a match he ran with and beat the almost equally celebrated Driver. This performance, even up to the present period, has never been exceeded; at least, there is no *public* match on record to that effect, although eighteen miles and more are said to have been done in trials. For a greater distance, a hundred miles in ten hours is about the best deed of the kind yet achieved, which, in America, according to the *New York Spirit of the Times*, was performed so late as the fifth of last May, on the Bull's Head Course, Albany. The match, for five hundred dollars, was against time; and the animal chosen, General Dunham's Fanny Jenks. By the time-keepers, she was declared to have finished a hundred and one miles, twelve minutes within the time!—a wonderful thing, certainly; but it is no less remarkable than true, that the American trotters have never yet equalled in England that they have managed when at home. To return, however, to the Norfolk Cob, who is, by the description we quote, a brown bay, rather over fifteen hands high, with capital shoulders, fine forehead, remarkably neat head, well put on, short back and powerful loins, arms long and very muscular, and legs clean as when foaled, and short from the knee to the ground. He is completely master of twenty stone; an extraordinary good walker, a very fine and high goer in his faster pace; and in fact, as the portrait proves, as good a specimen of a real Norfolk trotter as ever was seen. As a stallion, perhaps the strongest proof of his excellence is the fact of his covering for fifteen seasons, in nearly the same circuit from which he was brought two years since by Mr. W. Howlett, Veterinary Surgeon, Bath, where he stood at Mr. Harvey's establishment, until the last few months, when he was purchased by Sir William Codrington, and sent out to his estates in the West Indies: rather long in the tooth, perhaps, for such a voyage, but still full of health and vigour.

FOREST AND ORNAMENTAL TREES.

ARTICLE I.—OAK.

Having, in the last number, offered a few preliminary remarks on the general preparation of land to insure success, I propose to notice some of the choicest trees which are known to flourish in Britain, and constitute the chief ornaments of its park and forest scenery.

The Oak, termed by excellence "the king of trees," botanically considered, forms a very numerous genus, comprising above sixty species, and many varieties, forty of which are natives of the continent of America and of Mexico. The British Isles claim only three species—viz., *Quercus robur*, sessile-fruited and variegated-leaved oak; *Q. pubescens*, downy-leaved oak; and *Q. pedunculata*, peduncled oak. The others are chiefly natives of France, southern Europe, and the Levant.

Most of the oaks are raised from seed. The process is tedious, little adapted to ordinary practice; and, belonging to the nurseryman, it will be always more profitable to purchase young plants than to attempt their propagation. They, however, who take delight in the entire progress of the trees they cultivate, can meet with ample instruction for raising oaks in that amusing work, "The Woodlands," by the late Mr. Cobbett, commencing with No. 419 of his arrangement.

Botanically, the oak *(Quercus)* belongs to the natural order *Amentaceæ* (from *Amentum*, a catkin), and to the Linnæan class order *Monœcia Polyandria*. The flowers male and female separately upon the same tree.

The British species and their few varieties affect a firm and strong loam: their early developed roots "tap" deeply, and penetrate even a strong clay. In such soil they flourish when firmly established; but to make their first start, the soil, though a true loam, ought to be free and of easy pulverization: and, as a general rule in all plantings, every kind of land, be its texture and components what they may, should be trenched and made porous by labour, as directed in the previous articles. With this remark I quit the Common Oak, as it is essentially the tree of the forest, and appropriated to naval architecture. Still, it must be acknowledged that, in sites where it flourishes in ample development and rich verdure, it forms a glorious single object: witness the magnificent oak at Panshanger, near Hartingfordbury, the seat of Earl Cowper.

Of deciduous oaks, natives of North America, two require particular attention. These are—

1. *Quercus rubra,* the Champion Oak, introduced anno 1739, thus described in "Loudon's Catalogue:"—"Leaves smooth, oblong, sinuate, on long stalks; lobes acute, sharply toothed, bristle-pointed. Calyx of the fruit flat underneath; nut oval."

2. *Quercus coccinea,* Scarlet Oak, introduced 1691. "Leaves smooth, oblong, deeply and widely sinuated, on long stalks. Calyx of the fruit turbinated, half as long as the nut."

These trees are beautiful objects. Planted singly, with taste and judgment, upon a spacious lawn, within view, at different points, from the mansion, they claim admiration. Their figure is light and graceful, their foliage remarkable; and, whether as mere shrubs six feet high, or as trees forty or fifty feet high, these oaks stand pre-eminent. I have not seen them in groups; but it appears to me that, so arranged, their singularly graceful form would be compromised. Loudon says, "*Q. coccinea* is one of the handsomest of the American oaks. The leaves, which are six inches long, change in autumn to a beautiful scarlet colour; and, unless hard frost come on early, they do not fall off the trees till near Christmas. *Q. rubra* bears a near resemblance to the last species." They are both raised from seeds, and succeed on a sandy loam. I saw the red oak last year, in beautiful perfection, on a large property, the staple soil of which was a poor, hungry sand, abounding with heath; but there was evidently ferruginous clay in the subsoil.

The Live Oak, *Q. virens,* was introduced from America in 1739. It is an evergreen of rare value, not attaining a high stature, but producing wood of excellent quality. Loudon describes it thus: "Leaves coriaceous, elliptic oblong, revolute, entire, pointless, obtuse, at the base clothed with starry down beneath the footstalk; nut oblong." It is rarely seen in our nurseries; but Cobbett has exalted its character beyond all comparison. "Of all the oaks," he tells us, "this is one of the most valuable. It is evergreen, grows well in England, and ripens its seeds. There are several trees of it in the King's gardens at Kew; and I have seen acorns upon them in a very perfect state. It does not afford large timber; but is extraordinarily prolific in those knees which are so very useful in the building of ships. Michaux tells us that it flourishes best near the sea, and is proof against all storms and blasts. It is sought after with most destructive eagerness; and he considers its disappearance from the United States within fifty years as nearly certain." "Besides the utility of it, besides the great interest the country has in its cultivation here, it is a large and beautiful evergreen, not liable to be broken by the winds, every twig being as tough as a bit of rope, never flinching at the frost and snow, and affording the amplest of shelters to gardens and houses."

The Live Oak can only be raised from seed; and success is rather doubtful. The young plants require careful nursing for two years, in soil and beds most carefully prepared; but, with due precaution, "a plantation of live oaks," as Cobbett said (we fear to little purpose), "would be a most beautiful thing, and valuable beyond all calculation."

The Evergreen, Holly, or Holm Oak *(Quercus ilex)*, stands next in estimation; and here we can speak a little more practically. Like the "*virens,*" it can be raised only from seeds; but these, happily, ripen plentifully in England. It has two noted hardy varieties: the "entire-leaved," and that with serrated edges, somewhat like the holly. The foliage is firm, dense, of deep, sombre green, and rather hoary underneath. Bark smooth, and grey-brown. It affects a lightish sandy loam, and finally attains the height of sixty feet.

Some years since, I gathered a few acorns which had fallen from a fine tree upon the road that runs along Hedsor hill, that bounds on one side the seat of Lord Boston. These were sown directly, and several vegetated in the following spring: they were at the edge of a border, in the open garden, where the soil was rather binding. Finding the growth very tardy, and there being danger of accident in several ways, the young plants were cautiously raised, and transferred to pots containing fine light soil. The tap-roots were very long; and this was a dangerous circumstance. However, six or seven lived, acquired strength, and in two seasons were nearly a foot high. They were then moved to the open ground in prepared holes, and throve well. One of them is now (Sept. 17) full of fruit, and is a handsome, compact shrub, about eight feet high.

The Evergreen Oak ought to be raised in pots, and kept under glass, in a cold frame, during the two first winters. It is, from the first, a beautiful evergreen; and retains its character for rich foliage and compact growth even when a full-sized tree. It must never be removed after being once established, because the roots extend, and cannot be raised with a compact ball. Therefore, if admired as an evergreen ***shrub***, it must be raised from seeds in succession, and the former stock sacrificed as the plants become too large for the shrubbery. Wherever the tree in its full dimensions is the object, there the small shrub must be planted, and there remain. The only point to be considered is, the final effect to be produced; and surely there is not a tree in our collections which, take it for all in all, can surpass the Evergreen Oak. J. Towers.

PRODUCE OF A SINGLE POTATO.—Mr. Thomas Johnson, of Beadnell, planted a potato of the Norfolk kind in his garden this year. Last season, 1844, it grew in a field at Beadnell, belonging to John Railston, Esq. Mr. Johnson cut the potato into twenty-eight sets, and planted the sets in his garden this year, and 68lbs. weight has been produced from that single potato.—*Berwick Warder.*

STEWPONEY FARMERS' CLUB.

The periodical meeting of this club took place at the Stewponey Inn, near Stourbridge, on Monday. The meeting was scarcely so numerous as usual, the members of the club present, among whom were Mr. Robins (the chairman) and the Rev. George Wharton, not quite reaching twenty.

After the usual preliminary proceedings, the CHAIRMAN called upon Mr. Maughan for his essay "On brick-kilns, or kilns for burning pipes and tiles for draining; on the machines for making such pipes and tiles; and on the best method of using them."

Mr. MAUGHAN, of Dudley, then read the following paper:—

The subject to be discussed this evening may appear to many persons very uninteresting; and probably, in the hands into which it has fallen, it will prove as uninteresting as to those persons it may appear to be: but I nevertheless claim for it an importance not surpassed, if equalled, by any subject which has hitherto engaged the attention of our club; for in the economical construction of our tile-yards, in the cheap production of our pipes and tiles, and in the consequent reduction of the cost of draining, depend the employment of many thousands of our labourers, many thousands of capital, and the creation of many millions of national wealth.

First in the order of our subject is to be considered the best and most economical plan of constructing kilns.

There are two aspects in which this term "economical" is to be viewed. It will be undoubted economy, in the construction of a kiln intended for a sale-yard, and where fuel is dear, and where a considerable business is to be carried on, to incur the expense of the most improved plans of construction; but it will be a very questionable economy to adopt an expensive plan of construction where fuel is extremely cheap, and the kiln is to be used for a temporary purpose, or for a very small trade, or for a small private consumption of the goods to be produced.

The kilns in general use in our own district are the round kilns or ovens, and the oblong kilns, various in length and breadth, some of them arched over at the top, and some of them open at the top. I find, amongst practical brick-makers, that their opinions vary as to the comparative merits of these modes of construction. The round kilns are said to be "quickest;" that is, they raise a higher degree of heat, and burn in less time. They are, however, on that account, said to be unsuited for the burning of some particular qualities of clay.

The number of bricks required in the construction of an oblong kiln of any given capacity varies with the strength of the side-walls and the general substantialness of the structure; but, as a rule of general application, it may, I apprehend, be laid down that it will require 10,000 bricks to construct a kiln calculated to burn 10,000 bricks, and that it will require 17,000 or 18,000 bricks to construct a kiln calculated to burn 20,000 bricks, and about 25,000 bricks to construct a kiln calculated to burn 30,000 bricks, and so on. The small kiln requires ends as well as the larger ones; and hence the difference in the proportion of bricks required in their construction. If any one desires to know the cost of a well-made brick-kiln, adapted for the burning of any given number of bricks, if he adds for the bricklaying 6s. or 7s. per thousand to the cost of the bricks as required by the foregoing general rule, he will arrive at an approximation to the outlay to be incurred on that head.

As regards the mortar for the kiln, it may be information, to those who have never had occasion to construct a kiln, here to state that lime should not be used in the inner part of the walling. Some persons use mortar made of soil only, throughout the walls, inside and outside. It is, however, considered best to use mortar to the courses laid outside. The action of the fire cements the soil used for mortar inside, and runs it and the bricks into one compact surface. The escape of the heat through the walls is thereby materially prevented. But the use of lime in the outside courses and buttresses adds to the strength and durability of the structure.

Of course, in situations where suitable stone is near at hand, a kiln may sometimes be most substantially constructed at a less cost than if made entirely with bricks.

In the fifth volume of the "Journal of the Royal Agricultural Society" (page 551) will be found a communication from Thomas Law Hodges, Esq., of Hemsted, near Cranbrook, in Kent (a gentleman who for many years has laboured to impress on the community the great and paramount importance of draining, and to devise expedients for diminishing the cost of it). In that communication, Mr. Hodges states that his neighbour, the late Mr. Hatcher (the inventor of the valuable tile-machine that bears his name), had devised a method of constructing a kiln of considerable durability for the sum of £5. He thus describes the construction of the kiln: "The form of the clay-kiln is circular, eleven feet in diameter, and seven feet high. It is wholly built of damp earth, rammed firmly together, and plastered inside and out with loam. The earth to form the walls is dug round the base, leaving a circular trench about four feet wide and as many deep, into which the fire-holes of the kiln open. If wood be the fuel used, three fire-holes will be sufficient: if coal, four will be needed. About 1,200 common bricks are wanted to build these fire-holes and flues; if coal is used, rather fewer bricks will be wanted, but then some iron bars will be necessary—six bars to each fire-hole. The earthen walls are four feet thick at the floor of the kiln, are seven feet high, and tapering to the thickness of two feet at the top: this will determine the slope of the exterior face of the kiln. The inside of the wall is carried up perpendicularly, and the loam plastering inside becomes, after the first burning, like a brick wall. The kiln may be safely erected in March, or whenever the danger of injury from frost is over. After the summer use of it, it must be protected by faggots or litter against the wet and the frost of winter."

I have not had opportunity of seeing any kilns of this construction, but it is likely enough that a kiln so constructed may answer a temporary purpose extremely well, and that with one of the best of the pipe-making machines of the present day, at a cost of fifteen guineas, and a few thatched hurdles, or, better still, some lightly constructed frames covered with the patent asphalted felt, for roofing, at 1d. per square foot, made by M'Neil, of No. 44, Finsbury Circus, or by Mr. Croggon, of No. 2, Ingram-court, Fenchurch-street, London, the establishment of a tilery is practicable, at a very small cost—a tilery, too, capable of producing many more pipes and tiles in a season than many gentlemen are disposed to incur the cost of burying. Mr. Hodges says a kiln of the dimensions described will enable a pipe-maker to turn out 705,000 1-inch pipes in the course of the summer, 487,000 1¼-inch, or 300,000 of 1¾-inch diameter.

If, however, a gentleman intends to construct a tilery for a permanency, he will do well to inquire into the merits of the different plans now in use. Mr. Clayton has a plan of his own, Mr. Ford has another, Mr. Etheredge has another, Mr. Beart has another, Mr. —— has another, and there may be others with which I am not acquainted.

The right construction of the kiln (especially where fuel is dear) is a matter of considerable importance, and is entitled, at the hands of the Royal Agricultural Society, of local societies, and of the public generally, to much more investigation than it has yet undergone. Making all due allowance for the difference in coals and the difference in clays, I have been astonished at the discrepancies in the statements of practical brick-makers in regard to the quantity of fuel required for the burning of 1,000 bricks. Some idea may be formed of those discrepancies when I state that, whilst some brick-makers boast of being able to burn 1,000 bricks with four cwt. or five cwt. of coal, there are others who state it cannot be effected with less than twelve cwt. or thirteen cwt., and that in some cases it will require eighteen or twenty cwt.

It appears that there is a great deal depending upon the quality of the coal, a great deal upon the nature of the clay, a great deal—a very great deal—upon the attention and judicious feeding and management of the burner, and no doubt there is a good deal depending upon the construction of the kilns.

I have not had opportunity of instituting any experiments on these subjects. They would have involved a considerably greater application of time and money than I should have deemed it expedient for my present purpose to bestow.

It occurs, however, to me to mention and to throw out as suggestion for experiment, that, at a place called The Cape, about a mile from Warwick, there are two kilns constructed upon the plan of Mr. Etheredge (where is also to be seen in operation one of his pipe and tile machines driven by horse power). Almost side by side with those kilns, and burning clay of the same quality precisely, there is a kiln upon the old plan of construction.

The manager of this kiln, and of the yard to which it belongs, appears to entertain the most perfect contempt for all the new devices employed at the rival establishment; and I have no doubt he would be ready to back his old kiln and his own skill against the modern structures and science of the adjoining yard.

It is probable (with the consent of the proprietors) that a small sum of money to be disbursed amongst the men, and to defray, during the experiment, the expenses of a competent superintendence, would enable the public, after two or three trials of skill—that is to say, after two or three burnings—to appreciate the advantages of Mr. Etheredge's plan of constructing his kilns.

This experiment, or one similar to it, would certainly be desirable; and it is, I should say, almost due to the members of the Royal Agricultural Society, because there has lately been awarded to Mr. Etheredge the society's prize of 20*l.*, offered in 1844 for "the best essay on the cheapest and best method of establishing a tile-yard."

I do not happen to know how or in what manner the council of the society give the members and the public the benefit of their prize-essays. Upon inquiry recently made, I found Mr. Etheridge's essay was not published; and I, moreover, rather understood that it was not intended to publish it.

I believe the practice of the Highland and Agricultural Society of Scotland is to print and publish all their prize-essays; and it appears rather odd that the Royal Agricultural Society of England should award prizes of 20*l.* for essays, and not deem them of sufficient importance to be afterwards printed, and made available, at least to the members of the society, if not to the public at large.

Next, as regards the tile-sheds, and the best and most economical plan of construction:

A remark made in reference to the construction of kilns will apply to the construction of sheds. Where permanency is aimed at, and where a business of some extent is to be carried on, an amount of expenditure made in the erection of a good shed would be justifiable, which would not be so in a case where the shed was intended for a temporary service only, or for a very small manufacture.

As regards the roofing, for instance, most of us can understand the difference between putting on a good roof with good sawn beams and rafters and tiles, and one made with Scotch firs, or any other cheap or almost unsaleable stuff, and thatched with straw or reeds or heath or ling.

Mr. Law Hodges, in the article before referred to, states the expense of a tilery thus:

Hatcher's machine for pipes or tiles	£25
Pug-mill	10
Kiln	5
Straw for shed (exclusive of hurdles, as they can be used for sheep-folding in the winter)	10
Total....	£50

Or the matter may be presented thus:

	£	s.	d.
Beart's machine for pipes or tiles	15	15	0
Pug-mill	10	0	0
Kiln	5	0	0
A shed of M'Neill's construction, with 1,000 feet of his asphalted felt roofing, or that of M'Croggon (see M'Neill's estimate at page 15 of the Catalogue of Implements at Shrews-			

bury in July, 1845; and see what M'Croggon says at page 61)	19	19	1
Total....	£50	14	1

In order, however, to get fairly under weigh, there are, besides the foregoing, many little matters to be thought of, if we chose to look the subject fairly in the face. The brick-ground is to be formed, soil to be removed, a roadway to the tilery made, drying shelves to receive the tiles to be fixed, a hut for the brick-makers to shelter in, or perhaps for one of them to live in, or, at all events, a lock-up for the machine and dies, and other small matters to be provided. Hence, if we do not desire to deceive ourselves, the proper way to deal with the foregoing estimates will be to deal with them as we generally find it necessary to deal with estimates—double them.

In a debate upon draining at the Cardiff Farmers' Club, in February or March last, Mr. Fothergill, one of the members, furnished an account, from actual expenditure, of the cost of making his own tilery; and it stood thus:

	£	s.	d.
Sheds capable of containing 11,000 tiles	105	0	0
Kiln, to hold 12,000 tiles	85	0	0
A cast-iron mill	13	0	0
A Tweeddale patent tile-machine	40	0	0
License	2	12	6
Incidentals	10	0	0
Total....	£255	12	6

I have estimated the probable cost of a small, snug tilery, very fairly constructed, situate near Holly Hall, near Dudley. There are two kilns, one to contain 10,000 bricks, the other 15,000. The kilns are oblong, and arched at the top. The shed is 70 feet by 15 feet, and contains flues and shelves made of four strips or laths, two inches broad, placed two and a half inches apart, to admit of a free circulation of air amongst the pipes; and that, I consider, is the best plan for the shelves.

The estimate stands thus:

	£	s.	d.
The two kilns	80	0	0
The shed and shelves and flues, &c. ..	80	0	0
The rollers to grind the clay, and setting the same	30	0	0
The forming of the road	10	0	0
Levelling, draining, and incidentals ..	20	0	0
Total....	£220	0	0

Add for a pipe and tile machine from 20*l.* to 30*l.*

I do not happen to know how many pipes or tiles of any given size the kilns will contain. Bricks are always burnt with the tiles and pipes there; and no accurate calculation has been made of the number of pipes they would contain. No doubt the tilery would turn out in the year 200,000 or 330,000 bricks, and as many pipes or tiles.

The foregoing observations and estimates, taken together, will, I think, enable parties contemplating the construction of tileries to judge with considerable accuracy as to the cost of construction, and will enable parties about to drain their lands or to use bricks for buildings or repairs, to judge of the expediency of incurring the necessary outlay, or of sending their teams to the sale-yards in their respective neighbourhoods.

In addition to the first outlay for a tilery, there is the wear and tear of kilns, sheds, roads, &c., to be taken into the calculation.

We come next to the consideration of the plans in use for making drain tiles.

I need not describe the form of the old draining tile, nor the sole made for it to rest upon in all properly executed drainages. There are, however, two or three sorts of tiles before us, the length 12½ inches; height, 4¾ inches; breadth, 3¾ inches inside, or in the bore; weight, about 7lbs. The sole made of clay necessary to sustain it weighs about 2½lbs.; so that 1,000 feet (mind, I speak of feet, not tiles, for they vary in length) of those tiles, and 1,000 soles to accompany them, weigh at least 4 tons 5 cwt.

The cost of making by hand and of burning those tiles and soles—the cost of producing them cannot, I apprehend, under average circumstances, be laid at less than 32s. per 1,000 feet for the tiles and the soles.

If we are draining at distances of eight yards (and that is a distance quite wide enough in the compact, clayey subsoils of the coal districts of South Staffordshire, and of many situations elsewhere)—if we are draining at eight yards apart, about 1,800 feet of tiles and about 1,800 feet of soles are required.

A few years ago tiles of this enormous size and weight were deemed indispensable. There is a small tile before us 12 inches in length, 2½ inches in height, and 2½ inches in breadth inside, or in the bore; weight, 4lb. 3 ounces. A thousand feet of these tiles, and one thousand soles to accompany them, weigh from 2½ to 2¾ tons. In circumstances parallel to those before described, 1,000 feet of those tiles, and 1,000 feet of soles for them, cannot, I apprehend, be produced by hand for less than about 22s.

Observe that, when I speak of the cost of production, I speak of average circumstances, and assume that the kiln and sheds and clay are the property of the maker. For instance, coal costs 5s. in some places, and in others 30s., per ton.

I have used these small tiles for some years past in all situations, excepting that I have occasionally used the larger sizes for the main or carrier drains; but to this moment many of the farmers have a great prejudice against them, as being, as they consider, too small; and some farmers can hardly be persuaded to use them. What those parties will say to the fact that, so far from their being too small, they are really unnecessarily large (and, consequently, unnecessarily heavy and unnecessarily costly), I know not; but of that fact experience is daily affording incontestible evidence; and I believe I may say that the time is fast coming when parties engaged in the surface draining of clay soils will almost refuse the old large heavy draining tiles and soles even as a gift—certainly, in cases where they would be subjected to many miles of carriage.

There have lately come into use, as most readers of the agricultural publications know, and as all who attended the meeting of the Royal Agricultural

Society at Shrewsbury last month saw, a great number of machines for making pipes for draining. Experience seems to have demonstrated that in almost all situations (except for the mains) pipes of one inch in diameter are sufficiently large for surface draining. Here is one of such pipes, twelve inches long, and one inch diameter, weight 1lb.: a thousand of them weigh about 9 cwt. No soles are required. Made under circumstances parallel to those I have described when speaking of tiles, they cost at the utmost 6s. or 7s. per 1,000. Some parties say they can have them produced, where fuel is three times dearer than with us, at 5s. 9d. or 6s. I am informed that in Kent they may be purchased in the sale-yards at 10s. per 1,000.

There are some other pipes before us, of other ozes. I myself make, with a machine of my own sicntrivance, pipes of one inch diameter inside, the clay or rim of the pipe being three-eighths of an inch when first made, and when dry half an inch thick. Along with these one-inch pipes I make a pipe two inches diameter inside, and of the same strength of clay. These are specimens before us. The one-inch pipe is burnt inside of the two-inch; and I have adopted hitherto the plan of using them together in the drains, putting the ends of the one-inch pipe into the ends of the two-inch. The two-inch pipe weighs 2lb., or 18 cwt. per 1,000 feet, and will cost about 10s. per 1,000, when the one-inch costs 6s. or 7s.; so that the average cost of 1,000 feet of those one and two-inch pipes used in the drain is about 8s. or 8s. 6d., made at the proprietor's own kilns, but exclusive of any consideration for capital, royalty, repairs of kilns, sheds, &c. I deem this plan of laying a safer and better plan than that of using the one-inch pipes by themselves, laid end to end, and risking displacement. The plan described renders that next to impossible, and is less trouble, and of as little expense as the plan of socketing recommended by some gentlemen who have turned their attention to these matters. There are specimens of socketed pipes before us, made by Mr. Ford's patent, which is a very simple and very effective contrivance. It must add 5s. or 6s. per 1,000 feet to the cost of production.

There is, however, a plan of laying these pipes better than that now described, which consists of putting a collar about two inches long over the ends of the pipes at their junction with each other. Thus supposing you are using a pipe one inch in diameter, let a pipe two inches in diameter be cut in lengths of two inches. Place in the drain your one-inch pipes end to end with the collar over their junction, and you render displacement impossible. Care should be taken, in laying, so to pack the pipes that they do not lie hollow. The specimens before us illustrate what I mean. If you are surface draining with a pipe one inch and a half in diameter (large enough beyond all doubt) then, of course, the collars must be formed of pipes two inches and a half in diameter. I believe the merit of this suggestion respecting the collars is due to Mr. Clayton, the patentee of the excellent pipe and tile machine which bears its name.

I was conversing at Shrewsbury the other day with Mr. Beart, the patentee of another most excellent machine, on this subject. He admitted the merit of Mr. Clayton's contrivance, but observed, and justly, that the manipulation and cost attending the making of 1,000 of these collars were little less than what attended the making of 1,000 pipes, and that they would add considerably to the cost of the drainage. At that time I thought so too: but I have since that conversation devised a very simple and effective method of making these collars, and that the cost of them may be laid, say for collars two inches in diameter, at the almost incredibly small sum of 1*s.* 10*d.* per 1,000, or about 2*d.* per 100—so that in draining at eight yards apart, they would not add above 2*s.* 6*d.* or 3*s.* per acre to the cost of the drainage.

Mr. Clayton's process of producing these collars is, as I understand, to cut the pipes into lengths of two or three inches, and when dry to put them over the one inch to be burnt. Now, when you have to deal with 1,000 of these collars—the handling of them—the drying of them—the setting of them in the kiln—the removing of them after burning—the loading them into carts—the laying of them by the side of the drains, these various manipulations must add considerably to the expense. I obviate it thus:—

The rim of the pipe, when it comes through the die, is, say three-eighths of an inch thick—the pipe itself is, say fourteen inches long. I have a board like that now before us, with knives laid along it at distances rather more that two and a quarter inches apart. Those knives stand up about three sixteenths of an inch—a roller being introduced into the pipe, the pipe is rolled over the knives, and put back on the shelf to dry. By contraction, the collars are reduced to little more than two inches in length.

The nick made by this rolling process does not cut the pipe in pieces. It still adheres, and admits of being placed in the kiln, and of being drawn from the kiln entire; and these pipes being properly distributed in the field by the side of the drains, the drainer there will have nothing to do but to break off a collar in the manner that we break off a piece of nicked gingerbread. The board, with the knives and the pipes, before us, perfectly illustrate what I have been describing.

A boy or girl at 1s. per day, will roll and replace on the shelf many more than 1,000 pipes. If one pipe, fourteen inches long, when fresh from the die, makes six collars, 1,000 pipes will obviously make 6,000 collars. If 1,000 pipes, two inches in diameter, cost as before stated 10*s.*, the 6,000 collars will cost only 11*s.*, or rather less than 1*s.* 10*d.* per 1,000.

I believe I am entitled to appropriate to myself the merit of this simple contrivance. Simple though it be, I deem it important, very important, in relation to our present subject, because, at a cost of some 2*s.* 6*d.* or 3*s.* per acre (a consideration really not worth mentioning), it renders the introduction of soil into the ends of the pipes, and the displacement of the pipes themselves, impossible, and it gives a quietus, and puts an end to those uneasy apprehensions respecting displacement which I have heard almost a thousand times expressed by men distrustful, on the ground of displacement alone, of the small-pipe system of draining.

I shall pause here for a moment, to discuss the cost of a drainage executed with such tiles and soles as were universally in use in these districts five or six years ago, and are partially so still, and of a drainage executed with the pipes. Suppose an acre to be drained at eight yards apart, three feet deep in soils such as I have before mentioned; including the mains, we should have about eighty perches of our local measure of eight yards. Can we have the drains cut three feet deep in the furrows, and three feet six when they occur out of the furrows, and the tiles carefully laid and the drains refilled three feet and three and a half feet deep, in a district where the wages of labour are about 14*s.* a week, for less than 8*s.* per perch, or 1*d.* per yard? I apprehend not.

Now, with the large-sized tiles, and suppose the kiln or sale yard-three or four miles from the drainage—

	£	s.	d.
Eighty perches (or 640 yards) of drains, cutting, laying the soles and tiles, refilling the drains three feet and three feet six inches, &c. 8*d.* - -	2	13	4
Carriage of 1,800 soles and tiles, weighing nearly eight tons, say three or four miles, and suppose the work going on partly in rough winter weather, the teams plunging over two or three wet heavy fields, going twice one day and once the next, and laying the tiles conveniently along the drains for the drainers. What is this worth? The carriage of eight tons three or four miles under the circumstances? say 3*s.* per ton - - - - - -	1	4	0
Cost of the tiles and soles, even where the landlord makes them, 32*s.*, add for capital and wear and tear and repairs of kilns, sheds, roads, &c. 10*s.* per 1,000, and say - - - -	4	4	0
Cost per acre - -	8	1	4

A drainage with the smallest sized tiles will stand thus:—

	£	s.	d.
Eighty perches (or 640 yards) at 8*d.* per perch - - - - -	2	13	4
Carriage of nearly 1,800 feet of tiles and soles, nearly five tons - -	0	15	0
The tiles and soles at 22*s.* and 8*s.* for capital, &c., &c. - - -	2	14	0
	6	2	4

The cost of a similar drainage executed with the one and two inch pipes would be—

	£	s.	d.
Eighty perches cutting, laying refilling, &c. - - - - - -	2	13	4
Carriage, under circumstances parallel to those before mentioned, of 1,800 pipes and collars, weight nearly 20 cwt -	0	3	0
Cost of the 1,800 feet of pipes and collars at 8*s.* 6*d.* per 1,000, add for capital, wear and tear, &c. 5*s.* per 1,000 -	1	4	3
	4	0	7

From the foregoing calculation it will be seen that when the drainage is executed with the drains, say, at eight yards apart and three feet six inches deep, more than 4*l.* per acre is saved by using the pipes instead of the large heavy tiles and soles, and that 2*l.* 1*s.* 9*d.* per acre is saved by using the pipes instead of the tiles and soles of the smallest sizes yet adopted.

Of the efficacy of the pipes there is not the least room for doubt; some years of experience in other counties, as Kent, Sussex, Essex, and Suffolk, have demonstrated their efficiency. In the course of last winter I drained some lands in the occupation of Mrs. Russell, at the Straits, near Askew Bridge, about a mile from Himley, and I laid the drains (three feet deep) alternately with one-inch pipes, two-inch pipes, and with tiles and soils. The main or carrier drain has been left open, that the neighbours might observe, if they thought proper, the action of the different drains. The one-inch pipes have discharged after heavy rains as freely as the others. I purpose leaving the main drain open for some little time to come, and I hope that parties in the neighbourhood, both farmers and tile makers, who have any prejudices against pipes, will take occasion to observe the action of those drains after a fall of rain. I was myself at first rather distrustful of the one-inch pipes; I never doubted their sufficiency to carry off the water required of them in ordinary frequent or furrow draining, but I was apprehensive of displacement at the ends, and consequently of obstruction. If care be taken in the laying of the one-inch pipes, experience has assured us that they are in all respects efficacious. To make certainty, however, doubly sure, and to guard against any displacement at the ends, I have adopted and shall continue the plan of laying the end of the one-inch pipe into the end of the two-inch pipe, or rather of laying the pipes end to end, with a collar as before described, which is perhaps the better plan; and as to the sufficiency and efficacy of drains so constructed for surface draining in stiff clay soils, I do not entertain any doubt whatever. Some of the lands at the Straits before mentioned have been drained in the way first described, and the drains work admirably. We had a soaking rain on the night of Thursday, the 10th of July, and throughout a great part of Friday. On the afternoon of Friday I examined those drains, and have from time to time subsequently, and nothing can be more satisfactory than the manner in which they discharged the water after rains. The drains are three feet deep, some laid at eight yards apart; some intended for subsoiling at five yards, and in one field intended for subsoiling, the drains are laid at four yards apart; that field was drained some time ago at eight yards apart, two feet deep; that drainage proved insufficient, and it has been drained between the old drains at three feet in depth, and the improvement in the working condition of the land is most unquestionable; two horses will plough it henceforth as easily as three have heretofore done. The subsoiling has not yet been executed. It is intended to subsoil portions of those fields, that it may be seen in what degree the land drained and subsoiled will differ from that drained but not subsoiled. Parties living in the neighbourhood know the hitherto wet and miserable condition of those lands and they will thus have opportunity of observing the effects of the operations referred to.

With men who have familiarised themselves to the use of the large heavy draining tile, there will, no doubt, lurk for a time to come a distrust of the efficacy of these pipes of small diameter. Prejudices are not all at once surmounted. I put it, however, to the consideration of the most prejudiced of those who now hear me, whether, if they will doubt the efficacy of one pipe of one inch in diameter, they can entertain any doubt of the efficacy of a pipe two inches in diameter; or, better still, of two pipes of one inch in diameter laid in the same drain side by side—the junctions of the one line of pipes being made to lie half way down the lengths of the pipes in the other and parallel line? In the doctrine of chances, remote, indeed, must be the probability of the two orifices or tubes becoming obstructed. Even with these double lines of pipes laid in each drain, the saving to be effected in the expense of a drainage is most important, as compared with that incurred by the use of tiles and soles, whether large or small.

It is hardly possible to over-estimate the importance of bringing down the cost of drainage from 8*l*., 10*l*., and 12*l*. per acre to 3*l*. or 4*l*. The cost of an effective, permanent, and extensive drainage, under the old system, was wont to daunt both landlords and tenants. Few men had courage to face it. It was, indeed, a serious matter to undertake; and hence it is that so many thousands, aye, millions of acres, have never yet been subjected to those ameliorations of which draining must unquestionably be the forerunner. It will be observed that it is in the cost of production, and in the cost of carriage, that the saving under the pipe system arises. The cost of labour remains as before, or nearly so; indeed, in many soils, entirely so.

The next desideratum in practical draining is a plough to diminish the spade work. I am aware of several ploughs that have been brought before the public for that object, but I am not aware of any that have acquired extended popularity. I remarked in the proceedings at the Farmers' Club, held in January last, at the York Hotel, Bridge-street, London, that Mr. Smith, of Deanston, was directing attention to the plough of Mr. M'Ewen of Blackdab, in Perthshire, by which, with twelve and sixteen horses and eight or ten men, the cost of the spade work admitted of being greatly reduced; indeed, Mr. Smith states the expense of a drainage with that plough at 9*d*. for thirty-six yards, or exactly ¼*d*. per yard!

I feel, however, that a plough like M'Ewen's, requiring such a power as twelve or sixteen horses, will be slowly adopted. The machine is too unwieldly, and in small drainages and in small enclosures must be of doubtful economy. If we could have a plough to execute its work cleverly with not more than four horses, even if it did less work at once, and had to go up and down the furrow the more frequently, such a plough, I doubt not, would, at the present time, be in great request.

In the few estimates I have made in this lecture, I have founded them upon a supposition that the drainage was being executed with drains at eight yards apart. I must guard myself against having it supposed that I consider that the distance to be adopted in all cases. It is hardly practicable to lay down a rule on that head applicable to all soils and situations. Experience is the best instructor as to the distance proper to be adopted in the cutting of drains; and perhaps the subject requires closer and more philosophical observation than it has yet received. There is, however, in the present state of our science in draining, much justness in an observation somewhere made by Mr. Smith, of Deanston, that from eighteen to twenty-five feet from drain to drain will be found a good practical distance in surface draining. The depth of the drain in surface draining should never be less than three feet, and there are those who affirm confidently that four feet is far better than three.

From experience and observation, I am fully convinced that a great majority of drainers are cutting their drains much too shallow. I advise men who have any doubt upon the subject, and who consider twenty or twenty-four inches sufficient, to try in the same field depths of two feet, three feet, and four feet, and to leave their mains or carriers (where practicable) open, and to observe closely the working of the different drains, and the effect of the drainage upon the condition of the land. The experiment is easily made, and the subject is most important.

Connected with this branch of the subject is the important--the highly important--matter of refilling the drains. When Mr. Smith, of Deanston, first propounded his views on draining and subsoiling to the public, he advised that the drains should be 30 inches deep, and should be filled twelve or fourteen inches with stone, and with materials as porous as it was practicable to obtain. From the results of an enlarged experience (and with a candour which does him infinite credit), Mr. Smith has recalled his first opinions, and now admits that they involved an unnecessary expense, and that better cannot be done than to throw in over the pipes or tiles or stones the very clay that is brought out by the cutting of the drains. As this is a point upon which drainers are not yet agreed, and upon which farmers in general are very sceptical, it may be necessary to explain the manner in which the water finds its way to the pipe or tile laid in a drain filled up with clay. Simply thus:—If we cut a drain in a soil with a subsoil however clayey, however stiff, and throw in again the clay brought out, it is obvious that no junction takes place between the side of the drain and the soil which has been replaced in that drain. To effect a perfect junction a very troublesome and costly operation of puddling would be necessary. The water that falls upon the surface descends, where the subsoil is impervious, through the upper soil, until it meets with the impervious clay or subsoil beneath it. It then percolates down to the drain, and finds its way to the pipes or tiles down the fissures made by the imperfect junction of the sides of the drain and the clay thrown back in the process of refilling the drain; when, however, a permeable soil rests on sand or gravel, the surface water filtrates thither, and reaches the pipes or tiles, for the most part, from the bottom of the drains. The dryer the land becomes by the action of the drains, the more those fissures open in the manner we constantly see effected by the contraction of, and by the rends and fissures made in, clayey soils by evaporation in dry summers. This contraction of soils by drying is often lost sight of in the operation of filling in the drains, especially in grass lands. I doubt not most gentlemen present have noticed where grass fields have been drained, there has often been a subsidence of the soil thrown back into the drain, and a somewhat unsightly shallow gutter thereby produced. That arises partly from the occupier being in too great haste to spread the soil lying on the tops of the drains, and from the consolidation and contraction the soil in the drain undergoes in the process of drying. Hence it should be observed that all the soil brought out of a drain is required to refill that drain, even where a moderately sized pipe has been buried in it; and that in grass lands especially no part of the soil should be spread. I have no hesitation in saying that this information as to refilling with the clay or other soils brought out of the drains will save 5*l.* or 6*l.* per acre to many a drainer of the old school. I have repeatedly seen men wasting more than that sum per acre in raising and breaking stones, and carting and plunging over their wet lands with them to get them to their drains, and then filling them in. The draining of many an acre of land has thus been made to cost 10*l.* or 12*l.* where 3*l.* or 4*l.* would now, upon the plans of recent adoption. effect the object equally well.

I see that, a meeting of the Durham Farmers' Club (reported in the *Durham Chronicle*, a few weeks ago) the subject of draining was discussed; and it is to be collected from that report that many of the farmers of that county (as elsewhere) are still imposing upon themselves the unnecessary expense of carting "refuse coke and small coals" to maintain the porosity of their drains, and that they are "keeping all the clay out of the drains," to be spread over, and to be intermixed with, and to deteriorate the lands so drained. It is also to be collected that the cost of draining twenty-eight inches deep is there from 6*l.* to 8*l.* per acre. The distance of the drains is not stated, and consequently the expression "per acre" is vague and uncertain; but no doubt a loss of some pounds per acre is incurred by the cartage of the "refuse coke and coals."

As regards the laying out of drains:—

This being rather a controverted point, it may be as well to notice that some drainers contend for the propriety of running the drains across the slopes of the land; others of running them down the slopes. I believe that either plan will drain the land, but that the drains down the slopes will effect it soonest. Where, however, it is intended to subsoil, or where possibly a disposition to subsoil may thereafter arise, it is most undoubtedly the best plan to run the drains down the slopes. If the drains be, say, eight yards apart, the water has only four yards to percolate to reach the drain. In the other case it has often to travel nearly the whole distance of eight yards from drain to drain.

On the subject of subsoiling I wish to speak with diffidence. I have not seen any instance of an experiment in any field fairly tried, which was calculated to show how much the field had been benefited by the draining, and how much by the draining and subsoiling combined. I have not done much in the way of subsoiling, myself. I have lain by, to see how it answered in the hands of others. I have noticed attentively some fields of clay-bottomed soils on the estates of the Hon. R. H. Clive, in Worcestershire and Warwickshire, which were drained and subsoiled a few years ago with great care, and the beneficial effects have been in the highest degree questionable. Indeed, I think I may say that the opinions of some of the tenants are that not only has no benefit been induced, but rather an injury. That is certainly the opinion entertained in the case of a twenty acres field held by Mr. Wharford, of ———, near Alvechurch. Some of the land on the Cofton farm, held by Mr. John Penn, has been drained and subsoiled. No perceptible advantage resulted from the subsoiling. Both those gentlemen are exceedingly good farmers, and free from all prejudice against subsoiling. The lands in question were drained two and a half feet deep, at distances of from seven to eight yards—those on Mr. Wharford's farm being filled in over the tiles laid on soles, with cinders and gravel, at considerable expense. The clay was thrown out, intermixed with, and worked with, the soil. The subsoiling was executed with the utmost care.

The twenty acres field before mentioned has received the very best and most generous treatment during the six or seven years which have elapsed since the subsoiling; and it is doubtful to this hour whether any the least improvement in it is perceptible. Moreover, Mr. Wharford and Mr. Penn alike noticed that the grain does not ripen so early on the subsoiled pieces as on those adjoining which have not been subsoiled; and Mr. Wharford is of opinion that the water does not percolate to the drains so freely in this twenty acres field, and the land is not after heavy rains so speedily restored to condition for working, as in the adjoining fields not subsoiled.

I have no explanation or theory to offer for these phenomena. I simply state the facts, and they are deserving the attention and investigation of gentlemen about to subsoil on an extensive scale. If I were to hazard any conjecture upon the failure of this subsoiling (Mr. Wharford's more particularly) —if I were to hazard a conjecture on the causes of the questionable improvement of the soil and the lateness of the ripening of the crops, it would be that the many tons per acre of clay which were thrown out of those drains and worked into the soil were of themselves calculated materially to damage a soil already too stiff and clayey. I deem it, too, not improbable that in such a subsoil the drains at seven or eight yards apart are too distant for free and ready filtration after subsoiling, and that the subsoil becoming, by the operation of the subsoil ploughing, a depository for the water, a redundancy of water rests there until carried off by evaporation, the water in the meantime obstructing the absorption of heat—in other words "starving the land."

On the subject of draining it should further be stated that there are situations in which surface draining three or four feet deep alone will not lay the land sound and dry. It will mitigate but not totally remove the wetness. In such cases the application of Elkington's system of tapping the springs by deep cuttings or borings should be resorted to. This system of draining requires infinitely more experience and judgment than that of mere surface draining. There is at this time on Gouldsborough Moor, not far either from Harrogate or Knaresborough, in Yorkshire, on the estate of the Earl of Harewood, perhaps one of the best —if not itself the very best—exemplifications of this system to be met with in England. The moor, properly so called, consists of some 250 acres, lying very flat and level, composed of a deep alluvial soil, which in its wet condition appears as impervious as a clay; but, when dry, is absorbent and permeable There are, perhaps, 250 acres more affected by the drainage. Numerous attempts have from time to time been made to lay the moor dry, but without success, until about two years ago, when a line of boreholes was put down at the bottom of long and deep cuttings. The water rushes up with astonishing force from a porous stratum from depths of from fifteen to twenty feet; and the bore holes discharge along the mains which have been cut a quantity of water equal to that of a not very inconsiderable river. The pressure and force of the water have enlarged many of the bore holes five or six feet in diameter. The springs and bogs have been laid totally dry.

When I saw the drainage about twelve months ago, I doubted whether surface drainage to some extent would not be required. I am, however, told by parties who have seen it more recently, that from all present appearances the surface waters will percolate downwards with perfect freedom beyond the reach of vegetation, and that the probability is surface draining will not be required. It may certainly be worth while to delay surface draining for a time; a short period will test the efficacy of the present excellent drainage.

It may be useful to say a word here to the manufacturers of the old-fashioned heavy draining tiles, most of whom, I am aware, dislike the introduction of the pipe or tile machines, and some of whom have set their faces altogether against them. I earnestly advise those gentlemen to march with the times, to provide themselves with machines suitable to the nature of their respective trades, and to offer their goods at a fair price. I would urge them to reflect that if the cost of draining can be brought down from 8*l.* or 10*l.* to 3*l.* or 4*l.* per acre, they may safely speculate that, for one acre drained heretofore, five acres will be drained henceforth, and that their increased sale will yield them as good a profit under the new system as the old.

It might also be suggested to gentlemen who are about to drain their estates in different and distant situations, to pause in some instances before they incur the expense of erecting tileries of their own, because a tilery can seldom be placed upon a large estate within a convenient distance of all the tenantry, and the carriage is consequently rendered onerous to many. If there be existing tileries in the country, and the proprietors of them reasonable men, a landowner possessing a portable pipe machine might have it shifted from tilery to tilery, the proprietor to be paid a proper consideration for making and burning any given number of pipes or other goods. By arrangement, the man rendered by practice expert in the use of the machine might travel along with it. Several of the pipe machines are now so portable that they can be placed in a cart, and conveyed with perfect ease.

It may not be amiss to put down here the names and addresses of some of those meritorious individuals who have bent their minds and have bestowed their time and talents to the contriving of some of those valuable machines which have already effected, and are still effecting, such important reductions in the cost of draining, and who have thereby rendered such signal service to agriculture and their country.

The ingeniously contrived machine of the Marquis of Tweeddale has been before the public for some years. It possessed much merit at the time of its appearance, but it has been superseded by machines of more recent date. The tiles made from it are too heavy and costly for our present notions of the weight and cost of materials, to be employed in draining.

There were fourteen pipe and tile machines exhibited at Shrewsbury last July, all perfect and in good working order. A pipe maker would not make a great mistake who purchased any one of them; but, certainly, some were better adapted for particular purposes and objects than others. The following is a list, preceded by the number of the stand in the Shrewsbury catalogue:—

14. Mr. Etheredge, of 15, Park-street, Westminster, had three machines of different constructions, prices from 25*l.* to 50*l.*
3. Mr. Beart, of Godmanchester, Huntingdon, had one, price 15*l.* 15*s.*
8. Mr. Webster, of Hounsdown, near Southampton, ditto, from 20*l.* to 50*l.*
25. Mr. Clayton, of 21, Upper Park-place, Dorset-square, ditto, 26*l.*
28. Mr. Hatcher, of Benenden, Kent, ditto, 25*l.*
31. Mr. Harkes, of Mere, near Knutsford, ditto, from 16*l.* to 20*l.*
36. Mr. Chamberlain, of Bredicot, near Worcester, ditto, 20*l.*
60. Mr. Weller, of Caple, near Dorking, ditto, from 15*l.* to 30*l.*
54. Mr. Charnock, of Wakefield, and Mr. Denton, of Gray's-inn, ditto, 20*l.*
70. Mr. Scragg, of Calveley, near Tarporley, Cheshire, ditto, 21*l.*
72. Mr. William Ford, of Fulham, near London, ditto, 28*l.* 7*s.*; License, 3*l.* 3*s.*

Mr. Ainslie, of Acton, Middlesex (not in the catalogue—not having complied with the rules as to time of application for admission to the show yard), price 30*l.*

The respective machines of Messrs. Clayton, Beart, and Scragg were set apart by the judges for further experiment. To which of those gentlemen the honour of the Society's prize for the best machine will be awarded is not yet known.

To parties in our own neighbourhood, who may wish to see some of those valuable pipe machines in actual operation, it may be useful to mention that one of Etheredge's is at the Cape, near Warwick—another in the tilery of Mr. William Wood, of the Cock public-house, Droitwich.

Mr. Richard Smith, of Upper Hall, near Droitwich, has two very effective machines of his own invention, although he has not made any public exhibition of them. It is due to Mr. Smith to say that he has been considerably in advance of the present generation, in his own vicinity, in this department of agricultural improvement. He has made pipes these six years, and has executed several extensive drainages with them.

One of Clayton's machines is at work near Tardebigg church, near Bromsgrove, in a tilery of the Hon. R. H. Clive.

One of Hatcher's (belonging to J. H. H. Foley, Esq.) is, or lately was, at Mr. Mobberley's yard, near the Lye Waste, and near Amblecoat, near Stourbridge.

There will be one of Beart's (if he keep his promise) at Holly Hall, near Dudley, in a week or ten days. A number of Mr. Beart's machines are about to be manufactured by Mr. Walton, of Old Hall, Wolverhampton.

It may not be out of place here to mention that the honour of being the inventor of the pipe system of draining is due to Mr. John Reid, now of Regent Circus, who about thirty-six years ago was a farm servant to the late Rev. Dr. Marriott, of Horsmonden, in Kent.—(See p. 372, vol. 4, of Journal R. A. Society.) At all events, Mr. Reid was an inventor, and the first who applied the invention to practical purposes. It must be gratifying to him to have lived to witness the important consequences which have already resulted from the invention of his youthful days, and to contemplate the benefits to arise from it in time to come.

It should, perhaps, in justice to all parties, be mentioned that, at the Cardiff Farmers' Club, in November, 1844, the Rev. E. W. Richards acquainted the meeting that his ancestor, T. Edwards, Esq., of Llandaff House, had taken out a patent for making draining pipes upwards of half a century ago, and which patent he (Mr. Richards) had then in his possession.

We are not informed whether (as in the case of Mr. Reid) the invention of Mr. Edwards was ever made available to any useful purpose.

In the consideration of the advantages of draining should be noticed (as respects heavy clay lands especially), the striking effect produced in the working condition of the land. It is not too much to say that many lands which in their undrained state require the power of three or four horses in the plough, particularly when strung one before another, after the fashion of our midland counties, may, after a thorough and perfect drainage, be worked with two horses. Without perplexing the subject with too many figures, it may be stated that the economy of working through a rotation with two horses, instead of three or four, will amount, at least, to four or five shillings per acre. Let it be considered by tenants what this amounts to on farms of a few hundreds of acres, and by landlords to what it amounts on estates of ten or twelve thousand acres; and the vast importance of the subject, to both landlords and tenants, will strike the mind with a force which ought to stimulate to prompt and decisive action. Perhaps one of the best applications of the funds of the agricultural societies of the midland counties would be to defray the expenses of an intelligent deputation into the northern counties, to investigate and report on the causes which enable the farmers there to work their heaviest lands with two horses in a plough, whilst here, in parallel circumstances, we persist in stringing on three or four.

I am convinced that *effectual* drainage, and a positive prohibition on the part of landlords against the use of three and four horses yoked one before another, would speedily beat down and render obsolete this most insensate custom. Some forty years ago, Mr. Cooke, a farmer from Yorkshire, was introduced into a farm called Caerwys Hall, in Flintshire, situate between Holywell and Denbigh. Mr. Cooke set the example there of ploughing with two horses abreast. The gentlemen of the county (and to none more than to Sir Edward Pryce Lloyd, the present Lord Mostyn, is the merit due), by pecuniary rewards and by personal commendation, encouraged the ploughmen and the then rising youth of the county to adopt the plan of ploughing two abreast; and for nearly twenty years past the practice of ploughing their heaviest soils with more than two horses has been obsolete. Again, in Glamorganshire, the examble set by the north country bailiffs, introduced some thirty or forty years ago by the enterprising ironmasters of that county, has rooted out the practice of using more than two horses in a plough.

I feel that I cannot, and ought not, to conclude a lecture on a subject akin to draining, without pointing attention to the valuable papers on draining dispersed through the journals of the Royal Agricultural Society, and most particularly to that of Mr. Josiah Parkes, contained in the 5th volume —a paper which I hesitate not to say will open out to most men who will take the trouble to read it many new views on draining, and will furnish many most valuable suggestions. The paper in question is "On the influence of water on the temperature of soils; and on the quantity of rain water and its discharge by draining." The paper in question affords a striking illustration of the value of science and of general intelligence when brought steadily to bear upon any given subject, and will, I think, go far to dispose the merely practical agriculturist, who may read it to receive sometimes with some degree of complacency and respect the suggestions of men of science on agricultural topics, although those men might not have been trained to hold the plough nor to dig in a ditch. In Mr. Parkes's own language, "the discovery of causes is of the highest importance to the arts; and a correct theory of any action so rapidly accelerates, extends, and perfects sound practice, that we cannot too highly prize its possession." To those who value the possession of a correct knowledge of the causes which render it of importance to drain land three or four feet deep, instead of twenty inches or two feet deep, I earnestly advise them to peruse Mr. Parkes's essay; and perhaps this recommendation is the most valuable suggestion I have this night to offer, and is the best compensation I can make for having presumed to occupy the time and attention of the present meeting.

The efforts of Mr. Pusey, and of his able ally Mr. Parkes, to diffuse information in this department of agricultural improvement, have been most valuable, and claim from the public at large, no less than from the agricultural community, the expression of a grateful sense and appreciation of the important and well-directed labours of those gentlemen.

POSTSCRIPT.—On Saturday evening, Aug. 2nd, I chanced to be in the neighbourhood of Alvechurch, on a visit to a friend. I took occasion to cast my eye over the subsoiled fields of Mr. Penn and of Wharford, to which reference is made in a foregoing part of this discourse. There is a good crop of wheat growing on Mr. Penn's field, and an exceedingly good crop of beans on Mr. Wharford's—the first fair crop seen on the latter field since it was subsoiled. It was in wheat in 1844, and was a very shy crop (about twenty-two or twenty-three imperial bushels), even in parts not damaged by the game. The farm adjoining to that of Mr. Wharford, sen., is The Grange, occupied by his son, Mr. Wharford, jun., who is likewise an exceedingly good tenant. Upon this farm there is a field of beans, part of which field was drained, about three years ago, 2½ feet deep in the furrows, at distances of sixteen or seventeen feet, but not subsoiled, and the remainder was neither drained nor subsoiled. There is a very marked difference in the crop—the beans on the drained part of the field being an excellent crop, alike in ridge and furrow, and being at least seventeen or eighteen per cent. better than that growing on the undrained part of the field. I think there is more growth—more straw—on this drained land of Mr. Wharford, jun., than there is on the subsoiled land of Mr. Wharford, sen.; but I think the beans of the latter are rather the best podded, and, from present appearances, will yield the most per acre. The beans of Mr. Wharford, jun., on the land drained have come up too thick. It may and should perhaps be stated that this field of Mr. Wharford, jun., is naturally a better field than the subsoiled field of Mr. Wharford, senior.

At the conclusion of the lecture, a vote of thanks was voted to the lecturer; and the following resolution, after a very interesting discussion, was passed:—

"That the usual construction of kilns for burning bricks, and pipes and tiles for draining, is imperfect, and that the subject requires further investigation; that the construction of a shed for drying should depend upon the purposes for which it is intended; and that the best method of using pipes or tiles in draining is at depths of three or four feet, generally at distances varying from fifteen to twenty-five feet, the drains being carried down the slopes of the land rather than across them. That, for temporary purposes, the meeting approves of the plan for a tilery suggested by Mr. Law Hodges; and that the use of pipes of small diameter, instead of tiles and soles, is calculated to effect a most important reduction in the cost of draining."

The business of the meeting then terminated.

PRIZE ESSAY ON THE MANUFACTURE OF MANURES, AND THE APPLICATION OF THE SAME TO THE DIFFERENT VARIETIES OF SOILS.

BY ASAHEL FOOT.

READ BEFORE THE BERKSHIRE (AMERICAN) AGRICULTURAL SOCIETY.

"A good agriculturist will neglect no means of forming dung-heaps: it ought to be his first and daily care, for without dung there is no harvest."—CHAPTAL.

Preliminary Propositions.

That vegetation annually appropriates to itself, and thus removes from the soil, a certain amount of nutritive principles; and that the removal of a succession of crops, without some compensation in the shape of manures, will gradually impoverish, and, if carried far enough, ultimately exhaust the soil, are propositions so manifestly true as to require no illustration. We every where see that the process last indicated is sure to be followed by a gradual change in the colour and texture of the soil, and by a proportionate diminution of its vegetable products, until, if not arrested, the final result is absolute sterility.

The truth of the converse of these propositions is equally evident. Take an old field which has been reduced to barrenness by an unrelenting system of cropping without compensation, and restore to it a portion of those vegetable matters by the abstraction of which its poverty has been occasioned, and amendment is at once the consequence. Repeat the operation, and a further progress towards fertility is made; extend it sufficiently far, and the face of nature is entirely renewed, and every symptom of a full recovery exhibited.

From these, and kindred considerations readily suggested to the reflecting mind, we draw the following

Inferences.

1. That the appropriate food of vegetation is, for the most part, neither more nor less than the ultimate results of vegetation itself, modified by the action of the animal organism, and the several processes of fermentation.

2. That a limited amount only of the food of vegetation is contained in any given quantity of soil.

3. That a single crop cannot be removed from the soil, without diminishing, to a certain extent, its capabilities for supporting vegetable life.

4. That an uninterrupted cropping of any given portion of soil, without remuneration, will at length infallibly reduce it to sterility.

5. That the original fertility of any given portion of soil can only be maintained by faithfully restoring to it, in the shape of manures, an amount of vegetable matter equal to that which is annually abstracted from it.

6. That an *impoverished* soil can only be *restored* to its original fertility by the application to

it, of an amount of vegetable matter *greater* than that which is annually taken from it.

7. That the most exhausted lands can not only be regenerated, by sufficiently increasing the proportion of vegetable matter in the soil, but raised above the highest point of their original fertility.

8. That the deteriorated condition of the major part of our cultivated soil is proof conclusive, that all the resources of the farmer have not, in general, been put in requisition.

9. That the secret of all good farming lies in the skilful management and judicious application of the common *home-made manures.*

10. That it is of the highest importance to the agriculturist to study more carefully the nature of soil, the wants of vegetable life, and the mutual relations and dependencies of the soil and vegetation; and above all, to cast about him and explore the sources of those animal, vegetable, and mineral substances, the proper application of which to his cultivated fields is not only an indispensable prerequisite to their increased fertility, but the certain harbinger, if coupled with economy, of competence at least, if not of affluence.

Definition of Manure.

Manure is a term of almost unlimited application, embracing an immense number and variety of substances—including, indeed, whatever can be named in the animal, vegetable, and mineral kingdoms, capable of improving and fertilizing the soil. Says the author of "British Husbandry," "Any thing whatever may be called manure, which, when applied to the soil, rectifies its defects, corrects any bad quality, or either stimulates it to yield, or stores it with nutriment." Any classification of so heterogeneous a mass of substances, which should at once prove satisfactory to the agricultural chemist, and intelligible to the merely practical farmer, cannot, in the present state of agricultural science, be attempted with any prospect of success. A practical classification alone, however, would seem to be called for on the present occasion, and that which is regarded as the simplest will be chosen.

Classification of Manures.

"From the earliest speculations on the nature of manures, down to a very recent period, manures have been divided into two classes—nutritive and stimulative, or such as furnish the direct food of plants, and those which act as stimulants, or excite plants to take up and assimilate such kinds of food as are presented to them. In the first class have been placed all decayed vegetable matter, farm-yard manures, animal excrements, night-soil, and such other matters as, having been derived from plants, are considered as capable of being reconverted into vegetable matter. In the second class, it has been the custom to place gypsum, lime, such salts as are found to produce a favourable effect on vegetation, as the phosphates of lime in bones, and the nitrates existing in saltpetre, soda, &c." [*Albany Cultivator,* Vol. 8, p. 95.] To these may be added a third class, consisting of variable mixtures from the two former, with several kinds of earth, and denominated "composts." Thus we have the simple classification of all the manures into, 1st, *Nutritive Manures;* 2nd, *Stimulative Manures;* and 3rd, *Composts.*

Nutritive Manures.

The great depositories of the manures of this class are the *barn-yard,* the *piggery,* and the *privy vault;* each of which will claim our attention, for a moment, in relation to the causes which operate to diminish the amount and value of their contents.

Causes of Waste.

How, then, are the contents of these depositories chiefly liable to waste? We answer, 1st, by *infiltration,* or soaking away into the earth; 2nd, by *evaporation,* or being taken up by the sun and winds; 3rd, by excessive *fermentation,* in which the heaps accumulate so great a degree of heat, as to dissolve the salts which they contain, and dissipate them in the form of gaseous exhalations; and, 4th, by *drainage,* or flowing away in the currents of water, which are suffered but too often to despoil our barn-yards of their richest treasures, and to defile our highways and clog up our ditches with that which might otherwise fatten our corn-fields.

Remedy for Drainage.

To close effectually the last-named waste-gate, it is only necessary so to excavate the central portions of the yard, as to form a sufficient reservoir for the liquids that will naturally find their way into it, and carefully convey away the droppings from the roofs of the buildings, by good conductors, and to turn the course of any superfluous waters from higher grounds, by effective trenches.

Remedies for Infiltration and Evaporation.

To guard against infiltration, let the yard, and especially the excavated portions of it, receive a thorough coating (if nature has not been beforehand in supplying one) of the purest *clay* at command; and to escape the mischiefs of evaporation, furnish it with an abundance of litter, such as refuse straw, orts, weeds, and leaves from the forest, together with muck, surface-soil from the road-sides, hedges, and ditches, or any other convenient matters of a porous nature, to absorb the liquids and protect the whole mass from the influences of the atmosphere. A further security still, will be found in occasionally strewing the yard with plaster, which, by combining with the volatile portions of the manure, and converting them into salts not volatile, will rob the atmosphere of that portion of its prey.

Remedy for Fermentation.

Having taken the above precautions, little danger need be apprehended from excessive fermentation, except in case of considerable piles of horse-dung; and here it will be very easy to avert the evil, either by occasionally spreading open the heaps, or, what is far better, by interlarding them, at proper intervals, with muck or surface-soil, which will not only effect the object in question, but, by absorbing the juices of the pile, become of equal value with the dung.

Value of Liquid Manure.

It will readily be perceived, that the principal effort of the farmer, in the preservation of his manures, must be directed to their *liquid* portions—these portions not only being by far the most exposed to loss, but possessing *a superiority in value, which renders their loss irreparable.* This last sentiment, involving, as it does, a subject of vital interest in agriculture, we shall take the liberty of illustrating by the introduction of several authorities.

"The greatest value should be attached to the liquid excrements of man and animals, when a manure is desired which shall supply nitrogen to the soil. The greatest part of a superabundant crop, or, in other words, the increase of growth which is in our power, can be obtained exclusively by their means. When it is considered that with every pound of ammonia that escapes, a loss of sixty pounds of corn is sustained, and that with every pound of urine a pound of wheat might be produced, the indifference with which these liquid excrements are regarded is quite incomprehensible. In most places, only the solid excrements impregnated with the liquid are used, and the dunghills containing these are protected neither from evaporation nor from rain. The solid excrements contain the insoluble, the liquids all the soluble phosphates, and the latter contain likewise all the potash which existed as organic salts in the plants consumed by the animal." [*Liebig's Organic Chemistry*, p. 191.]

"Liquid manure consists, in a great degree, of the urine of various animals, which, during its decomposition, exhales a larger quantity of ammonia than any other species of excrement. Now, all kinds of corn contain nitrogen, and consequently any manure which yields a ready supply of ammonia must cause a fuller development of those parts of the plants which are of the greatest use to man. Even the kind of animal manure usually employed in this country owes its efficacy, so far as it is dependent on the ammonia present, to the urine, rather than to the solid excrement, of which it is made up, and hence becomes materially deteriorated in this respect, when the more liquid portions are allowed to drain off from it." [*Daubeny's Lectures on Agriculture.*]

"The quantity of liquid manure produced by one cow, annually, is equal to fertilising one and a quarter acres of ground, producing effects as durable as do the solid evacuations. A cord of loam, saturated with urine, is equal to a cord of the best rotted dung. If the liquid and solid evacuations, including the litter, are kept separate, and soaking up the liquid by loam, it has been found they will manure land in proportion, by bulk, of seven liquid to six solid, while their actual value is as two to one. One hundred pounds of cow's urine afford thirty-five pounds of the most powerful salts which have ever been used by farmers. The simple statement, then, in figures, of the difference in value of the solid and liquid evacuations of a cow, should impress upon all the importance of saving the last in preference to the first." [*Dana's Muck Manual*, p. 171.]

"Urine is always a most valuable manure. No farmer should permit it to run to waste, but should so prepare his cattle-yard, by loam or swamp muck, and by plaster, as to save these invaluable products of his stables, and of his own dwelling. As the urine is commonly mixed with the solid excrements in the barn-cellar or cattle-yard, it increases the value of this manure, it promotes its decay, and adds its own salts: but if the whole is exposed to the influence of atmospheric agents, it facilitates their action, and aids in depreciating its value; hence it is generally wholly lost to the farm. Farmers ought to know this, and to be apprized of the fact, that at least one half of their manures is wasted." [*Gray's Elements of Agriculture*, p. 302.]

"Upon nearly all our farms, the dung of quadrupeds is exposed to the open air, without the protection of a shed, as soon as it is removed from the stables, and is thus washed by the rains, which carry off all the salts, urine, and soluble juices, and form at the foot of the mass a rivulet of blackish fluid, which is either wholly evaporated, or lost in the ground. In proportion as fermentation advances, new soluble combinations are formed, so that all the nutritive and stimulating principles of the dung gradually disappear, till there remain only some weak portions of the manure, intermingled with stalks of straw, which have lost all their goodness." [*Chaptal's Agricultural Chemistry*, p. 55.]

A Valuable Hint.

"To remedy as much as possible an abuse so injurious to agriculture, it is necessary at least to dig a deep ditch, to receive all the juices which flow from the dunghill, in order that they may be used in the spring upon the corn or grass lands; or that they may be preserved to water the grass-lands with, after the first mowing. A large cask fitted upon a small cart, and which can be filled by means of a hand pump, is sufficient for this purpose. Beneath the tap of the cask must be fitted a narrow chest, about four feet long, with the bottom pierced with holes, through which the liquor may be scattered. This mode of watering, when used after mowing, produces wonderful effects upon the crop of the following year." [*Ib.*]

An Experiment.

In confirmation of the statement last quoted, the writer may be permitted to notice an experiment with liquid manure, made by himself during the past year. Some one hundred and fifty gallons of liquid were dipped, in the month of October, from an excavation beneath his horse-stable, and evenly distributed over a small area (perhaps twenty square rods) of old meadow land, the soil a stiff clay loam, on which but little grass had grown for four or five years. When that area was mowed, about the first of August last, it was judged to yield at the rate of at least three tons to the acre! an increase of certainly not less than five to one, and attributable to no other assignable cause than that dressing of liquid manure, of which, too, a considerable portion must have been made up of water.

Management of our Stables.

From facts like the above, we should be quick to gather lessons of wisdom; not lessons of knowledge merely (for they may be profitless), but lessons of that practical wisdom, which not only comprehends and appreciates what is good, but employs the best means for its attainment. Let our *stables* receive a just share of attention; let the ground beneath them be so shaped, as to conduct the urine which falls from it, directly to the common reservoir in the yard; or let it be excavated in a proper form, and supplied with suitable absorbents; or let the floors be made tight, so that the urine can be taken up by the litter, or conveyed by gutters to the yard; and there can be no question that at least one-third will be annually added to the value of our stock manures.

Where any of the improved machines for that purpose are in use, the expense of *cutting* the straw intended for litter will be more than repaid by the greater ease with which the floors may be cleaned, especially in winter, by the greater amount of liquid it will absorb, and by the greater facility and evenness with which the manure may be spread in the spring. Dry powdered muck and loam, stored under cover for the purpose, may also be highly recommended for free use in stables, as being well adapted to prevent the waste of the liquids there, and also the escape of the juices and gases from the heaps as they are formed without. And last, not least, an occasional sprinkling of plaster over the floors will not only preserve such salts as would otherwise be lost by exhalation, but at the same time greatly contribute to the sweetness of the stables.

Merits of this System.

It is not imagined that the system now indicated for the preservation of our barn-yard manures is a perfect one, securing all the advantages desirable to be secured. It does not wholly protect the manures from the wasting action of the atmosphere, nor from liability to loss by infiltration and drainage. But perhaps, considering the universality of its application, and the comparative ease and cheapness with which it may be adopted, it is the best that can be recommended for general practice. In situations where it is practicable, additional advantages may be unquestionably secured by the use of a *barn-cellar,* into which any or all of the manures of the establishment may be thrown, with suitable absorbents, and the whole wrought together into the richest of all composts, by the voluntary labours of the swine. No doubt farmers will find their account also in *housing* their manures as much as possible, since, by being thus protected, their most valuable portions (their juices and salts) will be preserved to a much greater extent than it is possible for them to be in the open air.

Comparative Value of Manures.

The barn-yard being the common receptacle of the excrements of the horse, the cow, and the sheep, and the great object having been, thus far, to point out the best mode of saving the *whole* of them, the *comparative value* of these different substances has passed unnoticed. In order, however, that the farmer may direct his labours for the preservation of his manures to the greatest profit, he should certainly have the benefit of all known facts on this point.

"The quantity of vegetable and animal matter in horse-dung is considerably larger than in cow-dung, it is as twenty-seven to fourteen, or nearly double; and of course the quantity of nitrogen which it is capable of yielding is nearly double that of cow-dung. Sheep-dung is similar to horse-dung, but contains a greater quantity of vegetable matter in a soluble state. It is also richer in salts; and the quantity of nitrogen which it is capable of yielding is greater than in either of the preceding substances. Hog-manure contains still larger quantities of soluble matter, and is capable of yielding a large quantity of nitrogen, in the form of amonia. It ranks next in value to night-soil, which has ever been celebrated as the most valuable substance used for manure." [*Gray's Agriculture,* p. 286.]

"Experiments undertaken by order of the Saxon and Prussian authorities, varied in every form, and continued for a long period, prove that if a soil without manure yield a crop of three for one sown, then the same land dressed with cow-dung yields seven for one sown—with horse dung, ten for one sown—with human manure, fourteen for one sown." [*Dana,* p. 143.]

The Piggery.

Still greater care will here be requisite, to "see that the commonwealth receives no detriment," inasmuch as the treasures at stake are of higher value, and from two circumstances, more liable to waste; namely, there being a greater proportion of liquid excrements, and the solid portions being more exposed, from the fact of their being constantly upturned by the rooting of the swine, and thus presenting, every hour in the day, fresh surface to the action of the sun and winds.

The former of these circumstances will be judiciously met by supplying the pens with an abundance of straw, leaves, saw-dust, and the like; the latter by furnishing the yard with an occasional load of muck, and almost any quantity of weeds, pea and buckwheat straw, potato-vines, &c., all of which will be rapidly converted into the most efficient supports of vegetable life.

It is suggested, whether it would not be an improvement on the present system, were the yard and pen but one enclosure, consisting of an open area under cover (with floors for eating only), where the same use might be made of muck and litter, as at present, and the whole completely shielded from the atmosphere.

The Privy Vault.

This, in proportion to the volume of its contents, should command a greater share of our solicitude than any other of the depositories of the farm manures. Considering simply the *nature of the food* from which the substances under consideration result, we might well suppose them to possess a superior efficacy in promoting the growth of the finer plants and grains—a supposition which agricultural chemistry unites with all experience in fully justifying. So far, therefore, as the simple preservation of manure is concerned, it is doubtless from this quarter that the farmer can derive the greatest profit at the least expense.

Let the vault, then, (constructed with a due regard to convenience, as well as to the exclusion of air and moisture,) be carefully supplied, at proper intervals, with powdered charcoal alone, or with dry powdered muck and gypsum, (the best of all substances for this purpose, but for which cut-straw, surface-soil, ashes, and old lime may be substituted,) and the object will be fully accomplished. The liquid portions will be absorbed, and the volatile products converted into fixed salts; the whole mass will become inodorous and inoffensive, (no small advantage to the family as well as to the farm,) and a goodly quantity of the richest of all manures will be prepared for convenient application to the cultivated crops.

Value of Human Excrements.

Deeply impressed, ourselves, with the value of these excrements, and deeming it of no small importance that a general interest should be awakened in relation to them, we cannot forbear from presenting our farmers with one or two pertinent quotations.

"In respect to the quantity of nitrogen contained in excrements, one hundred parts of the urine of a healthy man are equal to thirteen hundred parts of the fresh dung of a horse, and to six hundred parts of those of a cow. Hence, it is evident, that it would be of much importance to agriculture, if none of the human urine were lost. The powerful effects of urine, as a manure, are well known in Flanders, but they are considered invaluable by the Chinese, who are the oldest agricultural people we know. Indeed, so much value is attached to the influence of human excrements, by these people, that laws of the state forbid that any of them should be thrown away, and reservoirs are placed in every house, in which they are collected with the greatest care. No other kind of manure is used in their corn-fields. The agriculture of that country is the most perfect in the world."

"If we admit that the liquid and solid excrements of a man amount, on an average, to one and a half pounds daily, (five-fourths of a pound of urine, and one-fourth of a pound of fæces,) and that both taken together yield three per cent. of nitrogen, then, in one year, they will amount to five hundred and forty-seven pounds, which contain sixteen and a half pounds of nitrogen, a quantity sufficient to yield the nitrogen of eight hundred pounds of wheat, rye, or oats, or of nine hundred pounds of barley. This is much more than is necessary to add to an acre of land, in order to obtain, with the assistance of the nitrogen absorbed from the atmosphere, the richest possible crop every year. Every town and farm might thus supply itself with the manure, which, besides containing the most nitrogen, contains also the most phosphates; and if an alteration of the crops were adopted, they would be most abundant. By using, at the same time, bones and the lixiviated ashes of wood, the excrements of animals might be completely dispensed with.—[*Liebig*, p. 185.]

"In Belgium, which has been the cradle of enlightened agriculture, and where good modes of cultivation are continued and constantly improved, they make astonishing use of this kind of manure. So great a value do the Flemings attach to it, that the cities set a high rate upon the privilege of disposing of the cleansing of their privies, and there are, in each one of them, sworn officers for the assistance of those who wish to make purchases.

"We shall find great difficulty in bringing this branch of industry to the same degree of perfection amongst us, that it has arrived at in Belgium, because *our farmers do not realize its importance;* and have a repugnance to employing this kind of manure. But could they not collect carefully all these matters, mix them with lime, plaster, or gravel, till the odour was dispelled, and then carry the whole upon the fields?

"Already, in most of our great cities, the contents of the privies are used for forming *poudrette;* this pulverulent product is sought for by our agriculturists, who acknowledge its good effects; let us hope that, becoming more enlightened, they will employ the fæcal matter itself, as being more rich in nutritive principles, and abounding equally in salts; they can easily govern and moderate the too powerful action of this, by fermentation, or what is still better, by mixing it with plaster, earth, and other absorbents, to correct the odour."—[*Chaptal*, p. 62.]

Pure Animal Matter.

All animal substances, such as the carcasses of dead animals, unmerchantable fish, the refuse of the slaughter-house, the relics of the kitchen, and the waste of the tan-yard, the shoe-shop, the carding-mill, the comb, glue, soap, and woollen cloth manufactories, &c., by being seasonably gathered up, and either incorporated with the barn-yard manures, combined with compost materials, or buried directly in the soil, will prove the most efficient aids in promoting fertility. "The carcass of a dead horse," says Lord Meadowbank, "which is suffered to pollute the air with its effluvia, has been happily employed in decomposing twenty tons of peat earth, and transforming it into the most valuable manure."

In illustration of the value of numerous refuse matters, commonly accounted "good for nothing," and thrown away, it may here be stated that the finest crop of eight-rowed corn inspected by the Agricultural Committee of Berkshire, the present year, owed its superiority, in their opinion, to the employment of a compost manure, in which the principal ingredient was *woollen flocks.* The soil was thin, consisting of exceedingly coarse gravel; yet the growth was luxuriant, and the ears well filled, perhaps beyond comparison for the present season.

Pure Vegetable Matter.

This may include straw, leaves, vines, &c., and green or ripened crops ploughed under, to improve the soil; but the consideration of this topic being unnecessary in the present connection, it will be reserved for a future paragraph, under the second branch of our general subject, namely:—

THE APPLICATION OF MANURES.

In order to the most judicious application of our manures, it is obviously necessary that we have regard to certain characters and conditions of soil; as the proportions of its inorganic constituents, the amount of its organic materials, and its relations to temperature and to moisture.

Inorganic Constituents of Soil.

By the inorganic constituents of soil, are meant those purely *earthy* substances which form the *basis,* and chiefly determine the *texture* of all soils, but which, of themselves, whether in a combined or separate step, are wholly incapable of supporting vegetation. Such are gravel, sand, and clay, (as also lime,) which constitute the basis of the great majority of all our soils.

Constitutional Character of Soil.

When either gravel or sand predominates in the constitution of a soil, it is termed siliceous, from silica, the common name of gravel and sand. When clay preponderates, it is denominated argillaceous or aluminous, from argil and alumina, both which signify clay in a pure state. If lime be a principal constituent, it is called calcareous, from calx, signifying chalk, which is only a certain modification of lime.

Physical Conditions of Soil.

The different proportions in which the inorganic constituents enter into the composition of any soil, will also chiefly determine its physical condition; that is, it will be light or heavy, (more properly, loose or compact,) wet or dry, warm or cold, in proportion as it consists chiefly of gravel and sand, or mostly of clay.

Organic Constituents of Soil.

By the organic constituents of soil, are meant those vegetable and animal substances which help to compose the soil to a certain depth, which exert a considerable influence, also, upon its texture, and upon which vegetation is entirely dependent for its subsistence. In scientific works on agriculture, this portion of the soil is usually treated of under the name of *geine, humus, or vegetable mould;* and embraces every thing in the soil capable of undergoing decomposition, and thus becoming the food of plants.

Object of the Application of Manures.

To increase this organic portion of the soil, is the great object of the application of manures. It should not, however, for a moment be imagined, that the simple augmentation of the proportion of organic matter will insure fertility, since very much depends upon the state, as well as the quantity of this matter in the soil. It is upon these two circumstances, taken in connection, that the farmer is wholly dependent for success in all of his agricultural operations.

Certain Conditions of the Soil Prerequisite.

In illustration of what is meant by the dependence of fertility on the state of the geine in the soil, it may be observed, that manure, applied to either gravel or clay in a pure state, might as well be applied to the surface of an equatorial desert, a pool of water, or an island of ice; the former (gravel) being destitute of that quality of compactness which is necessary to prevent the salts and juices of the manure from escaping at once into the earth or air, and to retain a sufficient degree of moisture for the purposes of vegetable life; and the latter wanting that opposite quality of porosity, which is requisite for the escape of that superabundance of moisture, which, by its own presence, and the exclusion from the soil of the other atmospheric agents, would prove equally fatal to all the processes of vegetation.

The proposition, therefore, must approve itself to every intelligent farmer, that the fertility of a soil depends not only on the *quantity* of geine it contains, but also on the *state* of that geine, as affected by its relations to the inorganic constituents. Hence the importance to the agriculturist of making himself acquainted with the nature of soil in general, and of his own soil in particular, that he may husband to advantage his means of fertilization, and not expend his strength in labours that will, in the end, prove fruitless.

Constitution of the best Arable Soils.

The proportions in which chemical analysis has ascertained the different constituents of the most productive soils to exist, are about as follows: silica (gravel or sand), sixty parts in one hundred; alumina (clay), sixteen parts; lime, three parts; oxide of iron and manganese, seven parts; geine (organic matter capable of becoming the food of plants), nine parts; potash, three parts; soda, one part; magnesia, one part.

Says Chaptal; "From the results of analysis we find that in the best earths there is a large proportion of gravel, which renders the soil light and easily worked, and facilitates the passing off of superabundant rains. In consulting the analysis of less fertile soils, we find that their fertility diminishes in proportion as one or the other of the three principal earths (silica, alumina, and lime) predominates, and that it becomes almost nothing in those which possess the properties of but one. The mixture of earths, then, is necessary to the formation of a productive soil; and their proportion can be varied only according to the nature of the climate, and the kind of plants to be cultivated. Siliceous and calcareous earths may form a larger proportion of the soil in moist than in dry countries; and alumina may, in its turn, predominate in those lands, which, from their declivity, suffer the water to flow off freely; but a mixture of the three earths can alone form a good soil, and too great a disparity in their proportions materially affects the character of it." [p. 26.]

Starting-Point of Improvement.

Here, then, is evidently the starting-point, from which the farmer, that would run the race of improvement, must calculate his "latitude and departure." From this "post of observation," must he survey the sphere of his labours, carefully noting the several ingredients of his soils, and the different proportions of their several combinations, as well as their several physical conditions; and thus will he be qualified to enter intelligently on the execution of any scheme relating to their improvement. If a careful observer, he will early make the important discoveries,

1. That an excess of siliceous or calcareous substances, by rendering the soil too porous, occasions the speedy disappearance of his manures, exposes his crops to suffer from droughts, and frequently disappoints his hopes of a harvest, and frustrates all his efforts at successful cultivation.

2. That an excess of argillaceous matter, by rendering his soil too compact, obstructs the passage of the surface waters that rest upon it in spring, refuses admittance through its indurated surface to

the fertilizing dews of summer, excludes the healthful influences of the sun and air from the roots of his plants at every period, receives with indifference whatever manures he applies, and renders all his labours upon it, to a great extent, abortive.

3. That a certain admixture of the different earths composes a soil sufficiently light and warm, meeting, without detriment, the ever varying states of the atmosphere, affording a ready passage to the rains in wet weather, and to the dews in dry, appropriating largely to his crops the beneficial influences of the sun and air, making the most of every particle of manure received, and amply compensating him for all the labour he expends upon it.

Soils too Compact or Porous, improved by Admixture.

Having made the above discoveries, the resolute *improver* of the soil will come at once to the conclusion, that what the hand of nature has left unfinished, it is for *his* to complete: and setting himself at work, in imitation of the *pattern* she has furnished him, will, by a due adjustment of the different ingredients of his several soils, bring up, at length, the poorest of his lands quite to the standard of the best. He will not, however, find it advisable, in most instances, to effect this adjustment directly, that is, by carting soil from one field to another, for the purpose of admixture; but, rather, to cart it first to the cattle-yard, to be blended with a portion of solid and liquid manure, and thence convey it to the localities selected for improvement.

This practice has been followed, to some extent, by the writer, and with the most distinguished success. Indeed, so marked have been the beneficial results of this system, as to leave upon his mind the full impression, that for a light, siliceous soil, two loads of agillaceous earth, well mixed in the cattle-yard with one of manure, are of more actual value than would be three equal loads of clear stable manure. For a heavy, aluminous soil, a similar treatment with gravelly or sandy loam, combined with manure, will prove equally beneficial.

Soils improved by Draining.

On wet lands manure should never be applied at all. Let such lands be thoroughly drained, and in most cases it will be found that no manure is needed; the soil being already supplied with a sufficiency of vegetable matter, which, having been kept in an insoluble state by an excess of moisture, will, under more favourable circumstances, become decomposed, and furnish abundant support to vegetation. But when it is needful that manure should be applied to lands of this description, thorough draining should, in every case, precede the application, and then the expense will be remunerated.

A Fundamental Principle.

What has now been advanced will make apparent, if the writer has not failed of his object, the importance of what he deems a very fundamental principle in the application of manures, namely, that not only in the quantity and kind, but in the mode of their application also, *manures should always be adapted to the peculiar character and condition of the soil.* This general principle, in its relation to the nutritive manures, may be reduced, by way of detail, to a number of highly practical rules, the most important of which are the following:—

Rules for the Application of Manures.

1. The smaller the quantity of organic matter in the soil, the greater should be the quantity of manure applied, and *vice versâ.*

A light dressing of manure on an exhausted soil, and a heavy one on a soil already stored with nutritive matter, would be alike injudicious; the former being insufficient, not only to give a permanent fertility to the soil, but even to make the present crop a remunerating one; and the latter having no immediate office to perform, the crop to which it is given being already supplied with appropriate food.

2. The heavier, moister, and colder the soil, the lighter, drier, and warmer should be the manures applied; as horse and sheep dung in an unfermented state.

"Animal manures develop more or less heat, according to their nature, and their state of fermentation; those which have not been decomposed excite more heat, and maintain it for a longer time than others. The excrements of the sheep and horse are more heating in their action than those of the cow; the black or brown manures warm the soil more than marl or chalk." [*Chaptal*, p. 37.]

3. The lighter, drier, and warmer the soil, the heavier, moister, and less heating may be the manures applied; as cattle and hog dung, and compost manures.

The liability of light soils to suffer from drought, should lead the farmer, not only to exercise great care in selecting the most suitable manures, but to see that they are thoroughly incorporated with the soil, and not left in masses, to increase the evil. Moderate quantities of either animal or vegetable matter, if properly blended with the soil, will promote its moisture, by increasing its power of absorption; but if applied in excess, or left in considerable masses, the opposite effect will be produced. The same considerations should have their weight in relation to the kind or quantity of manure used (if any) *in the hill*, for hoed crops.

4. The more porous the soil, having a loose subsoil, the nearer the surface should the manures be deposited, to avoid infiltration.

We must beware, however, that while we draw one foot from the water, we do not thrust the other into the fire. If, on the one hand, by placing our manures too deep in the soil, we suffer loss from infiltration, so, on the other, by leaving them upon the surface, we shall find ourselves losers by evaporation, though, perhaps, to a less extent. The true practice would be, to give them just that covering which, while it would protect them from the more direct action of the atmosphere, would, at the same time, keep them longest within reach of the roots of the plants.

5. The more impervious the soil, having a compact subsoil, the deeper and more intimately should the manures be incorporated, to promote the freer action of the sun and air upon the soil, to render it easier of cultivation, to secure a wider range for the roots of the plants, and to prevent excessive moisture in wet, and drought in dry weather.

The common air, which is, to a great extent, excluded from soils of the kind now under consideration, exerts a most powerful agency in promoting vegetation, and that in various ways: 1. By imparting to the soil the temperature of the atmosphere. 2. By furnishing nutritive principles from the decomposition of its own constituents. 3. By serving as a medium for the introduction into the organs of plants, of their appropriate aliments; and, 4. By conveying to the roots of the plants, the various fertilizing matters contained in the dews which it deposits on the surface of the earth. Says Chaptal, (p. 33,) "That earth which is most easily affected by the dews, yields most readily to the action of the roots, whether it be to fix the plants firmly by their extension, or to draw from the soil its nutritive properties.

6. On soils disproportionately siliceous or calcareous, manures should be applied in combination with clay, or argillaceous loam, to increase the retentiveness of the soil, by giving it a stronger texture.

The presence of a certain degree of moisture, which is not always possessed by soils of this description, is necessary, 1, to excite, by the oxygen which it contains, the vital energies of the plant; 2, by its solvent properties, to aid in decomposing the vegetable matters in the soil; and, 3, to dilute, to the requisite degree, the food thus prepared for the plants, and help to convey it into their delicate organs. "It is generally considered," says Johnston, (*Agricultural Chemistry*, p. 78,) "that solid substances, of every kind, are unfit for being taken up by the organs of plants, and that only such as are in the liquid or gaseous state can be absorbed by the minute vessels of which the cellular substances of the roots and leaves of the plant are composed.

7. On soils disproportionately argillaceous, manure should be applied in combination with siliceous or calcareous matter, to increase its permeability, and thus make it more friable, raise its temperature, and secure, to a greater degree, the beneficial influences of the atmosphere.

To be convinced of the importance of permeability, or looseness of texture to the soil, we need but reflect for a moment, that plants are not permitted, like animals, to roam about in quest of their food, the invariable limits of their pasturage being the extremities of their roots. How obviously necessary, then, that they should be enabled to extend their roots with the utmost freedom, and lay under contribution, without impediment, whatever elements can yield them sustenance.

8. On positively wet soils the application of manure should, in every case, be preceded by thorough draining.

"Whenever water is converted into steam, the ascending vapour carries off much heat along with it. Let two adjoining fields be wet or moist in different degrees, that which is wettest will almost at all times give off the largest quantity of vapour, and will therefore be the coldest. What is the remedy? A removal of the excess of water. And how? By effectual draining. The first effect upon the soil is the same as if you were to place it in a warmer climate, and under a milder sky, where it could bring to maturity other fruits, and yield more certain crops." [*Johnston*, p. 54.]

"If the water is withdrawn from a marsh, free access is given to the air, and the marsh is changed into a fruitful meadow." [*Liebig*, p. 116.]

To the elevating of the temperature of cold, wet soils, too much importance can hardly be attached. "The solvent power of water over solid substances is increased by an elevation of temperature. To this fact is ascribed, among other causes, the peculiar character of the vegetable productions, as well as their extraordinary luxuriance, in tropical countries." [*Johnston*, p. 48.] "Warmth renders the sap fluid, and quickens its circulation; cold thickens it, and renders it stagnant. It is heat alone, that, by animating the vegetable organs, enables the plant to elaborate within itself the nourishment which it receives." [*Chaptal*, 36 and 102.]

Additional Rules.

The relations of manure to the *roots* of plants, and the peculiar *action* of manures on different plants and on different classes of crops, give rise to the following additional rules.

9. The deeper the roots of any plant penetrate the earth, the deeper should the manures be deposited; and the more superficial the roots of any plant, the nearer the surface should they be lodged.

The *mouths* of plants being uniformly placed at the extremities of their roots, the necessity is obvious, that, in order to derive from them the benefit intended, the substances employed as manures should be distributed in the soil, with some regard, at least, to the extension and position of these roots. That system which should lead the farmer to prepare in the same manner a patch of ground for strawberry plants, whose creeping roots scarce penetrate beneath the surface, and another for parsnips, which have been known to strike their roots to the perpendicular depth of six feet, would be indeed ridiculous.

10. The quantity and quality of manures should be carefully adapted to the character of the plant cultivated, as being a great or small consumer, and as having a special partiality for a particular constitution of soil, or for a particular kind of nutritive principles.

Some species of plants, as Indian corn, for instance, are well known to demand a supply of food which would surfeit and destroy the more delicate grains; some thrive luxuriantly in cold and wet, and others in warm and dry soils, to which an exchange of locality would prove fatal; and some, again, evince a natural appetite for the rank exhalations of fermenting manures, as those, in general, which have long, tap roots, and large, fleshy stalks, while others prefer ammonia, as red and white clover; others lime, as potatoes and wheat; others common salt, as the asparagus plant, &c.

11. Whenever manure is furnished to the soil, the quantity supplied should be amply sufficient to secure the fullest development and most vigorous growth of the plants intended to be cultivated.

It is a most interesting and important discovery of modern science, that plants, through the agency of their leaves, derive no small proportion of their elementary substances from the atmosphere; and that this proportion is graduated, to a greater or less extent, by the quantity, strength, and vigour of their foliage. "Hence, the proportion of organic matter derived frem the air, in any crop we reap, must always be the greater, the more rapid its general vegetation has been." [*Johnston*, p. 146.]

In illustration of the extent to which the atmosphere is drawn upon by plants for their nourishment, as well as the agency which manures exert in the operation, "Sprengel states, that it has been very frequently observed in Holstein, that if, on an extent of level ground sown with corn, some fields be marled, and others left unmarled, the corn on the latter portions grows *less luxuriantly* and will *yield a poorer crop than if the whole had been unmarled.* [*Ib.*]

12. Unfermented manures should be appropriated, in general, to the use of *hoed crops;* fermented manures and composts alone, to the finer grains and grasses.

The reasons for this rule (which have been, in a measure, already anticipated,) are, that while Indian corn, potatoes, and most tap-rooted plants are benefited, in the highest degree, by the powerful gases thrown off from manures undergoing fermentation, their effect upon the finer grains is, to hasten unduly the growth of the straw, and thus to expose the crop to the very serious evils of lodging, blasting, &c. "The plant," in this case, "absorbs more nourishment than it can readily digest, and becomes affected by a kind of obesity; the texture of its organs is rendered soft, loose, and spongy, and unable to give their products the due degree of consistency."? [*Chaptal*, p. 76.]

Fermentation of Manures.

That manure should never be suffered to undergo fermentation any where else than *in the soil*, or in well-protected compost-beds, may be argued from the facts, 1st, That even an incipient fermentation cannot take place without the evolution and escape of some portion of its volatile products, such as carbonic acid and ammonia, to the latter of which all nutritive manures are indebted for their principal efficacy; 2. That, during fermentation (in the open air) it is constantly exposed to further loss by infiltration and drainage; and, 3, That the finer grains do not require this process to be undergone *in the barn-yard*, since, coming as they mostly do, and as perhaps they always should, *after hoed crops*, they find the manure employed for the previous crop in just the requisite state of decomposition; a clear gain of the entire advantage secured in the previous harvest.

It may be objected to this view of the subject, that fermented manure is in particular cases indispensable for *forcing* vegetation—that is, for hastening the growth and maturity of certain plants. Let this be admitted; still the admission does not establish the necessity of that *waste* against which we are protesting. Let the manure to be fermented be carefully collected in *compost-heaps*, and we are satisfied.

Applying Manures to the Surface.

Whether putrescent manures should ever be applied to the surface of the soil, is a question on which the opinions of distinguished agriculturists are far from being unanimous. The right decision of the question depends, in our view, upon the following circumstances: 1. The condition of the manure to be applied; 2. The character of the soil for which it is intended; 3. The nature of the crop to be benefited by it; and, 4. The time of the year when the manure is to be carried out.

1. If the manure to be applied has been composted, or if the process of fermentation has already spent its force upon it, there can be no serious objection to its being spread upon the surface; since, the gaseous exhalations having already escaped, it is chiefly secured from the ravages of the atmosphere; and from infiltration there is nothing to fear, as that is the very process best adapted to bring the decomposed particles in contact with the mouths of the plants which are to feed upon it.

2. If the soil for which the manure is intended be very porous to a considerable depth, the *nearer* the surface it can be deposited, without too much exposure to the atmosphere, the better, it being evident that the nutritive juices will soon descend beyond the reach of the plants, if it be in the first place buried too deep.

3. If the crop to be benefited consist of any of the finer grains or grasses, the application of the manure to the surface (harrowed in, in the case of grain), will have a greater *present* effect than any other mode of application, as the roots, that is, the mouths of the plants, lying close to the surface, will have the readier access to their food. That natural meadow-land can thus be made to yield a greater burden of grass than by any other means, scarcely admits of a doubt.

4. If the manure to be applied is summer-made manure, which must be carted out in the fall, this mode of application will have another argument in its favour. By being spread at this season of the year, after the heats of summer are past, the fermentation and evaporation will be but slight, and the rains and snows which may be expected to fall upon it in succeeding months will either wash it into the soil, or so imbed it among the roots of the growing crop, as quite effectually to shield it from the wasting action of the atmosphere the succeeding season.

One thought more upon this subject. With the relations of plants to the atmosphere as a source of nutriment, we are as yet much less acquainted than with those which they sustain to the soil; and agricultural science, in its onward progress, may yet develop the fact, that manures applied to the surface, by exerting a direct and powerful agency upon the leaves of plants, and thus promoting an increased absorption of the nutritive particles of the atmosphere, may prove more beneficial, especially in the case of grasses and the finer grains, notwithstanding the losses they sustain from evaporation, than they would if buried beneath any portion of the soil.

Green Crops for Manure.

Green crops, ploughed under for the purpose of enriching the soil, have been regarded from very ancient times as valuable aids in agriculture, and are still recommended in no small degree by the highest agricultural authorities. It is indeed unquestionable, that a crop of clover, for instance, turned under the soil, will afford a sufficient quantity of nutriment for a crop of wheat or rye, and also leave the soil (if not cross-ploughed) in a condition highly favourable to the growth of such a crop. The great question is, whether it would not be more advantageous to the farmer, first to give his cattle the benefit of the clover, and then turn under the remaining vegetable together with the animal matter distributed over the soil, and thus secure two valuable objects instead of one. That such was the opinion of the late Judge Buel, (a more judicious adviser than whom has never contributed to the improvement of American farming), will appear from the following extract from his *Cultivator*, vol. 2, p. 13 :—"Vegetable matter, when thus covered by the soil in its green and succulent state, readily undergoes decomposition, and forms a very enriching substance. The practice, however, is chiefly suited to warmer countries, where vegetation is very rapid; and even there it argues a somewhat low state of the art, and is not the best way of producing decomposing matter. When we are able to raise green food of any kind, it is better that we apply it in the first place to the feeding of animals, for then it not only yields manure, but performs another and not less useful purpose."

It is a consideration, notwithstanding, of some weight, that in case of feeding off the green crop, the nutritive substances lose somewhat by exposure, and are much less evenly distributed over the soil for the use of the cultivated crop. "When, however," continues the Judge, "the practice is for any reason adopted, the period at which the plants should be ploughed down is just when they are coming in flower, for they then contain the greatest quantity of readily soluble matter, and have the least exhausted the nutritive substance of the soil."

In the concluding clause of the extract last quoted, green crops are spoken of as "exhausting the nutritive substance of the soil." We take occasion from this hint, to raise an interesting inquiry. If the green crop, while growing above ground, *exhausts* the soil—and this must be admitted —how can it, by being turned under, *enrich* the soil? Can it *give* to the soil any thing which it has not first *taken away* from it? Science answers in the affirmative. By the aid of her light it has been discovered that plants derive a greater or less proportion of their constituent principles from the *atmosphere*. These principles, by the process of turning under green crops, become a constituent portion of the *soil*. This, then, is one of the secrets of their utility. It is not, however, the only one. The *physical* condition of the soil is also improved by their means; its lightness, warmth, and *power of absorption* are increased, so that still further draughts are made upon the atmosphere, and thus the soil is permanently benefited.

Whether the crop "should be ploughed down just when coming in flower," or not till after maturity, is yet a question of debate. Says Dr. Dana, p. 214, "Powerful as are the effects of green crops ploughed in, it is the experience of some practical men, that one crop allowed to perfect itself and die where it grew, and then turned in dry, is superior to three turned in green. The whole result is explained by the fact, that dry plants give more geine than green. Green plants ferment—dry plants decay. A large portion escapes in fermentation as gas, and more volatile products are formed than during decay."

The testimony of Chaptal hangs quite upon the other end of the beam. "It is well known to the farmer," he remarks, "that ploughing in a green crop, of any kind whatever, prepares the soil for producing well without any other manure; since, by this process, all that the soil has yielded is returned to it, with some additions resulting from the decomposed principles of air and water, which are contained in the plants."

"In order fully to understand this doctrine, which appears to me of great importance to agriculture, it is necessary to consider the successive changes which take place in annual plants during their growth; first, they produce green leaves, which, by coming in contact with the air, receive from it the principles of which I have spoken; subsequently the stalks increase in size and number, and are covered with numerous leaves, which absorb from the atmosphere a degree of nourishment suited to the increased wants of the plants. This state continues till after the period of flowering, when a change worthy of note takes place; the roots dry up, the stalks wither and change their colour; and when fructification is at length completed, both roots and stalks have become mere skeletons, which answer but little purpose either for nourishing animals or manuring earth." p. 94.

But whether turned in green or dry, the ploughing should not be so deep as wholly to exclude the action of the sun and air (for acids will then be formed in the soil); neither should cross-ploughing ever succeed, as this would defeat the object intended, by feeding the atmosphere instead of the soil, upon the virtues of the crop.

Manufactured Manures.

Certain manufactued substances, as bone-dust, urate, poudrette, &c., might here receive a passing notice; but as they are not likely, at present, to secure much patronage among us, and certainly *should not be employed*, expensive as they are, until we have learned to save the *half of our home-made manures which are now suffered to be lost* for want of a little attention, it is not deemed important to enter on any discussion of their merits, especially as these, together with the proper modes of applying them, are fully set forth in all our agricultural journals. We proceed, therefore, to our second division, viz:

Stimulative Manures.

The value of this class of manures depends, not so much on any direct impartation of food to plants, as on their agency in exciting their organs to greater activity, in appropriating to their benefit the influences of the atmosphere, in combating their insect enemies, and in dissolving the salts, neutralizing the acids, and improving the texture of the soil—as lime, marl, gypsum, ashes, saltpetre, common salt, charcoal, soot, sand, clay, &c.

Lime.

Lime has been long and extensively employed in

Europe as a fertilizer of the soil, and with such success as to induce an English writer of note (Morton on Soils) to assert, that " the majority of soils cannot be cultivated to advantage till they are dressed with lime; and whether considered as an alterative, as a stimulant, or as a manure, it will be found to be the basis of good husbandry, and of more use than all other manures put together. Wherever lime has been properly applied, it has been constantly found to prove as much superior to dung, as dung is to the rakings of the roads, or the produce of a peat mire." And, says M. Puvis, a distinguished French author, " In limed earth, weeds and insects disappear. The earth, if too light, acquires stiffness, and is lightened if too clayey. In the same soils, with the same manure and the same tillage, by the addition to the ploughed layer of only one-thousandth part of lime, the products, whether volatile or fixed, are increased in a wonderful manner; the soil of the lowest quality reaches the product of the second—the second rises one half or more—and that of the best soil increases a fourth." Yet, strange as it may seem, there exists even among English agriculturists the greatest diversity of opinion in regard to the propriety and mode of its application on different soils, and the admission is heard on every hand that extensive tracts of British soil have been rendered infertile by its use.

Were we to hazard an opinion on a subject regarding which not only learned farmers but "learned doctors disagree," we should say that the truth in the case was something like the following. Vegetable matter becomes the food of plants only in a state of decomposition; of this process lime is a powerful promoter; when, therefore, lime is incorporated with a soil containing much undecomposed vegetable matter, it rapidly prepares this matter for the use of plants; the immediate consequence is, a great increase of vegetable products. But just in proportion to the crop produced, is the greatness of the draught upon the soil. Persisting, therefore, in the application alone of this mere excitant, *stimulating his soil to an unnatural activity, without supplying those nutritive substances which alone can sustain its strength,* the farmer finds ere long, to his cost, that he has "over-driven his beast," that he has tasked his soil beyond its capabilities, and is fast reducing it to a state of exhaustion. During the early period of his experiments while reaping his unwonted harvests, he could not sufficiently *extol*—now that he has closed theseries, and looks upon his jaded lands, he cannot enough *decry* the use of lime.

Such is, we apprehend, the origin, to a great extent, of that diversity of opinion which exists in regard to the *utility* of lime. Were its application always judicious, and accompanied, when necessary, with an adequate supply of nutritive matters, the probability is that no such disagreement would exist. Without, however, attempting to reconcile the multifarious and conflicting theories in relation to the use of this substance, we will proceed to notice some of the most obvious modes of its action, and leave the intelligent farmer to deduce from his own experiments (for here experiments are quite indispensable) the practice adapted to his particular soil. We observe, then,

1. Lime acts as a *specific food* for certain plants; that is, it enters as a natural element into the composition of their substance, so that without its presence they cannot be grown to perfection. For the production, therefore, of these plants (as potatoes and wheat, for instance), the existence of lime in the soil is absolutely necessary. Whether any given portion of soil is destitute of this earth or not—and upon that question depends entirely the propriety of its application as a *nutritive* substance—can only be determined by analysis.

2. Lime acts with great efficiency in *hastening the decay* of animal and vegetable matters. This is the secret of its efficacy when applied to old, matted turfs, to all peaty soils, and to such lands, of whatever description, as abound in undecomposed vegetable matter. To vegetable matter in a soluble state, and to animal matters in general, being easy of decomposition, it is not deemed proper to apply this substance, its tendency being, according to Chaptal, to form insoluble compounds with almost all animal and vegetable substances that are soft, and thus to destroy their fermentative properties. Loudon also maintains, that " lime should never be applied with animal manures, unless they be too rich [?], or for the purpose of preventing noxious effluvia; and that it is injurious when mixed with any common dung, and tends to render the extractive matter insoluble."

3. Lime has the property of neutralizing any noxious vegetable acids, or metallic salts, existing in the soil; which properly indicates the fitness of its application on fields infested with sorrel, on sour, marshy lands (previously drained), and on soils impregnated with the oxide of iron, or copperas.

4. Lime acts as an *alterative*, on both siliceous and argillaceous soils, by the effect it has of giving greater adhesiveness to the particles of the former, and of diminishing the tenacity and compactness of the latter. To sandy lands, however, it should not be applied too liberally, as, if dealt out in too large quantities, it will have the effect to form a kind of mortar with the soil, and thus prove detrimental both to tillage and to vegetation. " Clay land bears this species of amelioration better than lighter soils. It powerfully assists all adhesive soils, and, when laid on hot from the kiln upon deep clay, has been known to occasion a very great increase in the former crops."—*British Husbandry*.

5. From its caustic properties, lime is a valuable assistant to the farmer in combating those numerous insect enemies which so often ruin his hopes by depredating upon his fruit-trees, his grasses, and his cultivated crops. How far he may be able to avail himself of its aid in this respect, is only to be determined by a careful series of experiments.

Finally, in the language of the work last quoted, "It is much to be regretted that some more definite judgement has not been framed regarding the properties of lime, the effects of which are exposed to the most contradictory results:" and some caution will be necessary in whatever trials may be made of it as a manure. It would be better that experiments on a small scale should precede the application of it on lands where its efficacy has not yet been proved. The quantity applied, in general practice, to the acre, varies from 20 or 30 to 100 bushels, or even more, according to the character and circumstances of the soil (the lighter and poorer the soil, and the more it has been limed, the less the quantity); and this dressing is repeated once in four or five years, care being taken to recruit occasionally the nutritive matters in the soil, without the co-operation of which, by unanimous consent, the former substance would be worse than useless. When employed without regard to its caustic properties, it should first be slacked, and then spread evenly over the surface, and if the ground be intended for cultivation, it should be exposed for several months before it is ploughed under. The effect will not commonly manifest itself before the second or third year.

Marl.

Marl being but a modification of lime combined with variable proportions of divers other substances, it may be observed, in general, that whatever principles are applicable to lime (after having been deprived of its causticity) are applicable also to the use of marl, so far as its *nature* only is regarded. We shall, therefore, treat but very briefly of this substance. Suffice it to say, that its value has been highly appreciated in Europe, and in those portions of our own country where it has been most extensively employed, and that, wherever it is practicable, (and it is highly so in many parts of Berkshire county), the strong probability is, that the farmer will find his interest in making a thorough trial of it.

The most common locality of marl is low, wet swamps. It is readily distinguished from other soils by its light-gray colour when wet, and its white chalky appearance when dry. Its whiteness, indeed, will commonly indicate pretty nearly its comparative value, since both depend on the amount of lime it contains. A surer test, however, of the amount of lime present will be, to apply to it a few drops of sharp vinegar. If the marl be worth employing as a manure, it will effervesce; that is, small bubbles will appear, occasioned by the escape of gas.

In applying marl to different kinds of soil, particular reference should be had to two circumstances; 1st. The amount of its calcareous matter. 2nd. Its texture. If the proportion of its calcareous matter be large, the smaller will be the quantity proper to be applied, and *vice versâ*. Again, if the marl be of a strong, adhesive texture, containing a large amount of clay, its application will be most profitable on loose, siliceous soils; if, on the other hand, it be of a sandy or shelly character, strong loams and clays will be most benefited by its reception. The common mode of its application is to spread it evenly over the surface, and, in case of cultivated crops, never to turn it under till it has been thoroughly crumbled down by the action of the atmosphere. The reason of this practice is thus stated by Chaptal: "It is necessary for earths, in order to possess great fertilizing powers, to be saturated with all the principles which they can imbibe from the atmosphere. Thus those which, by the depth of their beds, have been constantly secluded from the action of the air, will require to be exposed to it a longer time before becoming fertile. The lime contained in marl, as it is taken from the bed, is never saturated with carbonic acid; but after being exposed to the air, it becomes at length saturated with the acid it receives from it, crumbles and effloresces. The decomposition of marl may be hastened by frequently turning it, so as to allow the air free access to the lime; and this method is generally practiced by those who employ marl as a manure." (Page 44.)

The quantity of marl applied per acre may vary, according to circumstances, from five to twenty-five or thirty waggon loads. For a full discussion of this subject, see Hitchcock's Geology of Massachusetts, a copy of which has been lodged with the town clerk of every town in the commonwealth.

Gypsum or Plaster.

Plaster, first introduced into the United States from Paris by Dr. Franklin, has effected the most important improvement in agriculture, perhaps, that has ever been made. Extensive districts in this and other countries, have been benefited by its introduction to an extent which, considering the comparatively *small amount* of the substance employed is truly astonishing. "In Germany," says Lampadius, one of her own agricultural writers, "it may with certainty be stated that by the use of gypsum the produce of clover and the consequent amount of live stock have been increased *at least one-third.*"

"There are, however, some tracts of country where the use of plaster has been attempted without success. But this arose from its being one of the original constituents of the soil, which derived no advantage from the addition of a new quantity. The existence of this salt naturally, in those lands upon which plaster produced little or no effect, has been proved by analysis."—*Chaptal*, p. 73.

Much mystery has heretofore enveloped the *modus operandi* (mode of acting) of this manure; but before the light of science the cloud is vanishing away. Many have supposed its efficacy to arise from the *specific food* which it furnished to certain plants, as to clover, for instance, which seems to be especially benefited by its application. But when we consider that by the employing of a *handful*, as it were, of this manure, upon an acre of ground, the product is increased from a few hundreds to *tons* of grass, it is at once apparent that, on such a supposition, the cause is wholly inadequate to the effect. It was reserved for the gifted and honoured Liebig to lift the veil, and to produce a theory, not only plausible in itself, but fully sustained in all its parts by the experience of practical men.

His theory is this—that the efficacy of plaster consists in its arresting, as it rises in exhalations from the soil, or descends in rain, dew, and snow from the atmosphere, the *ammonia* which is generated by the decay of animal and vegetable matter, and appropriating it to the use of the growing crop. We will permit him to present his own views, however, in a few extracts from his "Organic Chemistry."

"Nitrogen exists in every part of the vegetable structure" (page 88). "All animal" (and vegetable) "bodies, during their decay, yield the nitrogen which they contain, to the atmosphere, in the form of ammonia" (page 72). "The evident influence of gypsum depends only upon its fixing in the soil the ammonia of the atmosphere, which would otherwise be volatilized, with the water which evaporates" (p. 85.) "In order to form a conception of the effect of gypsum, it may be sufficient to remark, that 100 lbs. of burned gypsum fixes as much ammonia in the soil as 6250 lbs. of horse urine would yield to it" (p. 98). "If a field be strewed with gypsum, and then with putrefied urine, or the drainings of dunghills, all the carbonate of ammonia will be converted into the sulphate, which will remain in the soil" (p. 184.) "If we strew the floors of our stables, from time to time, with common gypsum, they will lose all their offensive smell, and none of the ammonia which forms can be lost, but will be retained in a condition serviceable as a manure" (p. 185). But this is not all. "When we give a plant nitrogen in considerable quantity, we enable it to attract with greater energy from the atmosphere the carbon which is necessary for its nutrition" (p. 188). Now "Carbon enters into the composition of all plants" (p. 3). So that, by strewing a field with gypsum, we enable plants to supply themselves from the atmosphere, not only with nitrogen, on which their most nutritious principles depend, but also with carbon, the chief constituent of all their frame-work.

This theory is confirmed by several circumstances which have long attracted the attention of observing farmers.

1. It has been observed that plaster acts with increased efficiency when applied in connection with manures or recently manured lands. The solution of the phenomenon, by our theory, is easy and satisfactory. The ammonia, which would otherwise escape from the decomposing manure into the atmosphere, is seized upon by the plaster, detained in the soil, and wholly converted to the use of the growing crop.

2. It has been observed that plaster acts with greater power on soils which have been recently stirred than on those which have lain for a long time unmoved. Solution: By stirring the soil its porosity is increased; consequently, it absorbs more freely the dews that fall upon it, from which the plaster separates and hoards up in the soil the rich deposits of the atmosphere. In proof of the extent to which the atmosphere is charged with fertilizing matters, which the rains and dews are constantly depositing upon the surface of the earth, we will here introduce the substance of a statement made to the American editor of Liebig by Mr. E. Tufts, of Charlestown:—

"Eight years since, about three-quarters of an acre of land, situated on one side of a lane, and on a declivity, were 'broken up.' About the same time, the proprietor of a field on the opposite side of the lane, and above the land of Mr. T., commenced gardening on a large scale, and formed an 'immense bed' of compost in the lane. This heap was made up of animal and vegetable matters, and from receiving constant additions is continually undergoing fermentation, and the gases and vapours emanating from it are always perceptible. Four years ago Mr. T. observed that, in some inexplicable way, his land had become so fertile as to induce him to dispense with the use of manure. He has not used it since, and is now 'fully persuaded that its fertility is owing to certain vapours arising from the heap, and then descending on his land.' None of the soluble matters of the heap are carried to Mr. T.'s field, no manure has been applied, and its fertility continues unimpaired."—*Appendix to Liebig*, p. 366.

3. Plaster has been observed to produce but slight effects upon old, dry, and hide-bound meadows. Says Liebig (p. 87), "Water is absolutely necessary to effect the decomposition of the gypsum, and also to assist in the absorption of the sulphate of ammonia by the plants: hence it happens that the influence of gypsum is not observable on dry fields and meadows." To which it may be added, that, but a small quantity of putrescent matter existing in such cases, the exhalations are inconsiderable; and what is deposited from the atmosphere by the dews cannot be absorbed by the soil, in consequence of its compact, impenetrable surface. On old, and even dry, *pasture* lands, the effect of plaster is much greater, there being ever present on their surface a portion of manure, to serve as a basis for its action.

4. It has been universally observed that the most striking effect of plaster is on the clover crop. Reason: "Red clover contains double the quantity of nitrogen that common hay does."—*Gray*, p. 158.

5. It has occurred, in the experience of different farmers, that where one part of a field is sown with plaster immediately before a thunder-shower, and another directly after the same shower, the portion sown first was benefited in a far higher degree than the other. Reason: "Rain-water must, at all times, contain ammonia, though not always in equal quantity. It must be greater in summer than in spring or winter, because the intervals of time between the showers are greater. The rain of a thunder-storm, after a long protracted drought, contains the greatest quantity which is conveyed to the earth at any one time."—*Liebig*, p. 73.

6. Considering the beneficial effects of plaster, at large, it has been observed that they depend, in general, not so much on any peculiarity in the location or composition of soils as on those physical conditions which render the surface of the soil an easy medium for the transmission of soluble matter; all which, it is thought, must go to corroborate the theory in question.

From the views thus presented we are led to infer—

1. That the atmosphere is an inexhaustible source of food for plants. 2. That the most available agent for securing the benefit of this food to plants is plaster. 3. That, viewed in this light, the value of plaster in agriculture can hardly be overrated. 4. That it may be safely recommended for general use on all soils containing a portion of fermentative matters, and not so compact or wet as to prevent the processes of exhalation and absorption. 5. That it should always be applied to the surface of the soil, or at least within the influence of the atmosphere. 6. That it should be sown at an early date in the season, before the period of the most abundant dews and exhalations has commenced. 7. That it should always accompany manures used as a top-dressing, or only slightly buried in the ground. And 8. That it should be

liberally employed about our barn-yards, stables, vaults, manure-heaps, compost-beds, &c.; not, however, in composts, under the supposition that it will hasten the fermentation of the mass. "Davy has refuted this opinion by direct experiment, placing it beyond a doubt that the mixture of plaster with manures, whether animal or vegetable, does not facilitate decomposition."—*Chaptal*, p. 74.

The proper quantity to be used, when sown broadcast upon the field, has been decided by experience, as also by chemical science, to be from one to one-and-a-half bushels per acre.

Wood Ashes.

Ashes, whether "live," or leached, considering the certainty, uniformity, and power with which they act, as well as the permanency of their action upon vegetation, may well be ranked among the very best manures. The *fact* of this superiority over the other manures is very generally understood; the *reason* of this superiority also appears quite obvious when we reflect that they are composed entirely of organized matter, reduced to the most consolidated form, and when. further, we learn from chemistry that their chief bulk consists of the very materials which enter most largely into the finer grains and grasses. Yet, strange as it may seem, no inconsiderable portion of this priceless article is suffered to be lost to all the purposes of cultivation, being permitted to lie waste about our dwellings, and to disappear as useless rubbish. To this remark, however, we find (by going, to be sure, "a great way off" for it) one very striking exception. Even leached ashes, transported thither from every State in New England, and all the way from the Canadas, "are bought up" on Long Island "at an expense of *from* 35 to 50 *cents a bushel,* and considered a profitable investment at that."—*Cult.*, vol. 6, p. 42.

The most profitable use of this manure, when applied directly to crops, is probably on light, siliceous soils, ashes being admirably calculated, not only to improve the texture of such soils, but to furnish to them just that kind of organic matter in which they are most liable to be deficient. They may be applied, however, with certain benefit to any soil, and that either by spreading them on the surface of grass or grain lands, or by applying them to the hill or drills in the case of hoed crops. The practice of dropping a handful *in* the hill, at the time of planting, has been practised by many farmers, and with excellent results. But perhaps their highest value will be found in the compost-bed, since, being capable of liberating a large amount of nitrogen, they will greatly promote the process of fermentation. "One bushel of ashes contains $5\frac{1}{2}$ lbs. of potash, a quantity sufficient to decompose 200 lbs. of peat earth."—*Gray's Elements,* p. 318.

Saltpetre.

Saltpetre, as a manure, has been employed in the way of experiment, by several of our enterprising farmers, and, in some instances, with signal benefit to the crops to which it has been applied; its use, however, has been abandoned by the most judicious, as being more expensive than profitable. That a solution of this substance may be serviceable for soaking seed corn, has been established by the experience of many of our farmers. That it may also be employed effectually to banish the canker-worm from our apple orchards, appears from an experiment made by O. M. Whipple, Esq., of Lowell, an account of which may be found in Coleman's Fourth report, p. 335.

Considerable quantities of this substance frequently accumulate in combination with earth under old buildings, particularly barns and horse-sheds; when available, in this form, the expense of saving and applying it will always be exceeded by the profit.

Common Salt.

Common salt, "highly recommended as a manure by some, has been as much depreciated by others, and hence, when directly applied, is considered as a doubtful fertilizer by almost all. The obscurity in regard to its use, however, rests chiefly on the quantity which ought to be employed. The result of comparative experiments made in Germany showed that a very few pounds per acre were sufficient to produce a largely increased return of grass, while in England it has been beneficially applied within the wide limits of from 5 to 20 bushels per acre, and when used for cleaning the land in autumn, of 30 bushels an acre.—*Appendix to Johnston*, p. 5.

Employed in moderate quantities in composts, salt is highly promotive of fermentation; applied liberally late in the fall, or early in the spring, it is very destructive to worms and insects; used in the form of a brine for soaking seed-wheat, it prevents the smut; and it otherwise acts beneficially, by stimulating the absorbent vessels of plants, or imparting to them direct food, by preventing injury from sudden transitions of temperature, and by increasing the moisture of dry, hot soils. It has a specific effect upon "all plants of the cabbage and onion tribe; nothing is more beneficial to an asparagus bed; and it is suggested to those, who consult their interests by rearing the most valuable kinds of fruits, to try the experiment, cautiously, of applying salt or brine in moderate quantities, about the roots of their trees." (*Farmer's Cabinet.*) Whether, however, it will be expedient for the farmers to introduce this manure in general practice, even if it suit his particular soil, is wholly to be decided by a reference to its comparative expensiveness.

Charcoal.

"Charcoal," says Liebig, "surpasses all other substances in the power which it possesses of condensing ammonia within its pores, particularly when it has been previously heated to redness. It absorbs 90 times its volume of ammoniacal gas, which may be again separated by simply moistening it with water" (p. 89.) "It is by virtue of this power that the roots of plants are supplied in charcoal exactly as in humus, with an atmosphere of carbonic acid and air, which is renewed as quickly as it is abstracted" (p. 61.) Being at the same time "the most unchangeable substance known," it is not surprising that it should constitute, not only one of the most powerful, but quite the most *durable* manure in existence.

In the language of J. Hepburn, Esq., of Lycoming, Pa. (*Cult.*, vol. 9, p. 106), "As charcoal is almost indestructible, and its effects remain as long as it exists in the soil, it is possible that it may be found one of the cheapest as well as most efficient manures for some crops, and on some soils. It appears evident from the manner of its action, that plants requiring the greatest supply of nitrogen would be the most benefited by its application, and hence its efficacy when given to wheat."

Again, "charcoal has a *physical* as well as a chemical effect on soils, decidedly useful. It renders them, as far as it is present, light and friable; and gives additional warmth to them by its colour, which absorbs and retains readily the rays of the sun during the day." Mr. Hepburn also states the important fact, that "wherever charcoal has been applied *rust never affects the growing crop of wheat.*" Its use may also be recommended, on trustworthy authorities, as an excellent means of curing diseased trees and unhealthy plants. In the neighbourhood of forges, furnances, smithies, and coalpits, considerable quantities of this manure can be obtained at a trifling cost, and it becomes the vigilant farmer to see that none of it is suffered to be lost.

Soot.

This substance, consisting chiefly of geine, nitrogen, and the salts of lime, potash, soda, and ammonia, is ranked by Dr. Dana "among the most powerful of manures in the class consisting of geine and salts." He observes, "On the principles adopted for determining the value of manures, the salts in 100 lbs. of soot are equal to one ton of cow-dung. Its nitrogen gives in a value, compared with cow-dung, as 40 to 1." *Manual*, p. 161.

A most satisfactory experiment with this substance has been tried by the writer, the present year. From 2 to 3 quarts of soot, which had been collected from a fire-place the last autumn, and lain exposed to the weather through the winter, was, some time in April, carefully incorporated with the soil about the roots of an egg plumtree, which, though it had borne fruit repeatedly, had attained but a very small size, and had not in the last seven years *put out so many inches of new wood.* The result has been, that, by actual measurement, it has sent forth numerous shoots, the past season, from two to three feet long, and one to the length of 4 *feet and a half.*

Sand, Gravel, and Clay.

Pure sand and gravel, from the obvious tendency they have to separate the particles, and thus increase the porosity of a tenacious and compact soil, may readily be supposed to possess no inconsiderable influence in improving such lands, as, by retaining too much water on their surface, are rendered unpleasant and difficult of cultivation, and to a greater or less degree unfruitful. It might also be taken for granted that pure clay would be alike beneficial when employed to give solidity to such light and porous soils as are incapable of retaining manures, and exposed to suffer severely from drought.

"On sandy soils a load of clay, properly incorporated, will produce a greater, because a more lasting effect, than a load of manure. Of this the fine farm formerly owned by Judge Buel is an example. This was originally a hungry, porous sand. To give it tenacity, and a proper retentiveness of moisture, Judge Buel covered his fields with clay from the Albany clay-banks, at the rate of from 20 to 30 loads per acre, and his experience convinced him that a load of such clay (it contained from 20 to 30 per cent. of lime) was of more benefit than a load of barn-yard manure. He distributed his clay as fast as drawn, upon the sward surface, where it was decomposed by the rains and frosts, when it was pulverized by the roller, and further distributed by the harrow." *Cult.*, vol. 9, p. 45.

"Even sand upon clay, or clay upon sand, are beneficial applications to improve the soil; the only question being, how far the benefits will repay the expense of application. The earthy materials are to plants, what the stomach is to animals—the recipient of food, and the laboratory of the main process of nutrition. The presence of clay, lime, and sand, are all essential in the soil, to enable it to perform its healthful functions. Where either of these is naturally deficient, it may be artificially supplied with manifest advantage. *Cult.*, vol. 3. p. 60.

Composts.

The *absolute value* of a compost depends on the amount of food it is capable of furnishing to plants. Its value *in relation to a particular soil,* will depend also, in a measure, on the effect it is calculated to have on the *texture* of that soil. The question of profit in *making* composts at all depends upon whether by their means the farmer can incorporate with his soil any valuable animal vegetable, or mineral substances, which he might not *otherwise* appropriate to his crops with equal benefit, and at an equal expense.

One thing is certain; "nothing can be *added* to the elements of fertility by mixing animal, vegetable, or mineral matters in a compost-heap." The only questions then to be decided are, 1. Can any fertilizing matters within the farmer's reach be *better saved*—that is, *more profitably* saved, by the employment of compost-heaps? and, 2. Can any such matters be more cheaply brought into *a fitter state for the use of plants* by their means? The first of these questions, it is believed, will not, as a general thing, admit of an affirmative answer; for by following the directions already laid down for the preservation of manures, the object will be nearly, if not quite as effectually, and far more cheaply, accomplished than by resorting to composts.

The only consideration, then, if "we have thus far trod on solid ground," which can render the system of composting highly advantageous to the farmer, will be the circumstance of his having on hand such animal or vegetable matters as cannot properly, or to a sufficient amount, be decomposed in his barn-yard. Such exigency will not be unfrequent. The farmer may have the misfortune, by accident or disease, to lose a horse, a cow, or a score of sheep. These are all appropriate subjects for the compost-bed, and should never be suffered to decompose in the open air, so long as earth of any kind can be obtained to cover them, and to absorb the nitrogen which will escape during the process of putrefaction. Again, peat-earth, swamp-muck, and similar substances, in which there exists a large amount of coarse woody fibre, may be the most conveniently and most effectually reduced to a proper condition for the use of plants, in compost-beds—especially in case a large amount of these matters is required in the operations of the farm.

How, then, the question now arises, shall we most readily, and at the least expense, effect the decomposition of these vegetable matters? or in other words, how shall we convert their insoluble into soluble geine—the direct food of plants?

"Every azotized constituent of animal or vegetable organism enters spontaneously into putrefaction, when exposed to moisture and a high temperature. Accordingly, azotized matters (that is, matters containing nitrogen in any of its forms), are the only causes of fermentation and putrefaction in vegetable substances," *Liebig*, p. 230. "It is a well established fact, that the production of nitre is not necessarily dependent on the presence of animal matter; but that, under the influence of porous materials, aided by alkalies or lime, the elements of air combine and from nitric acid and nitrates." *Dana*, p. 135. Form all which it appears that three conditions are necessary for the decomposition of vegetable fibre; namely, 1. A sufficient degree of moisture; 2. A proper elevation of temperature; and, 3. The presence of some substance containing nitrogen; which may be either pure animal matter, animal manure, lime (the principal alkaline earth), ammonia, potash, or soda (the most important alkalies), saltpetre (nitrate of potash), ashes (consisting of potash, soda, and lime), common salt (chloride of sodium).

The efficiency of these substances as decomposers will probably be found to correspond somewhat with the order in which they stand; but in making from them a selection for his particular purpose the farmer must of course be guided by circumstances. Whether his interest will be subserved at all by making composts, will depend on his facilities for accumulating undecomposed vegetable matter. Whether it will quit cost to employ his stable manures in composts, will depend upon the extent to which he can secure them (solid and liquid) in his cattle-yard or in his soil, and upon the cheapness with which he can procure other decomposers; and whether he shall make use of lime, or of any one of the alkalies, or alkaline compounds, in preference to another, he will decide with reference to the comparative expense of these articles, and the idea he has of their comparative value.

If animal manure be decided upon as the decomposer, it should be employed in as green a state as possible, its decomposing power depending entirely on its nitrogen, which even an incipient fermentation will diminish. The proportion in which the manure is to enter into the compost should be determined by the species of the manure—it being recollected that urine, night-soil, hog-dung, sheep-dung, horse-dung, and cow-dung, contain different amounts of the decomposing principle (nitrogen), corresponding with the order in which they are here arranged. The common practice has been, to allow one load of manure for 2 or 3 of vegetable matter; but it has been shown that this must depend on the quality of the manure.

It is equally evident, that the proportion of *vegetable* matter should be regulated by the ease or difficulty with which it is likely to be decomposed; or in other words, by the amount of labour it will require the manure to perform. If the vegetable matter to be decomposed to peat-earth or swamp-muck, it should have a previous opportunity of parting with its tannin, acids, and excessive moisture, by exposure for some length of time to the atmosphere.

The ingredients being in the requisite state, and the proportions of their admixture determined on, the pile may be constructed as follows: First, lay the foundation (of the form, size, and depth desired) with vegetable matter—cover this to the proper thickness with the manure; and thus proceed with alternate layers of vegetable matter and manure, till the pile has acquired a sufficient height, when it should be finished (in a somewhat conical form) with a *thick* layer of earth, to prevent the escape of such volatile products as will be formed during the subsequent fermentation. If it be wished to hasten the process, lime, ashes, or salt may be added for this purpose; and, in any case, a small addition of plaster will be useful from its tendency to preserve the salts of the pile.

At the end of six or eight weeks the whole mass should be shoveled over, broken down, and carefully blended together; and in case fermentation is still proceeding, a quantity of the finer earthy materials may be added. As soon as the work of decomposition is done, it should be removed immediately to the place of its destination.

"Weeds, leaves of trees, and all the succulent plants which grow so abundantly in ditches and waste lands, under hedges, and by the road-sides, if cut or pulled when in flower, and slightly fermented, furnish from 20 to 25 times more manure than straw does. These plants, carefully collected, furnish to the agriculturist an immense resource for enriching his lands. The turf that borders fields and highways may be made to answer the same purpose by cutting it up, with all the roots and the earth adhering to them, rotting the whole in a heap, and afterwards carrying the mass upon the fields." [*Chaptal*, p. 63.]

To form a compost with lime, our late Agricultural Commissioner (Rev. H. Colman) directs to "raise a platform of earth on the headland of a field, eight feet wide, one foot high, and of any length according to the quantity wanted. On the first stratum of earth lay a thin stratum of lime fresh from the kiln; dissolve or slack this with salt brine from the nose of a watering-pot; add immediately another layer of earth; then lime and brine as before, carrying it to any convenient height. In a week it should be turned over, carefully broken and mixed, so that the mass may be thoroughly incorporated. This was applied in the hill to corn. The crop was equal to that obtained by barn manure on parts of the field immediately contiguous.—*Fourth Report*, p. 347.

In forming a compost of peat and lime, Dr. Dana recommends to slack a cask of lime with so much brine as will be saturated with a bushel of salt, and after ten days blend it thoroughly with three cords of peat, shovel it over occasionally for six weeks, and apply it directly to the soil.—p. 197.

Of the use of clear lime in forming composts, there seems to be, amongst our most intelligent farmers a considerable shyness. The result of Mr. Colman's observation on this subject was, that, in its application to peat composts, it assists in their decomposition; but its tendency is to expel their ammonia, to drive off the enriching parts of the manure, and to reduce much of the remainder to an insoluble state. Here, however, its pernicious effects may be counteracted (in part?) "where there is a sufficient covering of mould to absorb the gases, which would otherwise be dissipated in the air. Under such circumstances, its use may sometimes be advised."—*Fourth Report*, p. 349.

Mr. Timothy Benedict, of Pittsfield, in the fall of 1841, prepared a compost heat of swamp-muck and lime, by mixing one bushel of the latter with a common load of the former, taken fresh from the bed. The last spring he applied this to a portion of his corn-field, a shovel-full to the hill, treating the remainder of the field in a similar way with common stable manure. When examined by the Agricultural Committee in September, it appeared that the compost had been equally efficacious as the manure. The crop was a luxuriant one, and received the second premium of the Society.

The writer's experiments with muck and lime, however, both on gravelly and clayey soils, have proved entirely unsatisfactory; while from the use of the same quality of muck in combination with ashes, he has derived the most signal benefit.

Ashes and muck, in the proportions of four or five bushels of the former to a common load of the latter, form a very valuable compost. If the muck be in a fine powdered state, the materials may be thoroughly blended together, and applied at once to the soil. But if the muck be of a strong texture, and contain much vegetable fibre, some time will be necessary for its decomposition. Leached ashes will answer the purpose equally as well as live, if a somewhat larger proportion be employed.

To this compost too high a value can hardly be attached. A series of experiments (amounting to twenty-nine in number), instituted, the past season, by the Editor of the New England Farmer, has resulted in showing it to be second in the scale of composts only to one "composed of both the dung and urine of cattle, horses, hogs, and human beings, mixed with straw and muck," in a barn cellar. See the *Farmer*, vol. 21, p. 157.

Finally, it may be remarked in relation to compost-heaps, that the more heterogeneous their materials, the more rapid and perfect will be their decomposition—since, the greater the number of affinities brought into play, the greater will be the struggle between the particles of the mass to indulge their "likings and antipathies" in making election of their future (though it may be very temporary) associates. Let not the manufacturer of composts, then, be afraid of laying under contribution too many of the sources of animal, vegetable, and mineral substances capable of being made to fatten his plants, and to "gladden the soil."

Occasion will be taken, in concluding, simply to express the sentiment, that, would the present race of cultivators of the soil but "come to the light" which science is shedding upon their profession, and, in accordance with its teachings, put in full requisition the resources of fertility which every where abound around them, another generation would inherit from their hands a land of garden-spots, and "shout the merry harvest home" on fields where now is only heard the sad, monotonous complaint of "hard, hard times."

DRAINAGE OF ENTAILED ESTATES.

The report of the Lords' Committee, appointed on the motion of the Duke of Richmond, and of which His Grace was chairman, to inquire into the expediency of a legislative enactment being introduced to enable possessors of entailed estates to charge their estates with the expenses of draining and otherwise permanently improving the same, has been printed. The Committee expresses an opinion that "the operation of draining, properly conducted, not only tends by its immediate effect to increase the produce of the soil and to facilitate its cultivation, but also permanently enhances the value of the inheritance to all future proprietors. The committee are further of opinion, that in some cases (brought before them in the course of the evidence they have taken) the full advantage to be derived from thorough draining cannot be obtained without the erection of farm buildings suitable to the improved state of the land drained. The Committee also wish to add their conviction that a more general extension of good drainage throughout the country is highly important, as calculated to prevent disease and improve the general health of the community. It is certain, however, that the attainment of these benefits is in many instances prevented, in England and Ireland, by the natural reluctance of proprietors to expend capital upon the permanent improvement of land in which they have only a limited or partial interest." The Committee proceed to state that the legislature had already recognised the propriety and importance of enabling parties with limited estates to charge the inheritance under certain regulations with money expended on permanent improvement by drainage, but that the apprehension of great delay and expense, consequent on proceedings under the 3rd and 4th Victoria, c. 55, had deterred persons from taking advantage of the enactment. They then propose a mode of carrying out the object at a small expense.

One of the witnesses examined by the Committee was Sir C. M. Burrell, Bart., M.P., whose evidence we subjoin:—

Die Veneris, 16° Maii 1845.

The Duke of Richmond in the chair.

Sir Charles Merrik Burrell, Baronet, a Member of the House of Commons, examined as follows:—

1413. You reside in the County of Sussex, in the neighbourhood of Horsham?

At Knepp Castle, where I have a large farm of nearly 1,200 acres, in the parishes of Shipley and West Grinstead, in my hands.

1414. You have been in the habit of using Pearson's draining plough?

For several years.

1415. Will you state to the committee the particulars of your practice as regards that plough?

I have put it down on paper.

The same is delivered in, and read as follows:—

Pearson drainage, suitable only to pure clay not infested with surface stone.

Tiled drains and outfalls thus used, instead of the common practice, are laid by hand thirty inches deep, with good fall into the open ditches, above which the plough drains go twenty-four inches deep at three cuts.

The mains on an average from twenty to thirty rods apart, at nearly right angles to the plough drains intended to be made with Pearson's plough, the distance varying according to the evenness or unevenness of surface mains being requisite in such parts as are lowest.

The plough drains are best and truest made down the furrows at half rod or eight and a half feet distances apart, and greater depth is thus obtained than if made in any other direction.

Before commencing making the drains and outfalls, the open ditches should be perfected to a depth, and with such a fall as to ensure the passage of the accumulated waters from the under drains; and this is to be looked to at the commencement of every winter, for if choked by leaves, or parts of the banks be scratched down by rabbits, the water in the under drains will be forced back, and find vent at the surface, like springs; and thus opportunity offers for directing the water for the supply of ponds very usefully, by means of an under drain from the open ditch to the pond, stopping the open (or carrier) ditch temporarily.

For pasture land the plough drains are usually made ten feet apart and eighteen inches deep, done at two cuts by varying the irons which succeed the use of the horn share; and the mains and outfalls should be made twenty-four inches deep.

Little, if any, manure escapes through the land in either case, as evidenced by the purity of the water flowing (even full tile) into the open ditches from the outfalls, clear as if filtered, thus proving the vast superiority of under draining over surface draining.

By this economical system of drainage (to be done preferably before the frosts commence) top water is rapidly removed, the land becomes capable of being much earlier worked in spring, the fertility is increased, and, being well farmed, it very much improves in colour and friability after the first four years cropping, subsequent to which the Deanston plough has been safely worked across the drains, and the increase in produce of all kinds after the Pearson-plough drainage has invariably become very remunerative, and as regards wheat especially. On my farm the produce, on the average (according to the nature of the land), has (since I commenced, about twelve years since) increased from two to three sacks per acre, viz., from an average of five sacks, preceding the drainage, to seven and eight sacks per acre, and in some instances to even nine sacks per acre; and in 1843 one field produced three well-loaded waggon-loads of red clover per acre; and I have succeeded in obtaining not only very fine crops of white Belgian cattle-carrots, but very good Swede turnips also, and this in a district where, when I first took land in hand in 1803 and 1804, no farmers in the neighbourhood attempted to sow turnips of any kind, except in their gardens for domestic use.

Of the permanence of Pearson's plough drains (made on suitable clay soils) I entertain the most favourable opinion, as does Mr. Thomas Law Hodges, formerly M.P. for West Kent, through whose friendly aid and advice I adopted the Pearson system, as may be seen in a small pamphlet he wrote, and may be had of Mr. Ridgway, Piccadilly.

In proof of the soundness of that persuasion, I, by the advice of my bailiff, caused more mains to be added on a field of eleven acres of arable, of which, being one of the first done, the mains had been made forty rods apart, which practice proved to be too wide from each other to ease the plough drains, which, from thus being overcharged, broke up in spots during heavy rains like springs, which inconvenience was effectually cured by making more drains, in the construction of which, when the plough drains were intersected after ten years' use, they were all found as perfect as when first made.

Of the pastures (inclusive of West Grinstead Park, naturally very wet, though drained by hand with frith or bushes several years since, at much expense), their soundness generally remarked by foxhunters, has been greatly improved, and likewise the herbage stock, including deer and sheep, doing well, and scarcely ever being liable to the rot, which was a very common occurrence previous to the Pearson drainage; and from its extent the health of my farmers and cottagers, with their families, has been much improved, so that agues, which had been common, no longer prevailed, and low fevers also have greatly diminished; and as regards stock they can beneficially be earlier turned out in the spring, and remain several weeks longer out in the autumn on the pastures, than previously.

The calculation of the average cost of the Pearson drainage, according to my bailiff's full consideration, amounts to 2*l.* 10s. per acre.

		£	s.	d.
1. Amount of arable land so drained	600 acres cost	1,500	0	0
2. Amount of pasture land drained, at £1 15s. per acre............	250 acres cost	437	10	0
Acres	850 total cost	1,937	10	0

1416. The country you live in is a clayey wet soil?

It is a very yellow clay; the subsoil is a very good brick earth. I have in the centre of my property a tile and brick yard, in which I make very good bricks and very good tiles of all kinds.

1417. Do you consider it a permanent improvement to farms to have good roads and access to them?

No doubt.

1418. Do you think it is a permanent improvement to have good buildings upon farms?

No doubt; in proof of that I have laid out a very large sum of money upon my estate, and I believe I may venture to say, without presumption, that no estate in the county of Sussex is in better order than mine, with regard to buildings of all descriptions; it has been my pride as well as my satisfaction to do it. I wish to make the cottages and farm-houses as convenient and as comfortable as they ought to be, in a reasonable way. I have adopted a plan with regard to the drainage of cottages, which I find very beneficial indeed. Whenever I have to build a new cottage, or to take up the floor of an old cottage, I use broken stone and broken bricks, and make a drain from the fireplace directly through the room, and also across any room adjoining, to an outfall where the drain runs into it; and we find the cottages are made very dry by it, and very much more healthy. It is a thing of very trifling expense. I have mentioned it to architects two or three times, who have all thought it a very good thing, observing that they had never heard of it before, but should recommend it in future. Alluding to the question of the committee relative to good farm buildings and other permanent improvements, I beg leave to offer to the consideration of the committee, that no greater improvement of entailed property would be attained than by the passing of an Act of Parliament for the purpose of enabling persons having life interests in entailed estates (with the consent in writing of their trustees or the majority of them) to convert timber (allowed by the testators to be cut for the purposes of the repairs of such estates) by sale into more substantial materials, as stone, brick, slates, tiles, iron, lead, cement, &c., instead of their being, by the stringency of legal and literal construction, forced to apply the timber itself in necessary repairs, an absurdity self-evident, when, as on most estates prevailing, houses and cottages, barns, cart stables, and other farm buildings, originally built of stone or brick, require solid repairs by appropriate materials. Contrary, however, to common sense, and contrary to the benefit of entailed estates, and the essential interests of the heir more especially than the owner for life, such are the prejudicial opinions of persons learned in the law. So that without some Act of Parliament giving a wider latitude, and at the same time a latitude of construction favourable to all parties interested in such entailed estates, no trustees will run the risk of sanctioning such conversion of timber, even with the consent of the next heir; for were he to die, the future heir might call their decision in question. In stating this I disclaim any interest for myself, while I add that I have been subject to the hardship of this legal construction (though my son was consenting to the proposed conversion of timber); but having lived to put my wishes of permanent repairs, even to rebuilding or adding to farm-houses, into general execution, what I now say is for the benefit of other estate holders similarly situated; and I earnestly hope it will be deemed worthy of the consideration of the noble lords now sitting in committee, and may by their means lead to some beneficial enactment.

1419. Do you think the tenantry generally are aware of the great importance of draining?

They are beginning to be aware of the superiority of the Pearson plough drainage in our district, compared with the old bad practice (as I presume to call it), according to my views and practical experience, the mole plough; for I am confident that when you squeeze nature out of its position, nature has the power, by means of the frost and wet that passes into the land, of squeezing it back again into its original position, and that the mole plough drainage never can answer for any length of time on plough land; but the tenants cannot be expected to drain land in so permanent a manner as the Pearson drainage, unless their landlords allow them a valuation for it, should they quit their holdings during from fourteen to twenty-one years, when they have no leases, or the landlords give tiles and put in the mains and outfalls for them.

1420. Are you acquainted with many entailed estates in this country, that would be the better for being properly drained?

Mine is an entailed estate; but I have done it out of my own pocket, considering it more advantageous for my son to succeed to property in thorough good order, rather than to extend the acreage.

1421. Do you pay the whole expense of the draining yourself, or do you pay a part only, and the tenant the other part?

I have been speaking of my own farm. With regard to my tenants, I made an offer to them to give tiles to all that would adopt the Pearson plough drainage for the drains and outfalls; and now that I am making pipe tiles, I shall very likely extend that gift to them wherever they will do it in an efficient manner.

1422. Can you account for the fact of entailed estates in England not being thoroughly drained?

Because in my opinion people have not the money to spare, or they have not the disposition to spare it.

1423. Or is it that they do not estimate draining quite so highly as you do?

Every man of common sense that sees anything and knows anything of country affairs in wet districts, cannot fail to acknowledge the great advantage of drainage. I am satisfied that the corn grown in the country may be increased three-eighths by good drainage.

1424. And that in stiff heavy soils?

Yes. I have stated that where I used to grow upon the average five sacks of wheat an acre in the clay district of the Weald of Sussex, I have been growing, according to the nature of the land, from seven to eight, and in a few instances nine sacks an acre: in one case, I believe, there was a field which produced a full load of ten sacks.

1425. You have employed a very large number of people in this draining?

Yes; that has been a very great inducement to me to do it, because it has kept the poor off the parish. I have employed sometimes two ploughs going; and the work that each Pearson plough will do at a fair morning's work, will require twenty-two hands to fill it up by night.

1426. How many horses do you put to this plough?

I should say that six horses would do it with ease; but they tread the land much deeper when they strain hard, and I generally put eight horses, because they go lightly over it, doing the work with greater ease, and in consequence not treading deep or injuring the land. I always recommend, if it can be done, to have the plough drainage completed before the frost sets in, and the doing it upon old clover leys, so that the treading may signify as little as possible, the frost taking it out afterwards very much; and then I usually give the land a summer fallow, thus doing away with any ill effect by treading.

1427. Is it not one of the objections the people generally have to draining ploughs, that it poaches the land very much, and therefore hurts a great deal of land by puddling it?

The farmers thought it would at first, and that the surface water would not find its way to the under drain; but they were surprised to see that where the drain ran, and where the horses had trodden on each side thereof, it generally was soonest dry on the surface, proving that the water found its way to the drain laterally and perpendicularly also.

1428. Do you think, from what you know of the owners of entailed property, that if they were enabled to charge their estates for the expenses of draining and other permanent improvements, to be paid off in a certain number of years by annual instalments, they would avail themselves of an Act of Parliament giving them that power?

I think some would; but I think they ought to have the approbation of the next heir, if of age, for I consider it would not otherwise be quite just, because it might involve him in pecuniary difficulty, for he might be a man with a large family, and might find himself in very straitened circumstances for a few years, in the first instance. I think it is a matter for consideration whether there should not be some check upon it. I think it is a very advisable measure, provided it is properly guarded.

WAKEFIELD FARMERS' CLUB.

At a meeting of this club, which took place on Friday the 18th Aug., Mr. HEANLEY read the following paper :

" Steam power is one of the mighty agents which has advanced the manufacturing, the mining, and the maritime interest of our country to its present proud position. Why is not the same powerful assistant applied to agriculture ? The use of machinery in agriculture is to produce a cheaper description of labour, with the advantage of enabling the farmer to expedite all his operations by a cheaper management than can be effected by manure or horse power. To show the necessity of that principle, look at the advantage the farmer derives in erecting a threshing-machine to work by horses; but now let us look at steam power, and you will find a great saving can be effected by using steam for threshing, grinding, chopping hay or straw, and steaming food for cattle:—1st, On thrashing corn by steam power, the saving is 2d. per load, for if wheat costs 5d. per load by horse power, it can be thrashed for 3d. per load by steam; a fact I am enabled to speak to from experience the last two years. Another advantage is, a portion of the crop might be threshed out immediately as it is carried from the field. The ancient practice was to thresh out the whole of the grain before it was removed from the field, and this custom would probably have still remained had it been practicable. In the present state of harvest-work such an operation is altogether impossible, because your horses are otherwise engaged, and manual labour could not do it, however great the advantage might be. It would lessen the amount of loss of corn, for loss must necessarily be incurred in building stacks and taking them down. It would lessen the amount of labour in carrying the corn, for it would be taken from the field to the threshing-mill, and would enable the farmer to bring a large portion of his new corn earlier into the market; and it would be also when it contained the greatest quantity of nutritious matter. It has been ascertained by numerous experiments that wheat carried immediately from the field is of greater bulk, or measures better than at any other time, and in this respect is in the most profitable state for selling upon the general average of years. It appears, from the experience of practical farmers, that corn when kept in stack for several months loses a great deal, and the quantity of meal or flour is seriously diminished. This is a fact with which every thinking farmer is acquainted, and, however strange it may appear, is almost totally overlooked or neglected; and the common excuse practical men make is, that the value of straw would be deteriorated if not given to the cattle as it is threshed; but the excuse is inadmissible, for the straw being made into large stacks immediately it is threshed out, it would keep as well when built into stacks with the corn in it unthreshed. I am aware there is a tenacity to old customs, and also a feeling of pride in the show of having an old corn stack or two left over-year. By the application of steam thrashing the farmer would have it in his power to sell his corn at the time it fetches the highest price, and this could only be partially done by the application of horse-power.

The advantages are as follows :—1st. The cost by steam-power being much cheaper than by horse-power, in some cases nearly half. 2nd. You can always have a supply of meal without being dependent on the miller. 3rd. I grind all the small corn and seeds of weeds, which is of little value unground, but when ground makes good flour for pigs. 4th. I have always less loss in waste of grinding, for when sent to a mill the waste is about 2lbs. per bushel. 5th. The engine and works are so easily managed, that any farm man or labourer can superintend the work, and the cost of dressing and keeping in order the mill-stones is very trifling, say about 6s. per year. 6th. By chopping the hay and straw you give to the stock kept in the yard, a great saving is effected : many are of opinion that straw for bedding is better cut, of course into longer lengths than for fodder, as the manure is fit for use much sooner than it could if not cut. 7th. Another great advantage arising from steam is, that the spare steam, after working the engine, may be easily applied to the steaming of food for cattle.

I make the difference in cost of steam thrashing and that done by horses as follows :—

BY STEAM-POWER, SAY

	s.	d.
3 men at 2s. per day	6	0
2 women at 1s. ditto	2	0
2 lads at 6d. and 8d. ditto	1	2
Oil for machine and engine	0	10
Coals and slack for engine fire	1	6
Allow for wear and tear	3	6
	15	0

Thrashing 60 loads per day would be 3d. per load.

BY HORSE-POWER :		s.	d.
3 men at 3s. per day		6	0
2 women at 1s. per ditto		2	0
2 lads at 6d. and 8d. ditto		1	2
Oil		0	4
8 horses at 2s. ditto		16	0
	£1	5	6

Which makes it cost a fraction more than 5d. per load for 60 loads of 3 bushels.

	£	s.	d.
The cost of an engine and thrashing-machine, fixed ready for work is	125	0	0
The cost of horse thrashing-machine, &c., about	90	0	0
Extra cost of engine	35	0	0

Mr. C. H. JOHNSON expressed great pleasure in having had the privilege of listening to a subject so highly interesting; and more particularly its having been so clearly stated rendered it practically useful, and coinciding with his own views, he having paid some attention and spent a little thought upon it.

Mr. JNO. DAWSON thought, if steam could be applied to farming purposes in this way, it would be highly advantageous. He could easily conceive that corn thrashed as it comes in from the field would be more in quantity, because it contains more moisture than when it has been in the stack for a length of time. He also noticed the advantages of steaming food for cattle, as dry food is apt to disturb the stomach, and by grinding the corn for horses and cows, they would derive more sustenance from it.

Mr. ANDREWS, of Kirham Lodge, said—I feel much pleased in having heard the remarks which have been made by the preceding speakers; it really appears to me that the advantages of using steam in farming are very great. I calculate a horse cannot last on an average above fifteen years, whilst an engine with moderate care will last one hundred years. Horses, whether working or not, are expensive in their keeping; but when an engine stands still, it is costing nothing. The small boilers you have named I have no doubt would do the quantity of work you state, but it is best to have your boiler large enough, there being then less risk. A four-horse engine will do more work than eight horses—I mean yoked at the same time—for they never are all of one mind for pulling together, whereas an engine is steady in its work, and its whole energies are applied at once. I recollect once employing eighteen horses to do some work; that is, six at a time, in three sets, relieving each other as they required; but it proved tiring work. I put up a six-horse engine, and it did the same work well. Ten per cent. upon the first cost will keep an engine in repair, which works every day for twenty years; but the cost of those used for farming purposes, as has been stated, may be about seven per cent.—say five per cent. for the outlay of capital, and two per cent. for wear and tear. Another point worthy of remark is, that where steam power is used for thrashing, should corn be required for market, it need not stop the regular operations in the farm, as the horses need not be taken off their work. At some periods of the year this must be highly valuable, as your other works are proceeding, and you may thrash corn to a very large extent in a short time. In whatever way you employ steam power, it is the cheapest and best way of getting work done, and done well; but I believe a locomotive engine may be made to do all that has been said of the stationary one, and will no doubt be the best for farmers. It could be applied in various places. Take it into the field when the corn is ready, and thrash it out. Use it for irrigation, by having a supply-pipe that could be lengthened as wanted, and work it in a semicircular manner until a field is well watered; or apply liquid manure in the same way. May I now be permitted to make a remark ar two, which may justly be deemed a digression from steam? I was very glad to hear of the efforts you are making to get the meeting for 1846 of the Yorkshire Agricultural Society to Wakefield. This is decidedly the best way to raise farming in this neighbourhood, as very small farmers would be able to benefit by the exhibition, and to them it would be a stimulus to exertion so much wanted. Although this is wandering from steam, I could not help expressing my great pleasure.

Mr. WHITTAKER, of Osset, said he could not help concurring in the views already expressed, but thought the advantages would be to parties who occupied not less than 150 acres of land.

Mr. GREAVES, Solicitor, fully concurred in the observations of the gentlemen who introduced, and also those who had since spoken on this subject. His attention had been for some time devoted to the application of steam for such purposes as splitting beans, and grinding and cutting corn for their colliery horses.

Mr. JNO. MOORE, of Moorhouse, said he was of opinion that farmers of smaller quantities that 150 acres might apply advantageously steam power, employing an engine of two horse power. He so fully approved of steam, that he was now erecting an engine and thrashing machine of an improved kind, and would continue to make such improvements as circumstances and observations might dictate.

Mr. WM. BARRATT, of St. John's, said—to me this has been a rich treat, to hear a subject so ably treated which promises fairly to aid the farmers of Britain so much as the application of steam power is very likely to do in many ways. What has contributed so much to England's present elevated position as a commercial country as the application of steam to manufactures? Her sea-girt island—a mere speck in creation—could soon manufacture enough of goods to supply the world; and I say success to the manufactures of England! because, amongst other benefits to be derived from them, an extensive trade is sure to benefit farmers in the prices and demand for their produce; and, again, we want all the auxiliaries we can for the farmers, to help them to contend with foreign countries in the raising of grain. I do not wish it to be understood that I think steam power can do proportionately as much for the farmer as it has done and is capable of doing for the manufacturer and the traveller; but that, if connected with other improvements, it will enable the farmer to triumph over the threatening aspects from free trade in corn. Let, I say, the dormant energies of the country be roused on this point, and, I repeat, farmers have nothing to fear. I am not an enthusiast on steam farming, but just contemplate steam thrashing, grinding, crushing corn and malt, and cutting straw and hay for cattle, saving at least 15 per cent.; keeping horses and cows, and feeding cattle, and steaming fodder, say 10 per cent. more. Causing less horses to be needed is another saving, as well as cutting turnips for cattle and sheep. Steaming food for cattle is yet but very partially practised, but is highly deserving of universal application. The mouldy hay, or weather-injured straw, by steaming, have the deleterious properties quite removed, rendering the food more easy to digest, removing all the danger arising from giving dry or even wetted chop to cattle. I have no doubt steam will, ere long, be generally applied, and I think the sooner the better.

The following resolution was then put from the chair and carried unanimously—"That in the opinion of this meeting Mr. Heanley has treated this subject in a very lucid manner, practically illustrated its uses, and clearly shown its advantages to the farmer, and that a vote of thanks be given him for introducing a subject which has so highly interested the meeting."

LINCOLNSHIRE AGRICULTURAL SOCIETY.

The meeting of this society was held at Sleaford on Thursday the 28th Aug. The following is a list of the premiums:—

HORSES.

To the owner of the best stallion for getting hunters, 10*l.*; Mr. Henry Marfleet, of Boothby, for his hunting stallion "Plantagenet." Two other competitors.

For the best hunting mare and foal, 5*l.*; Rev. Basil Beridge, of Algarkirke. Six other competitors.

For the best three years' old hunting colt or filly, 3*l.*; Rev. Basil Beridge, of Algarkirke. Five other competitors.

To the owner of the best stallion for getting draught horses, or horses for farming purposes, 10*l.*; Mr. Joseph Eno, of Long Sutton, for his black stallion "Competitor." Seven other competitors.

For the best cart mare and foal, 5*l.*; Mr. Robert Graves, of Bloxholme. Two other competitors.

For the best two years' old cart colt or filly, 3*l.*; Mr. Israel Brice, of Risby. No other competitors.

A sweepstakes of one sovereign each for the best two-year-old hunting colt; Charles Allix, Esq. Two other competitors.

CATTLE.

For the best bull of any age, 10*l.*; William Hutton, Esq., of Gate Burton.

For the second best bull of any age, 5*l.*; Mr. Fras. Iles, of Barnoldby-le-Beck. Five other competitors.

For the best bull under two years old, 5*l.*; Mr. Paul Francis Pell, of Tupholme.

For the second best ditto, 2*l.*; Mr. Paul Francis Pell, of Tupholme. Four other competitors.

For the best bull calf under one year old, 3*l.*; Mr. Joseph Brothwell, of Braceby. Four other competitors.

For the best milch cow, having produced a live calf in the year 1845, 5*l.*; J. B. Stanhope, Esq., of Revesby.

For the second best ditto, 2*l.*; Mr. Richard Dudding, of Panton. Four other competitors.

For the best milch heifer under three years and six months old, having produced a live calf in the year 1845, 5*l.*; Mr. Thomas Moses, of Stenigot.

For the second best ditto, 2*l.*; J. B. Stanhope, Esq., of Revesby. One other competitor.

For the best heifer under two years old, 5*l.*; Mr. Chas. Marfleet, of Bassingham.

For the second best ditto, 2*l.*; J. B. Stanhope, Esq., Revesby. One other competitor.

SHEEP.

For the best ram of any age, 10*l.*; Mr. W. Abraham, of Barnetby-le-Wold. 12 other competitors.

For the best shearling ram, 5*l.*; Mr. W. Abraham, of Barnetby-le-Wold.

For the second best ditto, 3*l.*; Mr. W. Abraham, of Barnetby-le-Wold. 5 other competitors.

For the best two-shear ram, 5*l.*; Mr. W. Abraham, of Barnetby-le-Wold.

For the second best ditto, 3*l.*; Mr. Edw. Clarke, of Canwick. Five other competitors.

For the best three-shear or aged ram, 5*l.*; Mr. Edw. Clarke, of Canwick. Four other competitors.

For the best pen of six ewes that have reared lambs and given suck until the 10th day of July, 5*l.*; Mr. Bryan Millington, of Asgarby. 1 other competitor.

For the second best ditto, 2*l.* No competitor.

For the best pen of six gimmers, 5*l.*; Mr. W. Abraham, of Barnetby-le-Wold. One other competitor.

For the second best ditto, 2*l.* No competitor.

PIGS.

For the best boar, large breed, 3*l.*; Mr. John Frudd, of Bloxholme.

For the second best ditto, 2*l.*, Kev. Basil Beridge, of Algarkirke.

For the best boar, small breed, 3*l.*; Mr. C. Fountain, of Carrington.

For the second best ditto, 2*l.*; Mr. B. Millington, of Asgarby. Six other competitors.

For the best sow, large breed, 3*l.*; Mr. John Frudd, of Bloxholme.

For the second best ditto, 2*l.*; Mr. R. M. Lunn, of Lincoln. Three other competitors.

For the best sow, small breed, 3*l.*; Mr. Anthony White, of Sleaford.

For the second best ditto, 2*l.*; Mr. Chas. Fountain, of Carrington. Six other competitors.

For the best litter of sucking pigs, quantity and quality considered, 2*l.*; Mr. T. B. Shelcock, of Hose, for seven sucking pigs, aged seven weeks. Two other competitors.

To the owner of any extra stock of great merit, a sum not exceeding 5*l.* J. B. Stanhope, Esq., of Revesby, 10s., for his roan Cow, "Adelaide," aged three years and five months; 10s. to ditto, for a red-and-white Heifer Calf, "Adeliza," aged nine months; 10s., to ditto, for a roan Heifer Calf, "Beauty," aged seven months.—Mr. Thomas Moses, of Stenigot, 10s., for his Heifer Calf, aged ten months. Mr. Thorpe Smith, of Barkston, 1*l.*, for his five-shear barren Ewe; 10s. to ditto, for a three-shear Ram.—Mr. Edward Dawson, of Great Hale, 10s., for his Heifer in milk, aged five years.—Mr. Edward Newbett, of Sleaford, 10s., for his roan Heifer, aged three years and nine months.—Mr. Bryan Millington, of Asgarby, 10s., for his Shearling Ram. Six other competitors.

For the Labourer in Husbandry, who has brought up the largest family without parochial relief, 8*l.* The premium to Samuel Evison, servant to Mr. W. Cropper, of Minting, with whom he has lived thirty years, and brought up and placed out thirteen children.

For the Waggoner who has lived the longest time with one family, and who has never returned home intoxicated with his horses, 5*l.* The premium to Henry Skakleton, servant to Mr. J. Greenwood, of Blankney, with whom he has lived eighteen years, seventeen of which he has been waggoner. Two other competitors.

For the Servant in Husbandry, being a single man, who has lived the longest time in the service of one family, not less than five years, 4*l.* The first premium to William Bell, aged forty-three, has lived in the service of Mrs. Evens, of Lincoln, for eighteen years. For the second premium, 2*l.*, to James Metheringham, aged thirty-five, has lived with Mr. Thomas Lee, of Barkstone, eleven years. One other competitor.

For the Servant in Husbandry, being a single woman, who has lived the longest time in the service of one family, not less than five years, 3*l.* The premium to Elizabeth Brackenbury, has lived with the late Mr. R. Smith, of Wigtoft Asperton, 29 years. The premium of 10s., with excellent character, to Elizabeth Donson, has lived with James Kerchivall, of Wellingore, 13 years, having previously lived nine years with the Dean of Lincoln.

For the Shepherd who has reared, during the present year, the greatest proportionate number of lambs from any number of ewes, not less than 200, 5*l.* The like, where the number of ewes shall be under 200 and not less than 80, 3*l.* No competitors.

For the best new invented or improved Implement or Implements, for the pupose of agriculture, simplicity and cheapness considered, to be given in two or more prizes, at the discretion of the judges, 15*l.* The show of implements was the best ever seen in Lincolnshire, and the judges regretted they had not more money to distribute.

The judges divided the 15*l.*, amongst the implements, as follows:—2*l.* 10s. to Mr. R. Hornsby, of Grantham, for his improved ridge manure drill, and 1*l.* 10s. for his improved corn dressing machine; 3*l.* to Messrs. Crosskill, for their clod-crusher and improved one-horse carts; 3*l.* to Messrs. Barrett and Ashton for their improved iron ploughs and harrows; 2*l.* to Mr. Grant, for his horse-rake and his improved plough and paring plough; 1*l.* 10s. to Messrs. Smith and Co., for their chaff-cutter and horse-rake; 1*l.* 10s. to Mr. Revill, for his cake-breaker and bean-mill, and also for his corn-dressing machine; and 1*l.* to Mr. Anthony White, for his large assortment of agricultural implements.

CURE FOR POTATO ROT.

TO THE EDITOR OF THE EXETER FLYING-POST.

Sir,—The great importance of this root, one acre of which will feed more people than three of wheat, makes the present blight a matter of national interest. It seems, from the reports, to be not merely an aggravation of the old potato disease; but a peculiar rot, occasioned by the extraordinary wetness of the season.

The old disease has engaged much of the attention of agricultural chemists: and I may have something to say about it, when satisfied with the information collected: but this rot is advancing with such alarming rapidity, that no time is to be lost in attempting to arrest its ravages; leaving the experimental confirmations and improvements to be going on in many places at once.

Amongst the most effectual preventives and correctives of putrefaction, are chloride of lime, and salt; both quite wholesome, and consisting of elements suitable for manure. For arresting the decay in the ground, a mixture of these—say 1 cwt. chloride of lime and 3 cwt. salt per acre, may be strewed around the plant, and immediately covered in (for daylight kills the chloride of lime). Or if the weather should happily become dry, it may be applied liquid, at the rate of 1 gallon of water to 1 lb. of the mixture, upon soil so wet as the present.

Potatoes dug apparently sound, and subject to rot afterwards, may be first washed in water, and then steeped in the above solution twelve hours (perhaps less time will be found to do). The same liquid will do for many quantities of potatoes, by adding more of the mixed salt and chloride, as they absorb it out: for which the taste may be a sufficient guide.

The salt should be clean, such as is sold about 1s. 6d. per cwt., for agricultural purposes: foul salt would exhaust the purifying quality of the chloride. The chloride of lime (bleaching powder) should be of the very best quality, which is the cheapest for use, as it is a perishable article. The salt should be well mixed with the chloride first, as the latter is apt to curdle in water alone: and no iron or metal of any kind should touch it, either in mixing or in solution, as metals quickly exhaust its qualities. Yours, Sir, &c.

Plymouth, Aug. 26th, 1845. J. PRIDEAUX.

IMPEDIMENTS TO GOOD FARMING.

TO THE EDITOR OF THE NORTHAMPTON MERCURY.

Sir,—Your late correspondent (Amicus) has expressed his opinion on the present mode of cultivating the soil, and has made some very pertinent remarks on the advantages of what is generally called "good farming." Now there can be but one opinion as to the benefits to be derived by the community in general from the adoption of the best modes of cultivation, in order that we may be liberally supplied with all the numerous productions of our native soil; and nearly every one who writes on the subject, and also those who publicly express their opinions at the various agricultural meetings, seem to have come to the conclusion, that the only security to the farmer is to be found in the increased production of the land he occupies. Permit me, sir, through the medium of your columns, to state some few of the barriers which have a tendency to prevent the adoption of the best modes of cultivation.

1st.—The great want of good homesteads attached to the locality of the farm.

No person can carry out the system of soiling and stall-feeding cattle, in order to increase the quantity and quality of the manure, unless he has convenient premises for the purpose; good sheltered yards and stalls for beasts are indispensable requisites for the profitable wintering of cattle; but we find very few farms with these advantages. Let any one ride through some parts of this county, and he will find that it is absolutely impossible for farmers to make the best of their cattle with their present badly-situated yards and scanty means of wintering cattle. Many a man cultivating two or three hundred acres of good land is obliged to put up with the daily inconvenience of a homestead probably not more than sufficient for half the land he occupies.

2nd.—The great want of draining the land, still evident in many parts of the country.

It is admitted by every one who has cultivated strong wet land, that before any permanent improvement can take place in the land, it must be well drained; and it is in vain to expect any profitable occupation from this description of land until the water has been drained out of it. This is a very expensive process, and requires considerable capital to be expended on the land, and the return is not immediate, but must be refunded in future years. This, therefore, is a question in which the landlord and tenant should mutually unite. Both parties would be greatly benefited; the former in the increased value of the freehold, and the tenant in the proportionate value of the land for occupation. There are thousands of acres of land, which are yielding but little rent to the proprietors and less profit to the occupier, which would, if well drained, probably be very useful corn-growing land.

3rd.—The prejudice that exists among many proprietors against the ploughing up of inferior grass land.

The present production of this description of land is very small indeed, and is only in many cases useful for occupation seven or eight months in the year, and then yielding but little return in the shape of cattle or sheep; as such alone it is scarcely worth cultivation, and I have no doubt would, if drained and ploughed up, give an increased rental, a much more profitable occupation, and cause a threefold greater demand for labour.

But I find I shall get beyond the limits of a letter for your columns, and shall defer any more remarks to some future time. I believe that, let the farmers of the present day have fair play, give them good homestalls, let the landlord assist them in well draining the land that may require it, let them have liberty to stick the plough in that land which is suitable for corn, and produces now little else but thistles, water grasses, and moss, and I have no doubt that in despite of all legislative enactments, corn laws or no corn laws, there remains still in the sons of the soil a spirit of enterprise, blended with activity and steady perseverance, that would cause "the earth to bring forth its increase."

I remain, sir, yours truly,

A MEMBER OF THE NORTHAMPTONSHIRE AGRICULTURAL BOOK CLUB.

August 20, 1845.

FARMERS' CLUB HOUSE.

At the monthly meeting of the committee, held on Monday the 4th of August, present: (Committee of Management) W. Shaw, T. Knight, W. F. Hobbs, R. Baker in the chair, the following gentlemen were elected members :—

Colville, C. R., M.P., Duffield Hall, Derby.
Gedney, J., Redenhall, Norfolk.
Hall, Richard, Cirencester.
Knott, John M., Madge-hill, Worcester.
Mew, W., jun., Rochford.
Neame, Frederick, Canterbury, Kent.
Rainbow, J. R., Guildford Lodge, Surrey.
Simmons, James, Haslemere, Surrey.
Skerratt, G., Sandbach.
Spottiswoode, Andrew, Broom Hall, Surrey.
Symons, Henry, Whipperton, Devon.
Wakeling, George, Chelmsford.
Wood, Charles, Longford, near Maldon.

The following subjects were selected for discussion at the monthly meetings of the club :—

Oct. 6. Upon the best method of Storing and Preserving root crops, by Mr. R. Baker.

Nov. 3. Tenants Rights, as between Landlord and Tenant, by Mr. W. Shaw.

Dec. 8. Geology, as connected with Agriculture (continued from June 2, 1844), by Mr. R. Baker.

ON MANURES.

FROM LAW'S TRANSLATION OF BOUSSINGAULT'S WORK ON "RURAL ECONOMY," PUBLISHED BY H. BAILLIERE, 219, REGENT STREET, LONDON.

Animal Excrements.

Horse-dung.—The composition of horse-dung would lead us to infer that its action must be more energetic than that of cow-dung. Nevertheless, agriculturists frequently consider it as of inferior quality. This opinion is, even to a certain extent, well founded. Thus, although it be acknowledged that horse-dung covered in before it has fermented yields a very powerful manure, it is known that in general the same substance, after its decomposition, affords a manure that is really less useful than that of the cow-house. This comes entirely from the fact, that the droppings of the stable, by reason of the small quantity of moisture they contain, present greater difficulties in the way of proper treatment than those from the cow-house. Mixed with litter, and thrown loosely upon the dunghill, horse-dung heats rapidly, dries, and perishes: unless the mass be supplied with a sufficient quantity of water to keep down the fermentation, and the access of the air be prevented by proper treading, there is always, without the least doubt, a considerable loss of principles which it is of the highest importance to preserve. I can give a striking instance of this fact, in the changes that happen in the conversion of horse-dung into manure in the last stage of decomposition. Fresh horse-dung, in the dry state, contains 2·7 per cent. of azote: the same dung laid in a thick stratum, and left to undergo entire decomposition, gave a humus or mould from which, reduced to dryness, no more than 1 per cent. of azote was obtained. I add, that by this fermentation or decomposition the dung had lost 9-10ths of its weight. From these numbers every one may judge how great had been the loss of azotised principles. In practice, however, little care is bestowed on the preparation of horse-dung: the fermentation is rarely, if ever, pushed to this extreme point indeed; but it is not the less true, that it is constantly approached in a greater or less degree, and that the consequences, although not altogether so unfavourable as those which I have particularly signalized, are nevertheless extremely destructive. All enlightened agriculturists have, therefore, long been aware of the attention necessary to the management of horse-dung, which requires a degree of care that may be perfectly well dispensed with when the business is to convert the dejections of horned cattle into manure. To obtain the best results in the management of horse-dung, it appears to be absolutely necessary to give it a much larger quantity of moisture than it can ever receive from the urine of the animal: if it be not watered, it necessarily heats, dries, and loses both in weight and quality; whilst by being kept properly moist, it produces a manure which, half-rotted, is of quality superior, or at all events equal to the same weight of cow-dung.

M. Schattenmann, who has the produce of stables containing two hundred horses to manage, follows a process of the most commendable description in the preparation of his manure, and which is attended with the very best results. His dunghill stance, of no great depth, is about 440 yards square in superficies, and divided into two equal portions. The bottom of this stance is so arranged as to present two inclined planes, which bring all the liquids that drain from it to the middle, where there is an ample tank for their reception, furnished with a pump for their re-distribution to the dunghill. There is also another spring-water pump, destined to supply the water that is necessary to preserve the dungheap in an adequate state of moistness. The latter auxiliary is quite indispensable; the quantity of water necessary is so considerable when masses of such magnitude are to be treated, that we cannot trust to any casual source of supply. The two portions of the area are alternately piled with the dung as it comes from the stables: it is heaped to the height of 10, 12, or 14 feet; it is trodden down carefully as it is evenly spread, and plentifully watered from the spring-water pump. Due consolidation, and a state of constant humidity, are the two conditions that are the most indispensable to the successful preparation of horse-dung. M. Schattenmann is in the habit of adding to the liquid, saturated with the soluble matters of the dunghill, a quantity of sulphate of iron in solution, or of sulphate of lime (gypsum) in powder; he also throws the same salts upon the surface of his heap; the object of this is evidently to transform into sulphate the volatile carbonate of ammonia formed in the course of the decomposition, and so to prevent its escape and loss. By these means a pasty manure, as rich as that which is yielded by horned cattle, and of a quality the excellence of which is proclaimed by the remarkable crops that cover the lands which receive it, is produced in the course of two or three months.* It is almost useless to add, that great care must be taken not to introduce too large a quantity of sulphate of iron, which might have a prejudicial influence upon vegetation, into the dunghill, or the drainings from it. In making use of sulphate of lime, there is nothing to fear on this score; this salt in excess would be rather favourable than hurtful: in general, gypsum is certainly the preferable substance, both on account of its never doing mischief, and of its greatly inferior price.†

Farmers generally advise horse-dung to be reserved for argillaceous, deep, and moist soils: this recommendation is given in connection with the manure that is obtained by the usual imperfect process of preparation. With regard to the horse-dung prepared in the manner which I have just described, and as practised by M. Schattenmann, it is adapted to soils of all kinds; and if it differs from the dung of the cow-house, it is only by its superior quality. This last fact is at once explained

* Schattenmann, Annales de Chimie, 3e série, vol. iv., p. 117.

† Every farmer who should have something like a cart or waggon-load of gypsum brought to the farm every year, would find his profit from the practice.—Eng. Ed.

by the elementary analyses of the excrements of a horse fed upon hay and oats.

100 parts of the urine of the animal so fed yielded 12·4 of dry extract, the composition of which was as follows:

	In the state of extract.	In the liquid state.
Carbon	36·0	4·46
Hydrogen	3·8	0·47
Oxygen	11·3	1·40
Azote........	12·5	1·55
Salts	36·4	4·51
Water	—	87·61
	100·0	100·00

The droppings of the same horse, after drying, gave 24·7 of fixed matter, the analysis of which indicated:

	Dry Excrement.	Moist Excrement.
Carbon	38·7	9·56
Hydrogen	5·1	1·26
Oxygen......	37·7	9·31
Azote........	2·2	0·54
Salts	16·3	4·02
Water	—	75·31
	100·0	100·00

The *dung of horned cattle* is often extremely watery; it is especially so when furnished by animals kept upon green food: this extreme humidity renders its preparation easy. Its equivalent number is higher than that of horse-dung; it is, in fact, less highly azotised, and consequently less active. If the food have a great effect upon the quality of the manure, it is quite certain that the circumstances or states of the cattle have an effect which is scarcely less remarkable. Milch cows, and cows in calf, always furnish a manure that is less highly azotised than stall-fed and labouring oxen; and this is readily understood: the azotised principles of the food are diverted to secretions, which concur in the development of a new being in the one case, in the production of milk in the other; for the same reason, the dejections of young animals, all things else being equal, furnish a manure of less power and value than those of adult animals. I shall have occasion to recur to this important subject, which has never yet been sufficiently studied.

The urine and excrements of a milch-cow, which is giving about twelve pints of milk per diem, have shown upon analysis the following quantities of elements—100 of the urine contained 11·7 of dry extract, and had this composition:

	Urine dry.	Urine liquid.
Carbon	27·2	3·18
Hydrogen	2·6	0·30
Oxygen......	26·4	3·09
Azote........	3·8	0·44
Salts	40·0	4·68
Water	—	88·31
	100·0	100·00

100 of fresh excrement left, on drying, 9·4 of dry substance, and in each state contained:

	Excrement dry.	Excrement moist.
Carbon	42·8	4·02
Hydrogen	5·2	0·49
Oxygen......	37·7	3·54
Azote........	2·3	0·22
Salts	12·0	1·13
Water	—	90·60
	100·0	100·00

Hog's-dung.—From all I have seen, I conclude that hogs, well kept and put up to fatten, yield dejections which are highly azotised, and which must consequently furnish a manure of excellent quality. Schwertz has, indeed, ascertained that this manure acts more powerfully than cow-dung.

Sheep-dung is one of the most active of manures, a fact which is confirmed by analysis; for it is by no means watery, and in the usual state contains upwards of 1 per cent. of azote. The mode of managing sheep generally implies that they manure the ground immediately. Schwertz calculates, that in the course of a night a sheep will manure something more than a square yard of surface: at Bechelbronn, we have found the quantity manured to be about 4 square feet. The followare the details of one experiment: Two hundred sheep were folded for a fortnight upon a rye-stubble, of an extent which gave as nearly as possible four square feet of surface per sheep. The manuring thus effected was found to produce a maximum effect upon the crop of turnips which followed the rye.

Pigeon's-dung is known as a *hot* manure, and of such activity that it must be used with discretion. Pigeon's-dung is available for crops of every description: Schwertz has made use of it for a long time, and always with the greatest success, mixed with coal ashes upon clover. The Flemish farmers procure pigeon's-dung from the department of the Pas de Calais, where there are a great number of dovecotes, one of which, containing from six hundred to six hundred and fifty pigeons, will let for the sum of about £4 per annum, merely for the sake of the dung; the quantity yielded in this time may be about a waggon-load.

In the neighbourhood of Lisle, this manure is applied particularly in the cultivation of flax and tobacco. According to M. Cordier, the dung of between seven hundred and eight hundred pigeons is sufficient to manure nearly 2½ acres of ground. The dung of three hundred and twelve pigeons, therefore, would suffice for an acre. The value of pigeon's-dung may be estimated from the large proportion of azote which it contains; that which I analyzed at Bechelbronn gave 8⅓ per cent. of this principle, a result which ought not to excite surprise when it is known that the white matter that appears in the excrements of birds consists of nearly pure uric acid. The manure of the henhouse is nearly or quite as good as pigeon's dung.

Guano is a manure of the same nature as pigeon's dung, and the use of which, long familiar on the coasts of Peru, has lately extended to these countries, the article being now imported in large quantities both from the South American and African coasts. Guano appears to be the result of the accumulation for ages of the excrements of the sea-fowl which live and nestle in the islets, in the neighbourhood of the great southern continents of the new and old world. The mass in many places forms beds of between 60 and 70 feet in thickness. The principal places whence guano is obtained, are the Chinche Islands, near Pisco; but other deposits of the substance are known to exist more to the south—in the islets of Iza and Ilo, at Arica, and in the neighbourhood of Payta, as I had an opportunity of ascertaining during my stay in that port. The inhabitants of Chinche are the principal traders in guano; and a class of small vessels, called guaneros, are constantly engaged in carrying the manure.*

Fourcroy and Vanquelin were the first who fixed attention on the nature of guano. The specimen which they examined was brought to Europe by M. de Humboldt, and contained uric acid (0·25), oxalate of ammonia, chlor-hydrate of ammonia, oxalate of potash, phosphates of potash and of lime, chloride of potassium, fatty matter and sand.

Since this time Dr. Fownes has again analyzed guano. The sample upon which he operated was of a light brown colour and extremely offensive smell; it yielded

Oxalate of ammonia . . . . Uric acid . . . . Traces of carbonate of ammonia and organic matter	66·2
Phosphates of lime and magnesia .	29·2
Phosphates and alkaline chlorides and traces of sulphates . . .	4·6
	100·0

Another sample, deeper in colour and without smell, contained—pure oxalate of ammonia, 44·6; earthy phosphates, 41·2; alkaline phosphates, sulphates, and chlorides, 14·2=100.

The composition of guano would confirm, were there any occasion for confirmation, the opinion that has been formed as to its origin. The islets which supply it are still tenanted, especially during the night, by a multitude of sea-fowl. Nevertheless, from the calculations of M. de Humboldt, the excrements of these birds in the course of three centuries would not form a layer of guano of more than one-third of an inch in thickness. Imagination stops short, startled, in presence of the vast lapse of time which must have been necessary to accumulate such beds of the substance as now exist, or rather, as lately existed in many places; for it is rapidly disappearing since it has become a subject of the commercial enterprise of mankind.†

The average composition of guano must by no means be inferred from the preceding analyses of picked samples; earthy matters are usually present in much larger proportion than they are here stated. The guano generally imported into England and France yields a proportion of azote very far short of that which the 25 per cent. of uric acid, which has sometimes been stated to exist in this substance, would yield. In three trials the azote found was 0·14, 0·05, and 0·05; the mean would therefore be 0·08, which represents the quantity of azote in pigeon's dung.

The litter and excrement of the silkworm is used as manure in the south. Analyses indicates 3 per cent. of azote in its constitution.

Human Excrements are regarded as one of the most active manures that can be employed. In countries where agriculture has made real progress, this article is highly prized, and no pains are spared to obtain so powerful a manure. In Flanders, feculent matters form the staple of an active traffic, and in the neighbourhood of large towns they form an invaluable material for the amelioration of the soil. The Chinese collect human excrements with the greatest solicitude, vessels being placed for the purpose at regular distances along the most frequented ways. Old men, women, and children are engaged in mixing them with water which is applied in the neighbourhood of the plants in cultivation.*

The fresh excrement is occasionally worked up with clay, and formed into bricks, which are pulverized when dry, and the powder is applied as a top-dressing. One of the advantages resulting from the almost exclusive use of this manure in China is this, that the fields seem to grow nothing but the plant which is the object of solicitude with the farmer. It is there extremely difficult to meet with a weed. The quality of feculent matter as a manure depends much on the nature and abundance of the food consumed by those who furnish it. M. d'Arcet relates a curious anecdote in connection with this fact: A farmer had purchased the produce of the *cabinet* of one of the most celebrated restaurateurs or taverns of the Palais Royal; encouraged by the success he obtained in employing this manure, and desirous of obtaining a larger supply of the article, he rented the produce of several of the barracks of Paris. The manure which he now obtained, however, he found to produce an effect greatly less than he had anticipated, so that he lost money by the bargain.

Berzelius found the following substances in human excrements:—

Remains of food	7·0
Bile	0·9
Albumen	0·9
A peculiar extractive matter . .	2·7
Indeterminate animal matter,	

* Humboldt, *Annales de Chimie*, vol. lvi. p. 258.

† Dr. John Davy, all whose scientific researches equal in accuracy the brilliant investigations of his illustrious brother, has lately turned his attention to this subject. He finds that we have collections of guano in Great Britain that are really not to be despised in some cases. The surface of the ground under old-established rookeries is a true guano-bed, and removed and used as manure in the open field, produces most excellent effects. See Dr. Davy's Paper in Ed. Lond. and Dub. Philos. Mag., Oct. 1, 1844.—*Eng. Ed.*

* Julien, Annales de Chimie, vol. iii. p. 65, 3rd series.

viscous matter, resin, and an insoluble residuum	14·0
Salts	1·2
Water	73·3
	100·0

The salts had the composition following:—

Carbonate of soda	29·4
Chloride of sodium	23·5
Sulphate of soda	11·8
Ammoniaco-magnesian phosphate	11·8
Phosphate of lime	23·5
	100·0

Human urine is one of the most powerful of all manures. Left to itself it speedily undergoes putrefaction, and devolves an abundance of ammoniacal salts, as all the world knows. Its composition, according to Berzelius, is the following:—

Urea	3·01
Uric acid	0·10
Indeterminate animal matter, lactic acid, and lactate of ammonia	1·71
Mucus of the bladder	0·03
Sulphate of potash	0·37
Sulphate of soda	0·32
Phosphate of soda	0·29
Chloride of sodium	0·45
Phosphate of ammonia	0·17
Chlorhydrate of ammonia	0·15
Phosphate of lime and of magnesia	0.10
Silica	traces.
Water	93·30
	100·00

The phosphates of lime and magnesia which it contains are extremely insoluble salts, and have been supposed to be held in solution by phosphoric acid, lactic acid, and, very recently, by Professor Liebig, by hippuric acid, which he now states to be a regular constituent of healthy human urine.

From the interesting inquiries upon urine made by M. Lecanu, it appears that a man passes nearly half-an-ounce of azote with urine in the course of twenty-four hours. A quantity of urine taken from a public urine pail in Paris yielded 7 per 1,000 of azote. The dry extract of the same urine yielded nearly 17 per cent.

Human soil, as commonly obtained, consists of a mixture of feculent matters and urine. It may be applied immediately to the ground as it comes from the privy. In some parts of Tuscany it is mixed with three times its bulk of water, and so applied to the surface. I have myself seen night-soil, as it was obtained and without preparation, spread upon a field of wheat without any ill effect: so that the Tuscan preparation may be regarded as a simple means of spreading a limited quantity of manure over a given extent of ground.

It is in French Flanders, however, that human soil is collected with especial care; it ought to be so collected everywhere. The reservoir for its preservation ought to be one of the essential articles in every farming establishment, as it is in Flanders, where there is always a cistern or cess-pool in masonry, with an arch turned over it for the purpose of collecting this invaluable manure. The bottom is cemented and paved. Two openings are left: one in the middle of the turned arch for the introduction of the material; the other smaller and made on the north side, is for the admission of the air, which is requisite for the fermentation.

The Flemish reservoir may be of the dimensions of about 35 cubical yards. Whenever the necessary operations of the farm will permit, the carts are sent off to the neighbouring town to purchase night-soil, which is then discharged into the reservoir, where it usually remains for several months before being carried out upon the land.

This favourite Flemish manure is applied in the liquid state (mixed in water) before or after the seed is in the ground, or to transplanted crops after they have been dibbled in. Its action is prompt and energetic. The sowing completed, and the land dressed up with all the pains which the Flemish farmer appears to take a pleasure in bestowing upon it, a charge of the manure is carried out at night in tubs or barrels. At the side or corner of the field there is a vat that will hold from 50 to 60 gallons, into which the load is discharged, and from which a workman, armed with a scoop at the end of a handle a dozen feet in length or more, proceeds to lade it out all around him. The vat emptied in one place is removed further on, and the same process is repeated until the whole field is watered.*

The purchase, the carriage, and the application of this Flemish manure cannot be otherwise than costly; we therefore see it given particularly to crops which, when luxuriant and successful, are of the highest market value, such as flax, rape, and tobacco.

This manure—the sample of it, at least, which M. Payen and I examined—is of a yellowish-green colour, and with reference to smell cannot be compared to anything better than a weak solution of hydro-sulphate of ammonia. This salt is undoubtedly present, but exposure to the air converts it rapidly into the sulphate of the same base. According to M. Kuhlmann, the quality of the liquid Flemish manure is to be judged of by its smell, its vicidity, and its saline and sharp taste. By the fermentation which takes place in the cess-pools, which are never emptied completely, the feculent matter kept for some time there does, in fact, acquire a slight vicidity. When solid excrementitious matter predominates in the fermented mass, its effect upon vegetation is of longer continuance; but when it is derived entirely from urine, it acts almost immediately after its application. In either case, the effect of Flemish manure does not extend beyond the season: like all the other organic substances which have undergone complete putrid fermentation, it is a true annual manure.

Occasionally, a quantity of powdered oil-cake is

* Cordier, Agriculture of French Flanders, p. 240.

thrown into the reservoir. This is either when the manure is supposed to be too dilute, or when there is little night-soil at command. The following, according to Professor Kuhlmann, is an example of the employment of the Flemish manure in a rotation which is common in the neighbourhood of Lisle, and in the course of which the crops are colza or colewort, wheat and oats.

First Year.—In October or November, the land is manured with farm-dung, which is ploughed in in the usual way. At this time a dose of the liquid manure, amounting to about 5,000 gallons per acre, is applied, a second ploughing is given, and the colewort is planted.

Second Year.—The colza is gathered, the ground is ploughed for autumn sowing, from 1,000 to 1,300 gallons, or so, of liquid manure are distributed, and the wheat is sown.

Third Year.—The wheat-stubble is ploughed down at the end of the autumn, and about 1,000 or 1,100 gallons of the liquid manure per acre are distributed; the oats are sown in the spring. If circumstances should prevent the application of the liquid manure in autumn, it is laid on in March, and then it has been found that one-fifth less will suffice; but its application at this season is avoided as much as possible on account of the havoc that is made by the passage of horses, carts, and men over the surface of the soft ploughed land. It is with a view to avoid this disturbance of the surface that in many places oil-cake in powder is applied to the fields under colza, when the manuring has to be performed after the crop is in the ground.

For beet, the dose of Flemish manure is carried the length of from 1,300 to 1,400 gallons per acre; but when the root is intended for the manufacture of sugar, liquid manure is sedulously avoided, experience having shown that it has the very worst effect upon the production of sugar—a circumstance which is very easily explained upon grounds that have already been given.

The price of Flemish manure at Lisle is 2½d. for a measure containing 22 gallons. In Flanders it is held that this quantity, which will weigh hard upon 2 cwt., is equal to about 5 cwt. of farm-yard dung. The liquid manure which I analyzed yielded 2 per 1,000 of azote. Farm-yard dung, in its usual state, contains as much as 4 per 1,000; it follows, therefore, that the real equivalent number of Flemish manure is 182, that of farm-dung being 100; in other words, it would require 182 of Flemish manure to replace 100 of farm-yard manure—a conclusion that differs widely from that which is usually acted upon. But it must be observed that from its nature the Flemish manure produces its maximum influence in the course of the season in which it is applied. It seems to have no effect on the crop of the succeeding year. Farm-yard dung, on the contrary, only exerts a portion of the whole amount of its beneficial influence in the course of the year, in which it is laid on; it has still something, often much, in reserve for succeeding years. To compare liquid manure with farm-yard dung, with reference to an annual crop, is to compare this manure to the unknown fraction of the farm-yard dung, which comes into play in the course of the first year, and from such a contrast no possible inference can be drawn in regard to the relative value of the two kinds of dung. I have insisted upon this circumstance because it is often involved in the estimates that are made of the relative values of the different species of manure; and because, from losing sight of it, unfavourable conclusions are frequently come to, in regard to manures that undergo decomposition very slowly; these manures, nevertheless, acting for a great length of time, produce both a greater amount, and a more durable kind of amelioration of the soil. Rapidity of action in a manure is undoubtedly a quality that is highly valuable in many cases; and Flemish manure possesses this quality in the highest degree. Nevertheless, it is also an advantage to possess a manure which elaborates gradually, and accordingly to the exigencies of vegetables, those principles that contribute to their growth, and which suspend, in a great measure, this elaboration in the course of the winter; which remain during the cold and rainy season in an almost inert condition, when any fecundating matter produced would merely be washed away and lost. These advantages, to which must be added that of breaking up and lightening the soil, are all possessed by good farm-yard manure. They are such, in fact, that this manure, even in Flanders, is still indispensable; the liquid manures of that country are nothing more than annual auxiliaries.

The method followed in Flanders of using night-soil is certainly highly rational. It is the same as that which is adopted in Alsace, in the neighbourhood of towns, with this difference, that our farmers collect no store of the material; they go in quest of it at the moment it is wanted. It is applied as in Flanders, or it is incorporated with absorbent substances, such as straw, or with other more consistent manures. The night-soil of Paris, which in the course of the year amounts to an immense quantity, is treated in a totally different manner, which appears to be in opposition to the simplest notions of science, of economy, and of all that is conducive to health. I allude to the mode of preparing *poudrette*.

In the neighbourhood of Paris there are places appropriated to the reception of the night-soil: it is thrown into reservoirs of no great depth in comparison with their superficial extent, and of an aggregate capacity which is such that they will contain the whole of the products collected by the nightman in the course of six months. These reservoirs are arranged in stages, one above another. Into the upper one are discharged the matters collected in the course of the night. The upper reservoir full, a sluice is opened by being pushed partially down, which allows the more liquid matters to escape into the second reservoir placed under it. Repeated drainings are effected in this way, and when the second basin is also full, there is a deposition of solid matter as in the first; the more liquid particles are then let off from the second into the third reservoir, and so on in succession until the last and lowest is attained, from which the liquid used to be turned into a water-course; but of late these contaminated liquids have been got rid of by means of what may be called absorbing artesian shafts—deep holes pierced in a dry and porous soil.

When the deposit in the first reservoir is held to be sufficiently consistent, it is drained by lowering the sluice more and more; no fresh matter is added, the new charges being deposited in another system of reservoirs. The deposit once drained is in the pasty condition; it is then taken out with the spade, and spread upon an earthen floor, which slopes off on either side, and the mass is turned from time to time, to favour the drying. This process, in fact, is continued until the material has become pulverulent. It is then stored under sheds, or thrown up into pyramidal heaps, the sides of which are well beaten, in order to enable them to throw off the wet.

Poudrette is of a brown colour, and weighs nearly 150 lbs. per sack. Put into a retort, and distilled with a heat of from 424° to 930° Fahrenheit, it yields 52·6 of ammoniacal fluid, and 47·3 of dry matter, in which we encounter fixed ammoniacal salts, such as the sulphates, phosphates, hydrochlorates, &c. M. Jacquemart finds that in 100 parts of poudrette there is 1·26 of ammonia, the greater part in the state of carbonate; but it contains a quantity of animal matter besides, which by dry distillation yields a nearly equal amount of the same substance; whence it follows that poudrette contains nearly 2½ per cent. of volatile alkali, or two of azote. By direct analysis I obtained 1·6 of azote.

Poudrette is spread upon the land at the time of ploughing, from 26 to 34 bushels per acre being allowed. On meadow lands it produces very good effects in the dose of about 25 bushels per acre. The disgusting smell of night-soil is to a certain extent an obstacle to its general use. This obstacle, however, is only felt in places where agricultural industry, and the manufactures connected with it, are still in a backward state. One remarkable circumstance is, that the disgust which naturally arises from the manipulation of such articles has been more especially got over in countries that are justly celebrated for their extreme attention to cleanliness, and the easy position of their inhabitants. I quote Flanders and Alsace in proof of the fact. It has been said, moreover, that certain articles produced in soils manured with human excrement contract a smell and taste which give rather unpleasant information of the nature of the manure that has been employed to favour their growth. In the limited circle of my own experience on this subject, I can say that I have observed nothing which favours such a statement. However this may be, Mr. Salmon has succeeded in disinfecting night-soil completely by mixing it with a kind of animal charcoal obtained by calcining in close vessels a porous earth, impregnated with organic substances. This is the article which is sold under the name of *animalized black*. Its quality as a manure must depend especially, I might even say entirely, on the quantity of azotised organic matter which enters into its composition.

Composts.—A great deal has been written and much has been said on the advantages of composts or mixtures contrived with a view to the amelioration of the soil. The receipts for these composts are very numerous; they prove that the discovery of a compost is an easy matter, and requires but a small amount of ingenuity. To unite different matters in such a way as to obtain a compound that shall act advantageously, it is only necessary to make it up of substances which of themselves and isolatedly are good manures. But that it is possible to supply the scarcity of manure, to create it in some sort by means of composts, is a subject of dispute. In fact, when we look attentively at the numerous mixtures which have been indicated as leading to this end, we always perceive that the proposal amounts to an extension or dilution of some powerful manure with a substance that is either inert or has little activity. This mode of proceeding may have its advantages; it enables us to make a more equal distribution of the manure we have at our disposal, but it actually supplies us with none.

Earthy substances almost always figure in composts. Turf, wood-ashes, ashes, marl, and particularly lime, are constant ingredients. Marl may suit certain soils: lime is a substance of great activity, and which, for this reason, must be admitted into composts with caution: it may act in the disintegration of woody parts, of stalks and stems and leaves; but we must be very careful not to follow the recommendation of Schwertz, who would have us throw quicklime into our privies with a view to bringing the matters there contained into a consistent and readily pulverisable state. By doing so we should infallibly lose the greater part of the principles that are truly useful in the soil. Much mischief and great destruction of manure, indeed, have been the consequence of the insensate and indiscriminate use of quicklime under all circumstances; the business is much rather to preserve than to destroy the substances that are used as manures; the purpose is to fix, not to dissipate the volatile elements which they contain. One great objection to the extensive employment of composts is the amount of labour they require in the repeated turnings which are held necessary in their preparation, and in the large quantity of matter which has to be transported.

THE APIARY.—By many it is feared that the present will prove an indifferent honey year, in consequence of the marked absence of heat early in the season, when our floral treasures of every description should be most brimful of saccharine matter. In Borgue, which has been justly called the Hybla of Scotland, the white clovers suffered so often from blashing rains that they withered early, greatly to the detriment of the industrious insects who feed on their petals. In some cases that fell under our own observation, the hive inmates perished, either from cold or inanition, if not a combination of both. In a case lately, where two hives were smoked, the produce in both scarcely exceeded a quarter pint. A correspondent, in speaking of Borgue, says—smoking will be general in a few days, and until the results of bee husbandry are thus tested, I cannot even guess at prices. Scanty as the produce was in 1843-4, I fear it will be still smaller in 1845. Some persons maintain that the bees gathered more honey from the 26th ultimo to the 8th instant than they did during the preceding summer by name, but not so in reality. When a labourer had three pints of honey to dispose of for 30s., as was often enough the case, he used to say—"I may thank the bees for buying mony wee odd things for the family." Within the last few years I knew a working-man who made 3*l.* by one season's honey, and at the same time retained a stole for breeding for the following.—*Scotch Paper.*

ON REAPING AND HARVESTING GRAIN CROPS.

By Thomas Sullivan.

(Concluded.)

Although corn of every description may be cut down by the scythe, yet the practice of mowing is undoubtedly better adapted to some species than to others. The oat crop is certainly the most easily reaped by the scythe, and is, in every respect, the most pleasant to harvest, especially in favourable weather: owing partly to the comparative softness and pliancy of the stems, and partly to the circumstance of oat straw, in general, not being too long: oats are therefore more easily cut, bound into sheaves, and set up in stooks, than any other kind of corn, whether the sickle or the scythe be the instrument employed in reaping, and are, accordingly, more frequently cut down by the scythe than either barley or wheat. The stems of barley are not difficult to cut, but the ears are somewhat apt to be broken off during the operation of mowing, especially when the crop is allowed (as is most generally the case) to become thoroughly matured. There is, also, a gummy matter in barley straw, that lubricates the scythe with a viscid coating, and renders the frequent application of the sharpening stone indispensably necessary in mowing this crop. Owing to the brittleness of the straw, the binders are always kept actively employed among barley; and for this and other reasons, the reaping cannot be so expeditiously performed as in the case of oats. Wheat is almost universally cut down by the sickle, many farmers being of opinion that the scythe is altogether an unsuitable instrument for reaping this crop; but there can be no doubt that wheat may be reaped in as efficient a manner with the scythe as any other sort of white corn, provided proper attention be bestowed on the different parts of the process; and the great advantages of mowing, viz., dispatch, economy, short stubble, and speedy winning, are of unquestionable utility in the harvesting of so extensive and important a crop as wheat. The mowing of wheat is, undoubtedly, severe work, and requires the most experienced and powerful scythesman to continue any length of time at it; but the reaping of it with the sickle is likewise both a tedious and fatiguing operation; and certainly the former method possesses a great advantage over the latter in being much more expeditious and economical; in short, no farmer, so far as I am aware of, that has fairly tried the mowing of wheat for a whole harvest, has afterwards deemed it advisable to relinquish the practice. A good scythesman will cut down in ten hours from one to one and a-half imperial acres of wheat, according to the luxuriance and condition of the crop; and the same number of attendants are required as in the case of mowing oats, detailed at length in a previous part of this article.

Having adverted, in a preceding paper, to the most approved mode of cutting down grain crops with the scythe, it will now be necessary to offer a few observations on the method of conducting the operation of reaping when the sickle is employed, as the latter instrument still continues to be by far the most generally used throughout the kingdom. My remarks upon this branch of the subject will, I think, be most likely to serve a practical purpose, by being restricted chiefly to details of the course of procedure adopted in the best corn-growing districts, in which the sickle is at present most commonly employed in reaping grain of every description.

The first point that demands consideration is the proper arrangement of the reapers in the corn-field, so as to prevent confusion or interruption at a time when every moment is precious to the industrious farmer, and this, when the number of persons employed at the work is considerable, requires no small degree of attention and study on the part of the master or overseer. When the ridges, or "lands," as they are also termed in certain parts of England, are not above twenty feet in breadth, no more than three reapers can work with freedom on one ridge; and when only a small band reap in company, two persons may be found quite sufficient for each ridge when they are less than 18 feet wide. In Berwickshire, the Lothians, and other counties in the south of Scotland, where reaping with the smooth-edged sickle, or scythe-hook, as it is likewise called, is most generally practised, the reapers are arranged in what are there termed *band-wons*, each band-won consisting of six persons, attended by one man, denominated a "bandster," whose duty is to bind the cut corn into sheaves, and also to set them up in stooks or shocks. Each band-won thus occupies two adjoining ridges when not more than eighteen or twenty feet in breadth; but on light dry land, in the districts referred to, ridges are not unfrequently either altogether omitted, as being quite unnecessary, if not prejudicial, on such soils, or made from thirty to forty feet in breadth, nearly level on the surface, and without any open furrow, properly so called, a light rut formed at seed-time with the plough, serving as a guide to the sower; and these marks, though somewhat obliterated by the subsequent harrowing, sufficiently indicate the position of the ridges to regulate the reapers at harvest: such ridges are of the greatest convenience in cutting down the crop, especially when the scythe is employed for that purpose; and for this, among many other reasons, to which it would be irrelevant to advert in this place, they should invariably be adopted in all cases of naturally dry or thoroughly drained land. In some localities, again, it is not an uncommon arrangement to place as many as four reapers on ridges of from eighteeen to twenty-two feet wide; but it is obvious that this number of persons can hardly have sufficient room to work with any degree of freedom on a ridge under twenty-four feet wide, a breadth of six feet being little enough for each reaper. In general, the most convenient and advantageous arrangement, in my opinion, is that of placing three persons on each ridge, one binder being allowed for every two adjoining ridges, or six reapers.

As a considerable number of females are employed in reaping, in the localities referred to, the usual custom is to place one man on each ridge, supported by two women, one on each side: the man takes the middle of the ridge, as the corn is generally heaviest there, and also because the duty of forming the bands by which the sheaves are bound usually devolves on him, the longest straw for which grows on the crown of the ridge. In reaping, the ploughmen and other servants constantly employed on the farm are placed foremost in the band, as most confidence can be reposed by the farmer on their steadiness and constancy; and then follow, in regular order, all the reapers that are engaged by the week. This arrangement must, however, be departed from when the carrying of the first cut portion of the crop is commenced, as the ploughmen are then withdrawn from the reaping, for the purposes of carting, stacking, &c. Very frequently the first or leading ridge is reaped by a man and two active women, though several of the other ridges in the band may have three men on each. When women have been inured from an early age to harvest work, as is the case in all parts of Scotland, few men can excel them either in despatch or neatness of reaping. It is rarely, however, that females become very expert at the peculiar mode of reaping known by the several names of "bagging," "slashing," &c, to which allusion has been made in a preceding page; but in the case of the ordinary system of reaping, by which the corn is cut in single handfuls, and in the performance of which, dexterity in using the instrument is more essential to despatch than great muscular strength, it is found that young active women are able to do quite as much as men; in proof of which statement I may observe that, in the many competitions which I have witnessed between different band-wons (and such trials frequently take place, despite every exertion of the farmer to prevent them), the women in very many, if not in the majority of cases, come off victorious

It is not considered advisable, in an economical point of view, to have more than from fifty to sixty persons in one band or company, whatever may be the extent of the farm. When a greater number is requisite in order to cut down the crop in the most proper state of ripeness, they should be divided into two or more bands, and placed in separate fields, or in different parts of the same field. About sixty persons will suffice to reap sixteen ridges together, of eighteen feet wide, allowing three reapers to each ridge: and this is as many as one man can properly superintend; besides, a considerable loss of time in unavoidably occasioned at the ends of the field before the whole of a long string of reapers are enabled to commence cutting in regular succession, especially if the ridges happen to be of unequal length, or to run in an oblique direction from the headlands. The inconvenience and loss of time occasioned in this way, furnish a strong inducement to the farmer to endeavour to secure the important advantages resulting from regular boundaries to his fields, and from having all his enclosures as nearly in the form of a square, or of a rectangle, as circumstances will allow. It is almost needless to observe that the loss of even a few minutes' work of a large band of reapers, every time they return to the headland, must amount to a very considerable loss during harvest, and materially augment the gross expense of reaping the crop: but this, though by no means a matter of trivial moment, is not all the injury sustained by the farmer from crooked fences and irregular enclosures, as it is obvious that much valuable time is also uselessly wasted in ploughing, and in performing other tillage operations. This is a branch, or rather a criterion, of good husbandry to which no inconsiderable importance is attached in those parts of the kingdom in which economy of time and of labour receives adequate attention; indeed, the many and important advantages accruing from regular enclosures and uniform fences are so very apparent, that it would seem altogether superfluous to advert to the subject in this place, were it not that the error or evils, to which this passing remark refers, are so prevalent as they are in many parts of the United Kingdom. We hope, however, shortly to see more attention directed to this all-important branch of farm management, and there is, unquestionably, very ample room for amendment, in this respect, in all parts of the country. But to return to our subject: the process of reaping with the sickle divides itself into three distinct branches or operations, namely—cutting, binding, and stooking; on each of which it will be necessary to offer a few observations, before proceeding to the details of securing the crop in the stack-yard, or other suitable place for the purpose.

Cutting.—The comparative merits of the serrated and the smooth-edged sickles having been already adverted to, it now only remains, under this head, to describe very briefly the method of using them. In using the serrated sickle, the reaper seizes the stems of corn, by small portions, with his left hand, and, holding the instrument in his right, he cuts them horizontally within a few inches of the ground, by drawing the sickle towards him; in this manner the corn is reaped in small handfuls, held firmly in the left hand, and when as much has been collected as the reaper can conveniently support, it is deposited upon a band formed of the stalks of corn, and laid upon the ground behind him: several such handfuls, reaped in close succession, make a sheaf, which, when of sufficient size, is tightly bound up by another person who follows for that purpose. When the ground happens to be somewhat soft upon the surface, as is generally the case after much rain has fallen, considerable care is requisite on the part of the reapers, in order to avoid uprooting part of the straw; indeed, the liability of inexperienced persons to this defect is often urged as an objection against the use of the serrated sickle. After what has already been said on the advantages of low reaping, it is hardly necessary to mention, in this place, that too much pains cannot be taken to cut the corn as close to the surface of the ground as possible, in order to secure the whole of the straw for the twofold purpose of provender and manure. It is also to be observed that the nearer the ground the easier is the straw cut by the sickle.

In using the smooth-edged hook, the body of the reaper is brought somewhat lower than is necessary in cutting with the serrated sickle, in order to enable the operator to draw the instrument horizontally and close to the ground; but, in either case, it is obviously of much importance, towards insuring short stubble, to bring the body as low as can conveniently be done, so as to enable the reaper with the greatest facility to draw the hook close to and parallel with the surface of the ground, by which alone low reaping can be accomplished. In cutting, small portions of the stems of corn are grasped with the left hand, whilst the right arm, which wields the instrument, is stretched amongst the standing grain, and in the act of drawing it towards the reaper, the stalks are cut horizontally and close to the ground. In this way several cuts are made in quick succession with the sickle, until the reaper has collected as much as he can easily retain in his left hand, when he lifts the whole up by the aid of the sickle, and places it upon the band previously formed and laid upon the ridge behind him. Two or three such handfuls generally make a sheaf of the ordinary size. The mode of reaping now described is that which is most preferred by correct farmers, and though not quite so expeditious as the system called "bagging," it is, upon the whole, in my opinion, much more advantageous at the end.

Binding.—In the northern districts, corn of every description is invariably bound into sheaves immediately after it has been cut down; but in many of the English counties, where the climate is much less humid and variable than in the north, this operation is frequently dispensed with, at least in the harvesting of oats and barley. Wheat is, I believe, in almost every instance, bound up into sheaves in all parts of the kingdom, in order to facilitate its removal to the stack-yard and its formation into stacks, as well as to guard against the loss which would otherwise arise from the shedding of the grain: but in the case of barley and oats many intelligent agriculturists deem the operation of sheaving and stooking altogether unnecessary in harvesting the crop, the usual practice, in certain parts of England, being to cut down the corn with the scythe, or otherwise, and treat it like hay in the winning. There can be no doubt that, in dry seasons, and when the fields are free from weeds or grass, the English mode of harvesting barley and oats may be advantageously adopted in other places; but, in most parts of the kingdom, we cannot calculate on three successive days of fine weather, and hence this system would be extremely hazardous in Scotland and Ireland; even in England itself, the practice referred to is now undergoing modifications, and farmers, who had previously adhered to it in every case, are at length beginning to see and acknowledge the greater safety and advantages of the northern mode of harvesting. It is admitted by all, that the soil, climate and local circumstances of particular districts, necessarily give rise to peculiarities in their husbandry; but, in regard to the sheaving and stacking of corn, it may justly be said to be common to all parts of the kingdom, and should invariably be adopted by every judicious cultivator in the harvesting of his crops. According to the practice of the northern counties, the sheaves are firmly tied by bands formed by twisting together a few of the stalks of corn at the ends next the ears. It commonly requires two lengths of the straw to make a band; but, in the case of wheat and other long corn, it has been recommended to form the sheaves so small as to be bound by bands the length of the straw, rather than so large as to require two lengths to be connected together. Though, admitting the obvious advantages of small-sized sheaves, especially in damp harvests, I cannot see any propriety in tying them with single bands; on the contrary, the practice appears to me to be injudicious, inasmuch as the grain at one end of the band is almost certain to be lost in the binding, or materially damaged by exposure to the action of the weather; whereas, when the ears are twisted together in forming the band, and turned inwards in setting up the stooks, none of the grain can be either lost or injured in this way. It is a point of much importance, particularly in moist seasons, and in naturally humid climates, to make the sheaves of a small and uniform size, especially if the corn has been cut in rather a greenish state, as the straw and grain become ready for the stack much sooner than if made up in large-sized sheaves; and, besides, the latter are of no slight inconvenience to the different parties engaged in carting, forking, and stacking the crop: it is likewise to be observed that the bands should, in all cases, be of sufficient length and strength for the purpose, otherwise the sheaves are apt to loosen in performing the subsequent operations, causing thereby a considerable loss of time in re-binding them; but the bands should not, however, be any thicker than is necessary to keep the sheaf together until the corn comes to be thrashed; sheaves should also be tightly bound, in order to prevent their subsequent loosening, and the band should be passed round the sheaf at such a distance from the stubble end as to balance equally on each side.

Stooking.—After a sufficient number of sheaves have been bound, they are set up into shocks or stooks, which are generally placed upon every alternate ridge; but when the crop does not happen to be heavy, two neighbouring binders stook together on the same ridge, the corn being then set up on every fourth ridge. In stooking, the sheaves are set on end in pairs, leaning against one another in such a manner as to be in contact at the ear ends, but a little apart on the ground, in order that they may stand more firmly on their bases, and also to admit a free circulation of air through them. The number of sheaves put together in a stook, and even the form in which they are set up, vary according to the particular kind of corn and the custom of different localities; but stooks should always be set up on the crown or middle of the ridge, and nearly in a direction from north to south, that both sides may derive equal benefit from the sun. In the case of wheat, six pairs of sheaves are usually placed together in a stook; but when the crop is oats or barley, five pairs are the common allowance; and these are sometimes covered by other two sheaves, the butt-ends of which are in contact on the top of the stook, while the ear-ends are divided so far as the band, and pulled down on each side, so as to cover and defend the upright sheaves: these last are called head or hood sheaves, and are used merely for the purpose of protecting the corn from the effects of inclement weather, but they are often altogether omitted, and are, in fact, quite unnecessary in dry harvests. In some parts of the country it is not uncommon, even in the case of wheat, to cover the stooks in this way with hood sheaves; but this precaution can hardly be requisite in the harvesting of this crop, the stems of which are hard and dry, and which requires to stand only a few days in the field before it is ready for the stack: hood sheaves should, therefore, in almost every instance, be omitted in the stooking of wheat; but, in the case of oats and barley, which, on account of the greater softness and succulency of their stems, require to remain a longer time in the field to become sufficiently dry for stacking, they may be of some use in defending the upright ones against rain. The corn, however, dries more quickly after being wetted, when the top sheaves are entirely omitted; and so little importance is attached to them, in most parts of Scotland, that they are now, generally speaking, altogether dispensed with in the harvesting of every description of grain crops.

As the great object of setting up corn into stooks is to dry and prepare it in the shortest possible period for the stack-yard, it ought, obviously, to be the aim of the stooker to set up the sheaves in such a manner as will best withstand the action of the wind, and most effectually throw off the rain. In order, in some degree, to insure these desirable objects, the butt-ends of the sheaves must be placed firmly upon the ground in the most advantageous position for standing, and the ear-ends must be sloped up in a narrow tapering form, like a wedge, in order that the rain-water may be compelled to run off on the outside of the sheaves: these precautions are more especially necessary in the case of oats and barley, which, on account of the softness of their stems, require to stand a considerably longer time in the field than wheat. There are different forms of stooks besides that which has now been described: instead of putting five or six pairs of sheaves together in opposite rows, with or without hood-sheaves, as above referred to, it is not an uncommon practice, in some districts, to set up only four sheaves, leaning against one another, with the ears of the corn sloped up so as to be close and compact together; sometimes a fifth sheaf, tied near the butt-end, is placed upon the top of the others, which is intended as a protection to the corn in the stook against rain. The hood-sheaf being opened up to the band, and spread over the upright sheaves with the ears inclining downwards, the rain is enabled to run off without entering the stook. This method of setting up corn has been very advantageously resorted to in damp harvests, and when the stooks are properly set up in this way they withstand a good blast of wind.

Another mode of setting up corn, which is known in the northern counties by the name of *gaiting*, is frequently adopted with advantage in moist weather. Although it is obvious that reaping should, if possible, be carried on only in dry weather, and when the straw is free from all extraneous moisture, yet in humid climates, and during unpropitious harvests, it often becomes unavoidably necessary to cut down a portion of the grain in a damp state, and in all such cases, gaiting is found to be of considerable advantage in facilitating the subsequent drying of the corn. This mode of binding is confined almost exclusively to the oat-crop, wheat and barley being rarely or never subjected to this treatment. In the case of wheat, the system of gaiting is obviously impracticable in most instances, on account of the length of the straw; and it has likewise been found from experience that when wheat gets dry, after being cut in a wet state, a considerable quantity of the grain is apt to shake out in binding the gaits preparatory to their removal to the stack-yard. Again, in regard to the gaiting of barley, it is found that in the rough handling of the crop necessarily attending this mode of binding, many of the ears are apt to be broken off the stalks; and besides, it is well known that much exposure to the weather in gaits or otherwise would materially injure the colour of the grain, and render it less valuable to the maltster. Oats, on the other hand, are protected by a thick husk, and when reaped at the proper period, the grain is not very apt to shake out in handling. When corn is wet, either with rain or heavy dew at the time of reaping, it might be unsafe to bind the sheaves tightly at once; as, by preventing the admission of air, the straw may be very long in becoming dry, and may also be rendered comparatively worthless as an article of food for live-stock, by getting mouldy in the sheaf; the grain likewise runs the risk of sprouting, by which, of course, its quality as a sample would be materially deteriorated.

In gaiting corn, the band of the sheaf is tied loosely round the stems, near the ear-ends, and the bottom is then spread out in a circular form, each sheaf being made to stand singly upon its own base. Gaited sheaves, though less protected against the effects of the weather, are nevertheless so loose and open that the straw is quite pervious to the air, on which account the winning process is materially accelerated on the approach of dry weather. Another important advantage attending the practice of gaiting in wet weather is, that the rain cannot lodge upon the straw, unless the band has been too tightly bound. As gaited sheaves are somewhat easily blown down by a highwind, three of them are sometimes set up together, which, by affording support to each other, are better enabled to withstand the force of the wind. When the gaits become sufficiently dry for the stack, they are tightly bound in the usual manner preparatory to their removal from the field, and they may be either carried at once to the stack-yard, or set up in regular stooks until it may be found convenient to remove them. Although this method of binding and setting up corn is of unquestionable utility in wet weather, yet, as it is attended with a great deal of after-labour in rebinding the sheaves, it should obviously be resorted to but as little as possible. It may be proper to observe in this place, that oats reaped with the scythe are seldom or never gaited, as the cutting is rarely proceeded with except in dry weather and when the straw is free from extraneous moisture; but in the case of reaping with the sickle, it often happens, even in favourable weather, that it would be highly injudicious to bind and stook the corn, though it might be quite proper, at the same time, to cut it down. Cases of this kind occur when there are heavy dews in the mornings, by which the corn is considerably wetted; but the moisture entirely disappears as the day advances. Gaiting is often resorted to in such cases; but this expedient does not seem to be altogether necessary, as by spreading the corn thinly upon the band, instead of tying it up, it will be ready in a short time for binding in the usual manner. This latter method is of considerable advantage even in dry weather, when the corn is mixed with a proportion of grass or weeds.

Before concluding this branch of our subject, it may be useful at this season to advert to some of the means whereby the winning process can in some degree be accelerated, as it is obviously of the utmost importance in our variable climate to get the corn secured in the stack-yard or barn as quickly as practicable after it has been cut down. Although I certainly consider it less hazardous in all cases to bind up wheat and other grain crops into sheaves simultaneously with the reaping, yet in continued dry weather, when no danger need be apprehended of the immediate occurrence of rain, the corn may with advantage be left spread out upon the bands with which the sheaves are afterwards to be bound, at least until the evening, when it should be tied and set up into stooks. In this way, any grass or weeds that may be amongst the straw are somewhat withered by the action of the sun and wind, and therefore become dry much more quickly than if the sheaves had been immediately bound up in the usual manner; and besides, the natural or superabundant juices of the stems are thus considerably evaporated. This mode of exposing the corn in a loose state to the sun and air before binding it, is often resorted to with advantage in the harvesting of barley on young grass, in order that the clover plant which is cut along with the straw may be somewhat withered and dried. It is almost needless to observe that one day's hot sunshine has more effect in winning corn thus spread out to the influence of the weather, than four days when it is bound up and stooked in the usual manner; but it is obvious that this practice would be exceedingly dangerous, especially in the northern counties, in any except very propitious weather. In some seasons, however, we have seen oats and barley lie unbound for several successive days without sustaining the least injury. In moist harvests, on the other hand, it has been found a useful practice in binding barley or oats on young grass to draw out the clover from amongst the stems of corn at the butt-ends of the sheaves. This, no doubt, imposes some additional labour on the binder, but it evidently accelerates the winning of the crop by several days, which, it will be admitted, is of the utmost importance in damp harvest. In reaping with the scythe, the rank grass may readily be shaken out by the gatherer in lifting the corn from the swathe, so that it would not be in any degree troublesome to the binder, and it is obvious that this expedient is more essential in the case of mowing than reaping, inasmuch as the corn is cut closer to the ground by the scythe, and consequently more clover is taken up in the operation. In fact, the scythe has been often objected to on this account, as an unsuitable instrument for cutting down corn on land that has been sown out to grass.

Corn of every description must remain in the field for some time after being cut, in order that the natural moisture of the stems, and of other vegetable matters amongst them, may be evaporated, before it can with safety be put together in any considerable quantity, either in the barn or stack-yard; for unless the crop be perfectly free from dampness before storing it, fermentation would quickly ensue in the mass, which would of course prove destructive to the quality of the grain and straw. The length of time required in the field depends so much upon circumstances that no precise rule can be laid down on the subject, to which it would be proper in all cases to adhere. Experience and a careful examination of the sheaves afford the only criterion by which to judge when corn is sufficiently dry for removal to the stack-yard. A good deal will, however, obviously depend on the state of the weather, the species of grain, and the method of reaping, as well as the manner of forming the stacks. Should the weather happen to be dry and windy at the time of reaping, and to continue so, only a comparatively short period is required to dry the corn in a sufficient manner to be removed from the field to the barn or stack-yard; whilst in close, damp weather, on the other hand, the necessary winning of the crop is rendered somewhat precarious and protracted. On an average, a week suffices for the drying of wheat, which, owing to its hard, strait stems, is more easily dried than any other grain; and in general cases, oats and barley become sufficiently won in from ten days to a fortnight, according to the weather. In regard to the influence of the mode of reaping on the period of winning, it has been stated in a preceding part of this article, that not the least important of the many advantages resulting from the practice of mowing grain crops arises from the circumstance that the corn in this case becomes ready for the stack much sooner than if it had been reaped with the sickle. Mown wheat, for instance, in most cases becomes sufficiently dry in four or five days after being cut down, and oats and barley in eight or ten days, according to the state of the weather. Towards the latter end of last year's harvest, the writer witnessed the stacking of a considerable quantity of oats on the third day after it had been mown. There is thus an important difference in regard to the period required for winning corn reaped with the sickle and that cut down with the scythe, arising principally from the loose and open state in which the straw is placed in mown sheaves. It is proper to observe that the mode of forming the stacks has likewise some effect in determining the necessary degree of dryness in corn, and consequently the length of time it should remain in the field; for when corn is to be put up into stacks built on stands or stages raised a little above the ground, as in the case of the corn-stands to be immediately described, it is not essential that it be quite so perfectly won as is necessary when they are built upon the ground. The same remark also applies to stacks furnished with funnels or chimneys through their centre, which, by admitting a free circulation of air into their interior, prevent, in a great degree, the heating or fermentation which might otherwise arise among the corn. The advantages in this and other respects of improved corn-stands, shall be more particularly adverted to in a subsequent part of this paper.

It has been already remarked that the time requisite for corn to remain in the field after cutting is not determinable by any precise rules, as so much depends on circumstances which the husbandman can neither foresee nor prevent: but although the practical farmer is unable to command propitious weather for harvesting his crops, yet he can hardly err in judging when corn is sufficiently dry for preserving in the stack. It is almost unnecessary to observe that it is of the utmost importance in this changeable climate to secure the crop as speedily as possible after it has attained proper maturity and has been cut down; but at the same time it must be remembered that the value and subsequent safety of the grain, whether stored up in the barn or stack-yard, would be eminently endangered by precipitation in removing it from the field. The proper time for doing so is to be learned only by experience and a careful examination of the state of the straw in the sheaf. Even in the finest weather, a certain exhaustion of the natural juices is necessary; otherwise the corn, when collected together in any quantity, would ferment. When ready for removal to the stack-yard, the sheaves will feel light when lifted up by the band, and the natural juices of the stems will have evaporated, not only from the outside, but also from the interior. The sheaves must not merely be free from moisture on the outside, but it is also requisite that no particular sensation of cold or damp should be experienced in thrusting the hand into their interior; for it often happens that the outside of the sheaf may feel sufficiently dry, whilst the middle may still be so damp as to render its removal to the stack improper in that state. Hence the necessity of discriminating between mere external dryness, and that thorough dryness of the whole sheaf which must be attained in order to insure the subsequent safety of the corn. If the sheaf feel light when lifted off the ground, and quite dry both inside and outside, it may be considered as sufficiently won, and no time should be lost in removing it to the stack-yard.

As has been already remarked, the winning of corn is attended with comparatively little difficulty, delay, or risk, when the weather continues dry for some time after reaping; but when it happens to be damp or showery, without wind or sun to evaporate the moisture, the process will be considerably retarded, and still more so, should much rain with high winds occur. In calm, damp, and warm weather, the ears of every species of grain are almost certain to sprout in the stook, and the straw to become damaged as an article of provender, and a long period must necessarily intervene before the crop becomes ready for the stack. But the winning process may be materially facilitated in such cases, by loosening out the sheaves and spreading the corn thinly upon the bands to dry in the wind and sun when favourable opportunities occur, as in the intervals of sunshine. In windy weather also the stooks are apt to be blown down and the sheaves scattered about over the ground, and unless set up again as soon as it becomes calm, the grain in contact with the damp ground is sure to sprout, while, by setting up the fallen sheaves as soon as possible, they receive the benefit of any drying wind that may subsequently arise. It may further be observed in this place, that while the dry portion of the crop is in the course of being removed to the stack-yard, every opportunity should be taken advantage of to secure and accelerate the proper winning of the remainder. Thus, in dewy or rainy mornings, and other periods when the carrying and stacking are necessarily suspended, some of the men engaged in driving horses may be usefully employed in setting up fallen stooks in the field, while others of them may be engaged in forming straw ropes, drawing straw into bunches for thatching newly-erected stacks, and preparing foundations, funnels, &c., for others. No time is thus lost, and when favourable weather arrives for the carrying being resumed, all parties are prepared to take advantage of it. Although in England it may not often be necessary to resort to such expedients during harvest as those now adverted to, yet, in Scotland, where the climate is much more humid and capricious, and the harvests in consequence more precarious and protracted, farmers are frequently obliged to try various methods of securing and preserving their crops, which are unknown, and perhaps unnecessary in most cases, in the more southern parts of the kingdom; whilst, on the other hand, the mode of harvesting which is practised in certain districts in England is totally unsuited to the more variable climate of either Ireland or Scotland. But though the difference of climate necessarily gives rise to, and justifies a different course of procedure in this as well as in other departments of farm management, yet there can be no doubt that there are many points in the practice of each country which might be successfully introduced and adopted in the others.

When the corn which was first reaped becomes sufficiently dry, its removal to the stack-yard is commenced, and the other portions are carried in succession as they attain the necessary degree of dryness. Corn stacks are usually built in an enclosed piece of ground near the barn; but it is customary, I believe, in many parts of England, to secure almost the whole of the grain-crops in large houses or barns erected for the purpose. Though not sufficiently acquainted with this practice to be able to say what particular effect it may have on the quality of the grain, I am decidedly of opinion that corn may be preserved during winter as securely in well-built and properly thatched stacks, as it is possible for it to be in a house, and evidently much more so if it be in any degree damp at the time of storing, as the external air is excluded from it in the house. It is obvious also that the straw is much more palatable and nutritious as an article of food for live stock, when threshed from the stack as it is required, than in the case of house storing, while the grain is more subject to the depredation of vermin in the barn than in stacks built upon raised stands of an improved construction. In those districts in which it is customary to store the whole or greater portion of the corn in houses; it is also common, I understand, not to bind it up into sheaves, but, when sufficiently dry, to carry it loosely like hay to the barn; and, in order to occupy as little house-room as possible, the farmers in the localities referred to do not scruple to leave a pretty long stubble on the ground. But with every effort to economise space, it must still require a very extensive building to contain the whole of the crop on even a moderate sized farm, which of course materially increases the cost of erecting farm-steadings where this practice prevails, the barn alone forming a considerable item of the expense. I do not hesitate, however, to say (and the statement is borne out by experience) that corn put up into well-built stacks, and secured both at top and bottom in the manner to be presently described, will be as safe as it could possibly be in any barn, however commodious; besides, when the crop is to be housed, it requires to remain longer in the field before it can safely be stored, as it may be stacked with a degree of dampness, which would prove destructive to both grain and straw in the case of housing, in consequence of being put together in large quantity and excluded from the external air; the whole being apt to heat, and fermentation is, of course, most destructive to the quality of the grain. In the northern counties, where the winters are much more severe than in the districts in which this practice prevails, no farmer ever thinks of storing his corn elsewhere than in a stack-yard enclosed for the purpose, and certainly there can be no reason why the same method may not be adopted with equal advantage in other quarters.

Another very reprehensible practice is sometimes resorted to in certain localities, which is, hurriedly stacking the corn in the field, until time admits of its being removed at leisure to the stack-yard. This is by no means an uncommon practice in many parts of the kingdom, and it is obviously both injudicious and expensive, for although the stacks formed hastily in the field are seldom either very neat or very large, yet they require almost as much time to put them up as would be sufficient to secure the corn in a proper manner in the place expressly set apart for the purpose. The small saving of time arising from the shorter distance to which the corn is required to be carried in the first instance, is greatly over-balanced by the additional labour occasioned by its subsequent removal; but in fact it often happens that the stacks thus hastily and imperfectly put up in the field, with a view of securing as much as possible of the crop in a dry day, or when rain is apprehended, are suffered to remain where first erected until it becomes necessary to thrash them out. Decidedly the most judicious and profitable mode of storing grain-crops then, in my opinion, is in stacks of a convenient size, built in an enclosed piece of ground, of sufficient area for the purpose, and situated contiguous to the barn.

As the first-reaped portion of the crop generally becomes thoroughly dry before the whole has been cut down, the several operations of reaping, carrying, and stacking are proceeded with simultaneously for some time. To insure despatch at this busy period, it would be of great advantage to every farmer to have a sufficient number of carts expressly adapted for harvest-work, or which might easily be made to answer the same purpose; and these are to be put in requisition when the carrying of the crop is begun. Corn-carts of a very improved construction are in general use in the Lothians and other parts of Scotland, and are drawn by one or two horses according to circumstances. The most common sort consists of a sparred frame-work, with the bottom and a few inches of the sides boarded, in order to prevent any of the grain from being lost, and is used almost exclusively for the purpose of carting corn in the sheaf, hay, and similar matters. Its first cost is inconsiderable, and when not in use, it can easily be dismounted and laid up till again required. When about to be employed it may be mounted on the wheels and axle of any common cart of equal breadth, which renders a separate pair of wheels unnecessary. No farm vehicle seems better adapted to the purpose for which it is intended than this; and no other cart admits of a larger load with as little trouble to the workman, or labour to the horse. English farmers who have given a trial to carts of this description for one harvest, have found them so much superior in every respect to the cumbrous waggons generally used in some quarters, that few have been disposed again to return to the latter. Light convenient corn-carts possess so many obvious advantages over waggons at the period of harvest, when despatch is of so much importance, that it is needless to advert further to the subject in this place.

Before proceeding to describe the formation of the stacks themselves, in will be necessary to advert briefly to the proper arrangement of the stack-yard, and the preparation of sites or stands on which the corn is to be built. It must have occurred to every person engaged in agricultural pursuits, that a very considerable quantity of grain is materially damaged, even after having been stacked in a thoroughly dry state, in consequence of the wretchedly imperfect manner in which stack-yards are generally arranged, as well as from want of raised-stands for the stacks. The most convenient situation for the stack-yard is exterior to that part of the homestead which contains the barn, in order to economise time in the removal of the corn to be threshed. It should be sufficiently spacious and airy, besides possessing a firm, dry surface; and to secure the latter requisite, it will be necessary, if the ground be not naturally dry and porous, to have it thoroughly drained, and disposed into wide ridges somewhat raised in the middle to prevent the accumulation of surface-water, every third ridge being reserved as a road to the stacks, and covered with broken stones, gravel, or other material. The stacks are thus arranged in regular equidistant lines, with a road for carts on every side of two adjoining rows, so that any stack may be reached and removed at pleasure; besides, there is no confusion or loss of time in harvest, whatever number of men and horses may be employed; and it is obvious that such a uniform arrangement of the stacks insures of itself a considerable degree of ventilation. The stack-yard should always be enclosed, but not, however, by a high wall or hedge, which would prevent a free circulation of air; a sort of sunk fence or a strong iron-railing would perhaps answer the purpose better.

But however well-drained and judiciously arranged the stack-yard may be, the corn should not be stacked immediately upon the ground. Some recommend covering the spaces on which the stacks are to be built, either with rough stones, with a mixture of gravel, or with common pavement, in order to prevent the corn receiving any injury from the natural dampness of the soil. A much better method, however, is to have the stacks raised considerably above the surface, by means of a frame-work of timber, supported by low pillars of stone, wood, or cast-iron. Such stands are not only advantageous in preserving the bottom of the stacks from the effects of dampness, but when properly constructed they also prevent the depredations of vermin. Corn-stands are sometimes circular or oblong basements of masonry, with a projecting coping of flat stones to prevent the entrance of rats and mice into the stacks; but though such fixtures may answer the double purpose of keeping the lower part of the stack dry, and of excluding vermin, they are still inferior to the improved corn stands which are supported by pillars, inasmuch as the latter admit of a free circulation of air from underneath, besides possessing all the advantages of the other kind, and this additional property admits of the corn being carried several days earlier than could safely be attempted when the stacks are to be built immediately upon the ground.

Raised corn-stands are constructed in different ways. The most simple consists of seven stones placed upright in a circular position, on which are laid spars of wood to keep the corn off the ground: but this temporary sort of stand is useful only in preventing injury from damp to the bottom of the stack, as it will not exclude vermin. In order to answer the purposes for which corn-stands are intended, the stone pillars that support the frame-work should be at least two feet high, and have projecting caps of flat stones, to prevent the ascent of rats and mice to the stack, another stone of equal height being set up in the centre to support the middle of the frame. When suitable stones cannot be procured for this purpose, pillars of timber may be substituted, the same precautions as before being taken to guard against the introduction of vermin. Stands supported by cast-iron pillars are now, however, very common in some districts, iron being preferable to either wood or stone, except where the latter materials are more than usually convenient and accessible. These pillars are generally two feet high, with a projecting cap of the same material at the upper extremity to prevent the ascent of vermin: the pillars and caps are connected together as one piece, and there are horizontal wings at the bottom, by means of which the pillars are fastened with small screws and lead to stones inserted in the ground for the purpose. Seven or eight pillars are required for each frame, according as it is heptagonal or octagonal in form, besides one of stone or wood to support the middle. Corn-stands of this description become rather expensive at first, but when the frame-work is composed of substantial materials, they last for a long period; and the advantages accruing from their use will soon and amply repay the expense incurred in their construction. A sort of frame for corn-stands has latterly been recommended, which admits of being taken asunder when not in use, in order to protect the wood from the action of the weather; but as its replacement occasions some trouble, the moveable stand does not appear to possess much advantage over the well-constructed permanent one; and if the frame be covered in a careful manner with the thatch, immediately after the removal of the corn to be thrashed, it can receive little or no injury from the action of the sun or rain during the spring and summer months. As raised stands of this description allow of a considerable circulation of air from underneath, a funnel or chimney in the interior of the stack is unnecessary, unless the corn happen to be more than usually damp at the time of stacking it, in which case these fixtures are of great advantage in preventing injury from fermentation to the grain.

When it is considered necessary, from the state of the corn, to erect a conical funnel on the frame-work just described, upright posts are placed at the distance of about two feet from the centre, and inclining inwards at the top, where they are fastened by a straw rope, or otherwise; the lower ends of the posts being at the same time stretched out in a circular manner round the centre. A few short spars of light wood may then be nailed to the upright posts, so close as to prevent the sheaves from falling into the hollow space in the centre of the stack. The same object may also be secured by wrapping a straw rope round the posts, at a distance of about one foot apart, which answers the purpose very well.

Notwithstanding the manifest advantages of raised stands, and the comparatively trifling expense incurred in their formation, corn is still very generally stacked immediately upon the ground, with no other protection from the dampness of the soil than a thin layer of straw or other dry matters, and the necessary consequence is, that much of the grain is damaged by the effects of moisture and the depredations of vermin. Even when the stack-yard is naturally quite dry, or has been made so by drainage, stacks should not be built upon the ground, for the reasons already assigned; but as this practice is still very generally adhered to in all parts of the kingdom, I would strongly recommend, especially in moist harvests, to have the stacks furnished with hollow bosses or chimneys, for the purpose of ventilation.

As has been already observed, stacks should, in all cases, be arranged in regular rows in the stack-yard; in which case those in each row are usually built in succession. The conical funnel which preserves the interior hollow is formed in the following manner. After fixing on the site or foundation for the stack about to be built, a short fork is placed upright at the centre, or a stout pin of wood may there be driven into the ground. Three posts, previously prepared for the purpose, and of an equal and suitable length, are then set up in an upright position over the centre; they are fastened together at the top by a straw rope, or by a wooden pin passed through a perforation in each, and are drawn out at the bottom in a circular manner at the distance of from two to three feet from the centre, according to the diameter of the stack. A few short spars are then nailed to the posts, or a straw rope wound round them as before, to prevent the sheaves from falling into the open space. In order that the external air may have free access to the interior, it is necessary to have a pipe or other opening communicating from the funnel to the circumference of the stack at the base. This purpose may be effected by several simple contrivances; but it would be found of considerable advantage, and would save much valuable time in harvest, to have a number of low tressels, from three to four feet in length, somewhat similar to those employed by masons in supporting scaffolding, one of which may be placed at the bottom of every stack between the funnel and the circumference, in the best position to insure a free circulation of air into the interior; and as the corn is removed to be threshed, these small tressels are laid up for future use. A layer of dry straw is then spread evenly upon the ground on which the stack is about to be built, and is brought to the circular form by means of a fork-shaft on which the radius of the stack is marked, or a cord attached to the pin previously inserted into the ground to mark the centre. In either case the purpose is effected by walking round, holding the shaft or the string at the specified distance of the radius, and pushing in or pulling out the straw until it be made exactly circular. This sort of stands and temporary funnels answer very well, and are of great advantage when the corn is somewhat damp at the time of stacking, and the ground dry; but, although they allow the free admission of air into the interior of the stack, and thereby diminish or prevent the tendency to fermentation, yet there is no preventive against the ascent and depredations of vermin, or the injury arising from the natural dampness of the soil. Raised corn-stands supported by pillars of stone, wood, or cast-iron, are therefore in all cases to be preferred; and although a considerable expense may be incurred in their construction, yet it will be most amply repaid in a very few years. In short, there are few, if any, fixtures connected with the farm-yard, that appear more useful and indispensable, or that more quickly reimburse the money expended in their formation, than improved corn-stands. The loss annually sustained by many farmers in damaged grain, from the want of some such arrangemens for ventilation as those now adverted to, not to mention that arising from the depredations of rats and mice, is, in fact, incalculable.

Corn-stacks are either circular or oblong; the latter form does not seem to possess any peculiar advantages over the former, while the circular stack, of a medium size, is obviously more convenient in many respects. In some districts it is usual to put the oats and barley into round stacks of a moderate size, and the wheat into large oblong ricks, as the latter crop is generally in a dryer state than the former ones, and there is consequently less risk of its heating. It is of considerable advantage to have stacks of such a size, whatever their form may be, that the barn will contain one of them at a time, or that one may furnish employment for half a day to the thrashing machine. Oat stacks are usually from twelve to fifteen feet in diameter at the bottom. Barley is generally made up into smaller sized stacks, as the straw, on account of its greater softness, is more difficult to get thoroughly dry, and the grain is more easily injured by heating. Wheat stacks, on the other hand, are built of a larger size than those of oats, being usually from fourteen to eighteen feet in diameter, and of a proportionate height.

When the carrying of the corn is begun, the corn carts, if any specially adapted for the purpose are available, are put in requisition; and if more than one stacker be employed, each must have an equal number of carts carrying to him: each set of carts is attended, in the field, by an active man or woman to fork or pitch the sheaves into the carts, and to assist in tying the ropes. The sparred corn carts with a projecting frame-work all round, formerly referred to, are well adapted for this purpose, as enabling the workman to build on large loads in a short time, and thus to proceed with the greatest despatch. When brought to the requisite height, the load is secured by one or two cart-ropes, fastened behind and thrown diagonally across to the front of the cart, where they are tied by the forker. A boy or woman is generally required in the field at the same time, for the purpose of raking together any stalks that may be left on the ground after the stooks are removed; and the corn thus collected is at once bound up and carried to the stack-yard.

In general, only one person is engaged in the building of a stack, and this should always be the most careful workman on the farm; but it is occasionally necessary to have a boy or a girl to receive the sheaves from the man forking or pitching them up, and to place them in a convenient position for the builder; this is especially requisite in the case of stacks of large diameter when they attain a certain height, as the forker would be unable to pitch the sheaves within reach of the stacker. It is not considered necessary to describe very minutely, in this place, the method of building corn-stacks, as this is likely to be well known to most agricultural readers; but as even this, the concluding branch of harvest work, is often executed differently in different districts, a few remarks upon the subject will not, it is hoped, prove uninteresting. When the stack is not to be provided with a funnel in the interior, whether it be built on the ground or on a raised stand, the stacker begins by placing a couple of sheaves in an upright position in the centre of the intended stack, round which he places other sheaves on their butt-ends, with their top inclining inwards; and in this way he continues piling sheaves closely together in successive rows round the centre ones, until he nearly reaches the circumference of the stand; he then places a course of sheaves all round the outside, on which other courses are laid in a similar manner, with the butts outwards, until the whole is raised nearly to the same height as the tops of the upright sheaves, observing, as he proceeds, to fill up the interior of the stack where necessary; after which, an inner course is laid all round, with the butts of the sheaves resting on the bands of the outside course; and, if the diameter of the stack be large, or the straw short, similar courses are laid, each being a little farther back than the preceding one, until the centre is properly filled up. The workman proceeds in the same manner, placing alternate courses outside and inside, and carefully preserving the heart, or centre of the stack, the highest part, so as to give the sheaves an inclination downwards towards the circumference until the stem has been brought to the requisite height. It is of great importance to have the stack always well filled up in the centre, as it the inner sheaves which retain the outside ones in their places; and the slanting position of the sheaves is necessary to prevent the rain finding its way to the interior. When the body of the stack has attained the requisite height, the workman sometimes places a row of sheaves two or three inches farther out than the others, in order to form a sort of projection for the eaves, that the rain-water may be thrown off more effectually; but this is not essential, and the stack may be at once contracted, when the proper height has been reached. The roof, or top, is formed by placing every successive row of sheaves as much farther in than the preceding one, as will afford the requisite slope, the elevation of the centre being, at the same time, not only preserved but increased: when the top has been thus contracted to an area of three or four feet in diameter, according to circumstances, four or five sheaves are placed in an upright position, with their tops uniting, and their butt-ends spreading out, so as to give a conical form to the top: these upright sheaves are secured in their place by a straw rope wound round them and fastened to the sheaves beneath, while the whole roof is prevented from being blown down by two ropes passing over it, and fixed to opposite sides of the stack; but these are unnecessary when the stack is thatched immediately. This is the usual mode of building stacks, which are without any arrangement in their interior for ventilation; but, as funnels formed of upright posts should always be used for this purpose, when it is necessary to stack corn before it is thoroughly dry, it will be proper to advert briefly to the method to be adopted in this case. Instead of commencing by placing upright sheaves in the centre of the stand as above referred to, the workman begins by laying successive courses of sheaves all round the posts, with their tops inclining inwards, until he nearly reaches the outside of the stand, when he proceeds as before, by placing several rows of sheaves round the circumference, to bring the whole almost level. In filling up the inside of the stack, the butts of the sheaves are placed against the upright posts; but the exterior rows are built precisely in the manner already described. When the stack has reached the height of the posts, and it is desired to extend the open space in the centre for the purpose of further ventilation, a bag compactly stuffed with straw is procured, around which the building is continued as before, the bag being drawn up occasionally as the stack increases in height. An opening is thus secured from the bottom to nearly the middle of the roof, where the stack becomes rather narrow for the purpose; but at this part a few drain-tiles may be placed from the centre to the outside in different directions, so as to communicate with the external air, by which means the most perfect vetilation of the stack is secured from the base to the summit, which must be of incalculable benefit to the grain.

Corn cannot be said to be completely or finally secured until the stacks are thatched, as it frequently happens in wet seasons that the top sheaves sustain considerable injury from rain before the thatch is put on. This operation is, however, seldom performed until the whole of the corn is in the stack-yard, after which more leisure is afforded for the purpose; but in some districts in the north, it is not an uncommon practice, especially if the weather be unsettled, to have a few men exclusively employed at this work, who thatch each stack shortly after it is finished, and has subsided a little. As already observed, the most general practice, however, is to defer this part of the work until the corn be all stacked, unless a damp day should occur, when, as the carrying must necessarily be suspended, some of the workmen may be employed in thatching. But before this operation can be commenced, it is necessary that a quantity of straw be prepared for the purpose, and a number of straw-ropes twisted. Both of these preliminaries should be attended to as apportunities of wet weather occur during the harvest and the preceding summer, so that every thing may be in readiness when required. Straw is prepared for thatching by drawing it out by the ends into handfuls, so as to bring the stalks parallel; the successive handfuls being laid together till a thick bunch is formed, when it is tied up.

Straw-ropes are twisted with different instruments and in different ways, every district having its own method. The most simple instrument used for this purpose, consists of a handle of from two to three feet in length, bent at one end like a bow, and having at the other a ring and swivel, through which ring is passed a straw-rope or other appendage, by which it is attached to the body of the person who turns it. This instrument may be made of a piece of ash or other tough and flexible young wood. In using it, the first end of the rope that is to be made is fixed to the extremity of the bow, and the man who lets out the straw sits beside a heap from which it is supplied as the rope extends, while the twister, who may be a boy or a woman, walks backwards, turning the instrument rapidly round until the rope is made of the requisite length, when it is coiled up into an oval ball upon the arm of the maker, and reserved for use. Instead of the simple instrument just described, a machine somewhat similar to that used by rope-spinners, is sometimes employed for making straw-ropes, and is of considerable importance in facilitating the process. With this implement four persons only are required to make three ropes, whereas with the former instrument two are necessarily occupied in the making of one rope. Those who supply the straw are stationary, while the machine is moved from them as the ropes increase in length. It is mounted on three low wheels, and attached to the body of the workman, who walks backwards and puts it in motion by turning the handle.

When the stacks have subsided a little after being built, and a quantity of straw drawn out into regular lengths, with a number of straw-ropes, are prepared, the operation of thatching is commenced. This is also performed by different methods in different localities. The workman stands upon the stack, and the bunches of straw being forked up to him as required, he begins at the eaves or bottom of the roof, beyond which the thatch is made to project a few inches, and deposits the straw in handfuls in regular breadths until he reaches the top, care being taken that the different handfuls overlap each other; and at the eaves it is necessary that their upper ends be pushed a little into the sheaves. In this manner he proceeds laying successive layers all round until the whole of the roof is covered with thatch. In finishing the top of the roof, it is of importance to give it a narrow tapering form, in order to throw off the rain most effectually. The straw is then secured from being blown away by means of straw-ropes, laid over the roof by the thatcher standing upon a ladder so as to be able to reach the summit, assisted by two persons on the ground. The ropes are passed obliquely over the roof in such a manner as to form a sort of net or lozenge work, of from twelve to fifteen inches in width in the meshes, and are fastened either to the stack itself, or, what is more preferable, to a stout rope passed round it, immediately below the eaves. After the stacks have been thus thatched and roped, their outside should be pared down with a hook or the blade of a scythe, by which a good deal of grain will be preserved, besides imparting to them a handsomer appearance; and this concluding operation is especially necessary when the corn has been cut with the scythe.

ECCLESFIELD FARMERS' CLUB.

At the monthly meeting of the club, held at the Black Bull, Ecclesfield, on Wednesday evening, the 13th August, the following paper was read:

On Guano.—By Mr. Eyre.

One of the most remarkable features of modern times is the establishment of the numerous associations at present existing, composed of men meeting for the advancement of science—to learn its progress, and to communicate to each other and the world new discoveries.

Amongst the numerous applications of science, none, it appears to me, can be of more importance than science when applied to the production of the first necessaries of life.

To every country the condition of its agriculture must be a primary subject for consideration; and to us in this country (I mean in the United Kingdom of Great Britain and Ireland), with a population increasing after a rate of nearly a thousand per diem, it surely cannot fail to be thought by all classes a consideration not to be surpassed by any other in importance, how this immense increase is to be met and supplied, and how highly essential must it be to the independence of our country, in the which we rejoice and boast so much, that its soil should produce a sufficiency of food for its population.

That this can be done we may infer from the fact, that unaided as we have been by those important auxiliaries to production, which the application of science to agriculture is daily discovering, our importations from foreign countries and our own colonies, during the years 1833, '34, and '35, did not, on the average, exceed more than a pint and a fifth of corn, equal to about fifteen ounces of fine flour, during the year, to each consumer, whilst in England alone we have 3,454,000 acres of land uncultivated, though capable of cultivation; in Ireland, 4,900,000 of acres; in Scotland, 5,950,000; in Wales, 530,000; in the British Islands, viz., Scilly, Jersey, Guernsey, Orkney, Alderney, Sark, and Man, and in the Shetland Isles, 166,000, making together 15,000,000, being a little more than one-third of the whole of our land cultivated and capable of cultivation.

We know that the earth naturally possesses a certain degree of fertility, and will spontaneously produce plants more or less adapted for the food of man; but how small in quantity, and how inferior in quality, are such products in this their normal state, to those which can be drawn from the soil by the application of the industry and intelligence of man!

The great advances now making in agriculture, are mainly attributable to the aid of chemistry.

The object of chemistry, as applied to vegetable physiology and agriculture, is to examine into the composition of the numerous modifications of matter which occur in the organic and inorganic kingdoms of nature, and to investigate the laws by which the combination and decomposition of their parts are effected. Thus we learn what are the properties of the soil, and the composition of the atmosphere, upon which plants in their normal state of growth are mainly dependant for nourishment; also, the constituents of plants, and what are the essential and peculiar components of the soil adapted for their production, as well as the components of the different substances used as manures, and their influence in imparting to the soil the properties necessary for the nutrition and development of any particular kind of plants—knowledge appearing to me to be absolutely necessary to constitute a rational system of agriculture.

The farmers in this country have hitherto been accustomed not only to neglect the acquirement of this theoretical knowledge, but actually to despise it; whilst it is obvious great loss must have been sustained by attempting to grow plants on soil unadapted for their production, and by the improper and indiscriminate use of various manures applied in ignorance of their properties.

This prejudice is now, however, giving way before the light of science, and a new era in the agricultural world appears to have begun. Farming is now becoming the occupation of the learned and the scientific, who are exerting themselves in developing those natural resources designed from the beginning by an Almighty Power to supply us with the necessaries of life, every new discovery impressing us with awe at the vastness of the Power which created and governs all things, whilst we are struck with admiration at the adaptation, beauty, and grandeur of the great design, so fully evidencing the wisdom and goodness of God.

Being fully imbued with a sense of the importance of agriculture, whether affecting us as individuals or a nation, and having the honour to be a member of this society, established to promote its interests, I have thrown together these few general remarks upon the subject, and I will now, with the chairman's permission, read a letter on the subject of guano, which I some time ago received from a friend of mine, who has visited the guano islands of South America, to whom I applied for information respecting this valuable auxiliary to vegetation, with a view of rendering it to the members of this club; before which, however, it would, perhaps, be as well to give the result of a recent analysis made by the eminent chemist Volckel, who found one hundred parts of guano to contain

Urate of Ammonia	9.0
Oxalate of Ammonia	10.6
Oxalate of Lime	7.0
Phosphate of Ammonia	6.0
Phosphate of Magnesia and Ammonia	2.6
Sulphate of Potash	5.5
Sulphate of Soda	3.8
Sal Ammoniac	4.2
Phosphate of Lime	14.3
Clay and Sand	4.7
Organic substances not estimated, containtaining 12 per cent. of matter insoluble in water—soluble salts of iron in a small quantity—water	32.3
	100.0

The result of which analysis, says Professor Liebig, proves how admirably guano is fitted for manure, for not only does it contain ammoniacal salts in abundance, but also those inorganic constituents which are indispensable for the development of plants.

Mr. Eyre here read a letter from Richard Thirlwall, Esq., of Richmond, Yorkshire, who, after referring to matters pertaining to the year 1838, says, "Since then I have roamed the wild wastes of New Zealand, the prairies of New South Wales, the forests of Van Dieman's Land, the sunny regions of South America, and its snow-capped Andes; I went out as an agriculturist to New Zealand, but found the Company and their settlements a take in. But to the purport of your letter. The Chinca Islands, on the west coast of South America, in lat. 13 deg. 44 min. south, are those from whence guano is obtained in the greatest purity and abundance. These islands are distant about twelve miles from the small port of Pisco, where they form a scattered group, of various extent and irregular appearance. The one from whence ships load is the farthest seaward, and is about three miles in circumference; its height, on the loftiest point, being upwards of three hundred feet.

"The island is formed of granite rocks, supposed to have a uniform elevation of about 100 feet; on this the guano lies piled in a pure solid mass, reaching the above-mentioned height. As might be expected, from the potency of the ammonia, there is neither blade nor speck of vegetation upon it, or even water. The vessels, when loading, lie alongside the rocks in a somewhat dangerous position, and the guano is conveyed on board by means of a badly-contrived canvas shoot; the only labour required is digging it with mattocks, for it is in a hard, compressed condition; then throwing it into the mouth of the shoot, which delivers it into the vessel's hold. Only one part of the island has been worked upon. The thousands of tons already conveyed away have made scarcely any impression on the immense bulk, which resembles in magnitude and appearance the drifted sand-hills of the desert.

"It is said that this enormous accumulation is the excrement of a small black gull, about the size of a pigeon. That this is its true origin, the immense and almost incalculable quantity seems to deny, for this island is only one of the many scattered about equally covered. On the closest calculation, even from the beginning until now, taking into account the burning influence of a tropical sun, had they constantly covered the space, I think it would not be offering too decided an opinion to say it is almost impossible. However, it is nevertheless singular, that to the lowest part yet reached (100 feet, or more) all throughout, eggs, in a state of putrefaction, feathers, the bones of an animal of the phosa tribe, and a round stone about three pounds in weight, are occasionally met with. It is formed in layers, of unequal thickness, differing in colour—some light and some dark—and between each a fibrous matter, that I am inclined to think has been some species of sea-weed, proving the whole has been formed at stated intervals. The surface is coated over with a thick incrustation, of almost pure muriate of ammonia. When the bulk is disturbed, the ammonia given out is so strong as to cause an unpleasant sensation to the eyes, and severely to affect the organs of respiration. The labourers working amongst it suffer considerably, causing some to bleed from the nose and ears, others to swell in the extremities, and finally break up their bodily health.

"The reputed guano 'gull' at the present day burrows some two or three feet amongst the guano, where it forms its nest, and rears its young; their number, however, scarcely equals that of an ordinary rookery, neither do their holes betoken that at any period have their flocks so darkened the sky as is reported. Pelicans, shugs, penguins, and many others, are in vast flocks hovering round the island; yet they are never seen upon it, but frequent caverns, and roost on isolated rocks; so they cannot be said in anywise to have contributed their mite in its formation. It is a mystery, requiring the sapience of a Savan to unravel, and is well worthy the attention of the scientific, which, it may be hoped, will shortly be turned to it.

"The beneficial properties of guano, as a manure, have been long understood and applied in that country. On the conquest of Peru by the Spaniards, the aborigines were at that time (about 1530), it is said, known to use it; and from them the Spaniards gleaned the knowledge of its beneficial properties. At the present time it is extensively used, producing in that climate, where they entirely depend upon irrigation (rain being unknown), year after year without intermission, from the same land, most luxuriant crops. The soil is a fine rich loam. After being thoroughly cleansed and prepared for the seed, the guano is sown over at the rate of from 300lbs. to 400lbs. per acre, at a rough calculation;

it is then lightly turned in, that the soil may perfectly take up the ammonia, the seed sown, and afterwards the whole laid under water, and repeated as required.

"Guano, as applied by many in this climate, is little less than wasted (remember, I confine my remarks to Peruvian guano, which is dry, and resembling Scotch snuff), some sowing it with 'back end' wheat, others applying it in the spring in a liquid state, much diluted, and adopting many other schemes that are decidedly opposed to plain common sense.

"The principal points to be considered in the application of this manure are simply these: In guano, you have an article holding in its composition a powerful and volatile quality, which has been determined by chemists to be a valuable accessory, nay, I may almost say, the vital principle itself of vegetable life. Then, to combine this with the parent soil, and retain, as much as possible of its powerful and invigorating properties, is the great desideratum. Instead, therefore, of exposing it to the absorbing influence of the sun and atmosphere, as is the custom of some farmers in this country, it should be amalgamated with the soil, and applied at that season of the year when vegetation *commences* and is in activity, that the plant may receive, as of course at that period it must, the greatest benefit from it. This is the method pursued by the Peruvians, who, as I said before, have used and known the fertilizing properties of guano for more than three centuries.

"On pasture or meadow land, I would most decidedly recommend guano to be applied either during a shower of rain, or when the weather-wise are certain of its approach. My reasons for recommending this will be obvious from what I have before stated. Should the season be dry, then I would recommend a strong solution, which will be certain to make a handsome recompence; whilst the niggardly 'two ounces per gallon,' applied by some, is almost useless.

"For turnips, after the land is brought into a fine clean condition, let the guano be sown over, at the rate of from two to three hundred weight per acre; then harrow it over with a stout pair, so as to mix it thoroughly with the soil. This done, the soil may be thrown into rows ready for the seed. No other manure need be applied; and I will undertake to say, there will not be found a grub in the field.

"Guano effectually destroys the slug, when slightly sown over the plant affected by them. I have seen the experiment tried in South America, and its effects were instant death to the worm. I should always recommend the application of guano to turnips, whenever that plant is affected by the caterpillar or fly. Its application, if unsuccessful, will not be attended with much expense, or the total sacrifice of the article used, as the young plant will be materially benefited and invigorated by it."

A discussion upon the paper having taken place, the Chairman proposed a vote of thanks to Mr. Eyre, for his excellent paper, which he was sure would be received by the members of the club with a deal of pleasure, as it contained some very valuable information of an original nature, and in a concise form, which could not fail being of great benefit to those who would take the trouble of reading it. After the motion was seconded and carried, the Secretary announced that the next meeting would be held on the 10th September, when W. F. Dixon, Esq., of Birley House, had kindly offered to give a paper "On the importance of adopting a regular system, or routine, of cropping." A vote of thanks to the Chairman was then passed, and the meeting broke up.—*Sheffield Mercury*.

ECONOMICAL MODE OF FEEDING HORSES.

BY WILLIAM DYCE GUTHRIE, ESQ.

A considerable time has elapsed since the practice of cutting hay and straw and bruising oats was first recommended: but it has never as yet been, in my opinion, sufficiently practised; and the benefits of it have not been sufficiently appreciated. Some cannot see the advantages to be derived from such a practice; some will not take trouble; some find their men will not attend to it; some think their horses won't eat it; some think they won't thrive; and some are afraid it won't agree with them—that horses will purge and get soft if they are so fed. These, however, are all imaginary evils, which a fair trial would soon dispel. The writer then cites the experience of Mr. Croall, the extensive coach-proprietor, which is as follows, and will be found of the most satisfactory description:—Observing the advantages accruing from this practice; Mr. Croall states that he directed his attention still farther to the subject, gradually reducing the quantity of hay, and adding a quantity of cut straw. He then began to consider the quantities of nutritious matter in, and cost of, the various kinds of grain, and at length changed his system of feeding to the following. Each horse was given 15 lb. of the following mixture:—

10 bushels cut straw,	90 lb.
6 bushels bruised oats,	174
1 bushel bruised beans,	59
	323 lb.

Or of Oats, ...	8 lb.
Beans, ...	$2\frac{3}{4}$
Straw, ...	$4\frac{1}{4}$
	15 lb. to each horse.

And at night, in addition to the above, about 25 lb. of the following mixture:—

1 boll of potatoes, at 7s. 6d. 5 cwt. (steamed),	560lb.
Fine barley dust, 10d. per stone, ...	36
Cut straw, at 6d. per stone, ...	10
Salt, at 3s. per cwt., ...	6

From this it appears that the 'cost for each horse was about 5d. for supper, and about 1s. for daily forage and cookery; in all, about 1s. $5\frac{1}{2}$d." In Mr. Croall's establishment, "a man is constantly employed in preparing the food and serving it out, whose wages and the expense of fire are included in the above expense of feeding. With such feeding most people would have supposed that the horses would have been unable to do fast or severe work. It would have been expected that they would not run a stage without being fatigued; they, however, have kept their condition, and have improved by the feeding; and although, when Captain Cheyne proposed first to try the experiment, the post-lads insisted the horses would not be able to do their work on such soft feeding, and thought they would purge and become washy, they soon found their fears were imaginary; and experience has so fully convinced them of the advantage of such feeding, that their only anxiety now is to obtain a greater quantity of the *mash* at night."

SUFFOLK FARMERS, AND THEIR LEASES.

On Thursday, the 11th Sept., the annual dinner of the members of the East Suffolk Agricultural Association was held in the Assembly Rooms adjoining the Angel Inn, Halesworth. Upwards of 250 of the Suffolk farmers from the surrounding district and county generally sat down to dinner. The Right Hon. the Earl of Stradbroke, President of the Association, in the chair.

The noble Earl was supported by the Hon. Captain Rous, M.P.; Mr. R. N. Shawe, of Kesgrave; Mr. J. Moseley, of Great Glenhem-hall; Mr. W. Long, of Herts-hall; and Col. Barne, of Dunwich.

The cloth having been removed, and the usual loyal and patriotic toasts disposed of,

Mr. R. N. Shawe proposed the health of the Earl of Stradbroke.

The noble lord, in rising to acknowledge the compliment, was received with enthusiastic applause. When silence was restored his lordship spoke as follows:—Gentlemen,—In returning thanks to my friend on my right for the kind manner in which he has introduced my name as Her Majesty's representative for this county and the president of this society, I cannot do less than acknowledge the enthusiastic manner in which the toast has been received by you. The duties I have to perform in the first capacity are extremely light, in consequence of being surrounded by a body of magistrates as eminent for private character as they are zealous in public duty, and always ready by advice and attention to create and encourage the happiness and prosperity of the people (*Hear, hear*). As president of this society it now becomes a part of my duty to refer in some measure to the business of the day; and, first, I must regret that the circumstance of our having changed our place of meeting to this town has not been the means of introducing that increased quantity of stock which many anticipated, and which I should have been gratified to have witnessed, from the gentlemen farmers of this county. However, the stock exhibited, though not very numerous, is good, especially the horses and the Leicester and Southdown sheep, although the younger specimens of the former animals are not quite so good as the averages of former years. There are many subjects which it may be desirable to comment upon on an occasion like this, and one I should like to make a few remarks upon is the subject of leases—a subject which has occupied much public attention of late, and upon which much has been written and spoken (*Hear, hear*). The object of leases is three-fold—first, to enable and encourage the tenant to invest his capital, and to give him due and proper time to recover remuneration for that investment (*loud cheers*); secondly, leases are advantageous to the landlord, for they give him hope that his land will be better cultivated (*cheers*); and, thirdly, they are beneficial to the poor, because they insure them better and more constant employment than they could otherwise secure (*loud cheers*). It is my fixed opinion that the landlord does not perform the duty he owes to himself, the duty he owes to his tenant, or to the poor, unless he includes in the leases of his farms a clause to insure a certain portion of labour being continually employed on the land, the effect of which will be that the farms, if, unhappily, not renewed to the same parties, shall be given up in a good state of cultivation; and in such case the tenant ought to be entitled to adequate remuneration for the improvements he may have made (*cheers*). But I submit the practice would have a better effect still—it would encourage a desire to renew leases, and thus cement the affection and reciprocal feeling which are sure to be the result of friendly intercourse (*cheers*). I am aware there are in this county many energetic and skilful agriculturists who object to the clogging clauses—such as the four-course system. (*Hear, hear*). But the difficulty the landlord has to solve is this: how is he to distinguish between a skilful farmer and a land-jobber? It is true the one may cultivate a farm without detriment to the land, while the other, resting upon his own judgment, may ruin it in eight years, or injure it so much that a succeeding tenant could not hire it without a great reduction in the rent. (*Hear, hear*). Gentlemen, I am, then, an advocate for the rotation of crops as being most advantageous (*cheers*). Some of you present may remember I ventured to state that the crop harvested last year would be abundant throughout Great Britain and Ireland. It was abundant, and the effect of it is that you may anticipate for the present a low price for grain. The result of my anticipation proves the truth of my assertion, for from the close of the last to the commencement of the present harvest wages were not so low as 7s. a week, as stated in the public prints; neither were they so high as 11s. or 12s., as was boldly asserted by a high authority—Sir J. Graham—in the counties of Norfolk and Suffolk. You all know the price of wages was about 9s. (*Hear, hear*). If wheat had fallen, wages would have also fallen; if it had risen to what you term remunerative prices, they would have been raised (*cheers*). I have only to refer to years gone by to prove that such has been invariably the case. In 1793 they were 8s., in 1810, 21s.; in 1834, 8s.; and in 1838 and 1839, 12s.; thus constantly and invariably, as far as my information guides me, wages have been dependent upon the price of wheat (*cheers*). There can be no doubt that some relief was afforded from the circumstance of the great rapidity with which the railway was constructed from Bishop Stortford through Ely to Norwich, and also by the more sluggish works upon the line between Colchester and Ipswich. These works have been the means of affording much employment, and relieving various parishes from what would have been otherwise deemed a burden. (*Hear, hear*). There is another subject, upon which I shall only lightly touch, because I believe my worthy friend (the vice-chairman) is prepared to address you upon it: I allude to cottage allotment. (*Hear, hear*). My opinion is, they are productive of much good (*cheers*), and I am anxious to see every cottage united to either 1-8th or 1-4th of an acre of land. At the same time I would caution my more enthusiastic friends, and those who have the interest of the poor at heart, and who pursue honestly, but in some degree a mistaken notion, that if the time should come when there will be a great many occupiers of from one to two acres of land, they would see the curse of Ireland illustrated, namely, a vastly increasing population living in beggary and dying amidst crime *(cheers)*. I therefore caution those who are the advocates of the poor to take heed how they undertake to do that which may be fatal to the interests of the country. *(Hear, hear)*. The next subject which I shall touch upon is one which I think you ought to receive as deserving your best attention; but whether you agree with me or not, you ought to receive it in the way in which I wish to impart it. It is a well-known fact that the farmers of the present day are superior to those of seventy years ago; but if it is the desire of the farmers of this generation—as indeed it must be—to witness their sons stand in the honourable position that they themselves hold, it will be necessary for them to pay the utmost attention to their education, and to see that they are not kept behind in the rapid course of civilization. *(Hear, hear.)* Already there is established at Cirencester, in Gloucestershire, a college partly endowed, in which men of great science and professional skill have been engaged, and where young men can be boarded and educated for 30*l.* a year, and instructed in every branch of agricultural knowledge; where they will be instructed in the difference and variety of the soil, and the effects of different manures; and where they will be instructed in all the branches of scientific knowledge connected with agricultural pursuits. Should these studies prove successful, they will produce a set of young men capable of taking their position in society, and entering upon the science of agriculture as a means of livelihood which cannot fail to have the most beneficial effect upon this kingdom. *(Hear.)* I shall now conclude, with an anxious wish for the happiness of all present in their private capacities, and prosperity in their public stations. The noble Earl sat down amidst loud cheers.

To the toast of "The Army and Navy,"

The Hon. Captain Rous, M.P., responded. He contended that something must be done, if the population increased in the same ratio that it had of late years, to supply them with food. It was a well-ascertained fact that the inhabitants of this country were annually increasing to the extent of 400,000; and it was also well known that the resources of the country, though not developed to the extent to which they might be, never could be adequate to supply the wants of the people multiplying at such a rate. What, then, he asked, would be the case if this state of things existed forty years hence? The idea was a dreadful one to contemplate, and he was at a loss to conceive how any minister of this country could lay his head on his pillow and regard such a prospect without a feeling of horror. *(Hear, hear, and cheers.)* This country presented an anomaly to the practice adopted in all other countries similarly situated. He would not contrast it with any European state; he would compare the practice with the Celestial Empire, and he was quite sure that the result would prove that the government of China had far surpassed that of Great Britain in the measures they had taken to ameliorate the condition of the bulk of their people. What was the usual practice adopted in China in reference to the laws that regulated the importation of food? It must be recollected that in that country there was a population of not less than 300,000,000 souls. To provide that vast population with food, the government of China not only threw open their ports for the admission of foreign vessels conveying rice and other articles of consumption, but also relieved them from paying harbour dues, or the other ordinary charges connected with the admission of those articles. The hon. and gallant captain concluded by expressing a strong opinion in favour of a relaxation, at least, of the duties on colonial produce.

Several other toasts of a local tendency having been proposed and responded to, the company separated.

THE POTATO CROP.

At a meeting of the Hadleigh Farmers' Club on Friday, September 13th, the lamentable failure of the potato crop formed the principal subject of discussion. In the hope of allaying the alarm which prevails in the neighbourhood respecting the use of potatoes that have become partially injured, and also of suggesting a method by which a large amount of wholesome food may be saved from such as would otherwise be thrown away or given to pigs, it was resolved that a statement should be circulated, expressing the opinions of the Club on these subjects.

I. It appears to be certain, that the failure is entirely owing to the season having been unsuited to fully perfecting the tubers of most of the varieties of the potato.

II. Wherever the leaves and stems are dead, it is advisable to dig up the crop as speedily as possible; and to select the best tubers (to be kept apart from the rest) for seed-potatoes. It is probable there will be a great scarcity, when sets will be wanted, unless precautions are pretty generally adopted for saving the best.

III. The potatoes thus separated for sets should be preserved with more care than usual. They should be kept as dry as possible, and examined at intervals, to see whether any of them are beginning to decay, and all such should be immediately removed.

IV. The spotted and decaying potatoes should be carefully picked out from among such as are to be preserved in store for winter and spring use.

V. As there is great danger from a single decaying potato being left in contact with others in the same heap, lest it should tend to rot all around it, care must be taken to stack the store potatoes in layers, with sand or dry earth between them, and so that each potato may be prevented from touching its neighbours. A trench might be advantageously dug around the store; and if the whole were thatched it would tend to keep them very dry. It will be advisable to delay the operation of clamping as long as possible, to allow the potatoes to dry the more thoroughly.

VI. The progress of decay in the spotted potatoes may be stopped (at least for some time) by exposing them in dry situations to the light, but their decay will proceed if they are placed in the dark, or on moist ground.

VII. If the decaying parts are pared off, or cut out, the rest of the potato is perfectly wholesome. Many idle rumours have prevailed to the contrary, which are unworthy of credit.

VIII. If the decaying potatoes have not passed to a state of putridity, they may be safely given to pigs: but they would be improved by being scalded, with the addition of a little salt.

IX. It seems to be a providential arrangement that as yet the really nutritive portion of the potato is very little injured, even in those tubers which have become partially decayed, and appear to be wholly unfit for food. The nutritious portion of the potato consists of delicate white grains of starch-like matter, which are enclosed in little cells. When the cells are broken, the grains fall out, and collecting together form a beautifully white flour. It is very easy to separate this flour from the rest of the substance of the potato; and if a few persons in different villages would undertake to make the method generally known among the poor, a vast amount of wholesome food may yet be secured to them, which otherwise they will suffer to perish. From an experiment that has been tried during the past week, it appears that where 12 lbs. of flour can be extracted from a bushel of sound potatoes, 8 lbs. can be procured from such as have become so far decayed as to be useless as an article of food.

X. To obtain the flour separate from the decaying cells, the potatoes should be first very thoroughly washed, so that not a particle of dirt remains upon them: they should then be finely grated with a bread grater into a tub of water, and the pulp well stirred about to separate the particles of starch as much as possible from their cells. The whole should then be left to settle, and the heavier particles of starch will soon fall to the bottom, whilst the lighter skin and cells will continue floating in the water, and may be poured off with it. The mass of flour formed by the settling of the particles should be washed two or three times more, by pouring water upon it and stirring it about, and again leaving it to settle as before. After the flour is considered to be sufficiently washed, it must be spread upon a cloth placed on a board in the sun, or in a warm-room, to dry; or it may be dried in the oven after the bread has been removed. It may then be kept for any length of time, and when wanted, used like wheat flour for making puddings, &c. This process will be sufficient for common purposes, but a more perfect method may be described, by which the potato flour can be procured in its purest state, in which it is frequently sold for arrow root, and by a variety of other names as a delicate food for weak digestions, for children, and for the sick.

XI. The more perfect process for obtaining the flour in the form of "British arrow root" is as follows:—

1. Thoroughly wash the potatoes.
2. Peal away the skin, without cutting off much.
3. Grate the pealed potatoes finely into a pulp.
4. Place the pulp on a hair sieve, pour water over it, stirring it about well, till the water ceases to pass through with a milky appearance.
5. The pulp left on the sieve may be thrown away, and the milky water put aside to settle.
6. When the particles of starch have all settled, the water should be poured off, and fresh water added: the whole stirred up afresh and allowed to settle again.
7. These washings may be repeated four or five times, when the starch will have assumed the character of arrow root, and will have become white as snow, whilst the water will now be perfectly clear.
8. The prepared flour must be thoroughly dried, and may be kept for any length of time in jars or casks.

XII. When a dish of potatoes is about to be obtained from the inside parts of such as are only partially decayed, instead of pealing them, the decayed parts may be grated, and whatever starch can be extracted from these parts might be added to the boiled potatoes. Thus very little will be lost of the whole amount of nourishment which the potatoes would have contained if they had been quite sound. In many cases it may be more convenient to keep such gratings for three or four days, till enough has been collected to make it better worth while to complete the process.

XIII. In times of scarcity it may be useful for persons to be made aware of the fact, that excellent starch-like arrow-root may be procured from certain wild plants. In the Isle of Portland, some of the poor are in the habit of preparing it from the tubers of the plant commonly called "lords and ladies" *(Arum maculatum)*. The tubers are well washed and grated, and the pulp treated like that of the potato. The process gets rid of an acrid juice with which the fresh tuber abounds. This sort of arrow root is sold in the neighbourhood of Weymouth for about 8d. the pound.

XIV. It was suggested that local companies or societies might be formed, to buy up the decaying potatoes, and to employ some of the poor to prepare the starch, which could be sold at little or no loss. It is the practice in Scotland, when the store potatoes are found to be frozen, to extract the starch from them in the manner described.

THE POTATO DISEASE.

[FROM THE BRISTOL MERCURY.]

SIR,—My attention has been given to the disease which has shown itself so extensively amongst the growing potatoes. I find, in almost every instance, that the epidermis of the stalk *below* the surface of the ground, is more or less in a state of decay, often disintegrated, and completely rotten; the leaves and branches accord with the state of that part of the stalk below the ground. The tuber, beneath the outer skin, is first spotted brown (like a bruised apple): these spots extend and penetrate towards the centre, quite changing the nature of the potato. Those near the surface are most injured; in some cases the lowest on the root are not at all affected, while the upper ones are useless. I should therefore expect that the longer the crop remains in the land, the greater the injury will be. It seems, from the microscopic appearances, that the starch escapes injury for a long time after the skin and cellular parts are gone; and as the whole of the nutritive powers of the potato reside in the starch, I should recommend that wherever the disease has shown itself to any extent, the crop should be dug whether ripe or not, and the starch extracted by the following simple process—

After washing the roots, let them be rasped fine, and thrown into a large tub or other vessel; pour a considerable quantity of water, and well agitate and rub the pulp with the hands; all the starch or fecula will, from its great weight, fall to the bottom, while the skin and fibrous matter will be carried away by the water; wash the starch with one or two more waters, allowing it to fall after each washing; spread it upon cloths in a warm room, to dry—in this way about 20 or 21 lbs. will be obtained from every 104 lbs. of potatoes, and it contains as much nourishment as the original roots; it will keep any length of time, and might be used with flour to make bread, pies, puddings, &c., as well as farinaceous spoon-meat.

This is much better than throwing away the diseased roots, and will furnish food for tens of thousands who might otherwise want it. WILLIAM HERAPATH.

A NEW REASON IN FAVOUR OF LEASES.—At last term, a tenant at will of a few acres on the Panmure property, who is also a deacon of the free church in Carmyle, went to pay his rent to the factor, and the latter in handing him in his receipt, told him that he could not have his place again, and that it had been let to the neighbouring farmer, into whose land it lay. The man expressed his surprise at this, adding "Sir, I asked your advice (two or three years ago) about improving the land, and wished some security for my continuance in it, when you told me the more I improved it the better, and that there was no danger of my being removed. Accordingly, I have expended a great deal in putting the land into order last year." The factor did not attempt to deny the man's statement, but said, "You have left the established church, and adhered to Wilson, and Lord Panmure is determined not to countenance and support any person who does so. You were well warned of this beforehand." It thus appears that the threats which were abundantly uttered by the factor about the time of the disruption are to be executed by the gradual process of removing one or two free churchmen at a time; and while other proprietors, such as the Duke of Buccleuch and Lord Cawdor, can declare that they have never removed any tenant or servant for adherence to the free church, Lord Panmure is bold enough, or incautious enough, through his factor, to avow his doing so.—*Witness.*

GUANO.

TO THE EDITOR OF THE WAKEFIELD JOURNAL.

Sir—As I promised you my observations on the subject of guano, or rather on the meeting at our Farmers' Club to discuss that subject, I very gladly fulfil my engagement to you.

I must confess I was very agreeably surprised, for I rather expected a desultory, conflicting, and unprofitable discussion; but when the meeting was over, I thought it the best discussed subject we had ever had.

The opening speech of Mr. Briggs was a lucid and scientific one, giving theoretically and practically too the chemical analysis of guano and other manures, and a striking and clear comparison of the superior fertilizing properties of guano compared with most other manures, demonstrating that it was lasting in its effects also. To that gentleman we are deeply indebted for his research and communicated practice.

Mr. Brackenridge's confirmation of Mr. Briggs's remarks will give additional confidence to the user of guano; he also threw some useful light on the kind of ground best adapted to suit guano tillage.

Mr. Charlesworth's observations on the *proper time* to apply it, was well timed and of the utmost consequence.

Mr. Scarth's remarks by no means disproves the utility of guano, but rather says, Beware where you purchase, and how you apply it.

Mr. Farrar's various experiments, in detail, are excellent, and well worthy of being carried out—particularly the difference in the progress of turnips in the latter end of the season.

Mr. Hislop's remarks embrace proofs of its goodness, encouraging to farmers, and capital for cottage gardens.

Mr. W. Nicholson reminds one of the lad who said "I will not go," but afterwards excelled the one who said "I will go," but never went. His (Mr. W. N.'s) testimony is fine, and does not contradict Mr. Charlesworth as to the time of applying it; both the gentlemen's observations are really worthy of adoption, and no doubt will unravel many a disappointment from wrong application.

Mr. John Wood.—What a pity such a man, who exercised his good sense and spent his valuable time and money in purchasing and applying guano, should have met with such trash, instead of the genuine article! But after all, every good thing is liable to bad imitations, as the best coin is to the counterfeit.

Mr. John Moore's speech was one which carried conviction with it of the good resulting from a judicious application of guano.

Mr. Wm. Brown's speech was full of sensible remarks, very unusually so, and gave a fresh mode of application, which must be safe, and very probably the most perfect way of supporting and increasing vegetable life.

Mr. Bayldon and Mr. Johnson's speeches, though short, nevertheless added weight to the previous testimonies in favour of guano.

To conclude, I consider nearly all that the most fastidious could wish for on the subject of guano has been said at that meeting—from the grass in the valley to the oak on the mountain top—from the cabbage in the solitary cottage garden, to the staff of life—"bread," or rather wheat on the thousands of acres, both food for man and beast may be increased, and that abundantly and cheaper, by the proper use of guano. Who, then, ought to despise a description of this sort? The speeches in St. Stephen's—the oratory of the bar—the eloquence of the pulpit, meteor-like, dazzle but do not always profit. Not so the unaspiring farmer, who is now straining every nerve to supply that which supports alike the peasant and the prince.

I am, Sir, your obedient Servant,

W. Barratt.

St. John's, 1st Sept., 1845.

ON THE ADVANTAGE OF THICK SOWING.

By David Barclay, M.P.

The following is the result of some experiments which I made last year, in order to ascertain the relative merits of thin and thick sowing wheat, drilling, dibbling, and by broad-cast. They were conducted with great care upon five acres of level land of uniform quality, being a good deep loam on a chalk subsoil, following a clover ley folded by sheep. The land was ploughed about five inches deep, as it was not thought desirable to bury the sheep-dressing below that depth. The seed was put into the ground about the 7th of December, 1843, and the wheat was hoed in the Spring of 1844, except the acre sown by broad-cast, which was harrowed instead of being hoed. The plants in Nos. 2 and 3 (thin sowings) were by much the strongest, and looked the best throughout the season, until the approach of harvest, when it became evident that the quality of the grain and straw was inferior, more particularly on No. 2, which appeared to have suffered a little from mildew.

Samples of the different lots were submitted to an eminent miller, and the value of each determined by him; the straw was valued at the market price. (See next page.)

The results of these experiments are very remarkably in favour of thick sowing, and particularly of the old broad-cast system; and, if not conclusive against the doctrine of thin sowing, so strongly and, I may add, so ably advocated in the present day, should at least induce caution on the part of farmers before they depart from the practice of their forefathers. Indeed it is difficult to believe that so great an advantage as the saving of a bushel, or a bushel and a half of seed per acre can have been overlooked for so many generations. It seems more reasonable to suppose, that long practical experience has taught the farmer the more prudent course of a liberal supply of seed. It may however be contended, that had the ploughing been deeper and the seed put earlier into the ground, the result would have been different: this is not improbable, and it is possible the deficiencies in the quality and quantity of thin-sown wheat and straw might have been less observable, but the large differences which my experiment indicates could hardly, I think, have been made up. I have this year repeated the trial of thin-sowing, having drilled one acre on the 26th of October last (the land having been *deeply* ploughed), with 1 bushel of seed, the rest of the field having 2 bushels per acre. The result I shall be happy to communicate if desired.

ACCOUNT of EXPERIMENTS on the relative Merits of Thin and Thick Sowing, Drilling, Dibbling, and Broadcast, conducted on Eastwick Farm, in the County of Surrey.

No.	Quantity of Seed used per Imp. Acre.	System pursued.	Grain produced.	Weight per Bushel.	Straw produced.	Value of Grain.	Value of Straw.	Total Value of the Produce per acre.
				Lbs.	Trusses.			£ s. d.
1	$2\frac{1}{2}$ bushels	Drilled 9 inches apart.	Head .... 34 bushels Tail .... 3 ,, 37 ,,	$64\frac{3}{4}$	70	Head at 7s. per bush. £11 18s. 0d. Tail at 6s. 0 18 0 12 16 0	At 36s. per load, 3*l*. 10s.	Grain .. 12 16 0 Straw .. 3 10 0 16 6 0
2	1 bushel	Drilled 12 inches apart.	Head .... 22 ,, Tail .... 3 ,, 25 ,,	$62\frac{1}{2}$	51	Head at 6s. 6d. per bush. Tail at 5s. 6d. ,, 7*l*. 19s. 6d.	At 30s. per load.	Grain .. 7 19 6 Straw .. 2 2 6 10 2 0
3	1 bushel	Dibbled 12 inches apart	Head .... 28 ,, Tail .... 3 ,, 31 ,,	$63\frac{3}{4}$	63	Head at 6s. 9d. per bush. Tail at 5s. 9d. ,,	At 3s. per load.	Grain .. 10 6 3 Straw .. 2 17 9 13 4 0
4	1 bushel and 3 pecks	Dibbled 9 inches apart	Head .... 34 ,, Tail .... 3 ,, 37 ,,	64	72	Head at 6s. 9d. per bush. Tail at 5s. 9d. ,,	At 33s. per load.	Grain .. 12 6 9 Straw .. 3 6 0 15 12 9
5	$2\frac{1}{2}$ bushels	Sown broadcast.	Head .... 37 ,, Tail .... 3 ,, 40 ,,	65	84	Head at 7s. per bush. Tail at 6s. ,,	At 36s. per load.	Grain .. 13 17 0 Straw .. 4 4 0 18 1 0

Journal Royal Agricultural Society.

EXTENSIVE AND IMPORTANT SALES OF SHORTHORNS.

FROM THE DONCASTER GAZETTE.

Within the last few days several sales of improved short-horned cattle have taken place in Yorkshire and Nottinghamshire, especially within a few miles of East Retford; and in consequence of the importance attached to these changes of stock, we have given below, the prizes obtained for each animal, together with the names of the respective purchasers. As a few remarks, by way of preface, may not be deemed out of place, we briefly take the sales in the order in which they have taken place.

The Earl of Carlisle's sale was held at the farm, near Castle Howard, and was uncommonly well attended, not only by gentlemen from a considerable distance, but also by the gentry and farmers of the surrounding country. After sufficient time for inspecting the stock about to be offered for public competition, a capital cold collation was served up, and to which (to judge from appearances afterwards) ample justice was done. At two o'clock Mr. Wetherell mounted his rostrum, and commenced operations. The stock offered needs no encomium, suffice it to say that it consisted of some of the best blood in the kingdom; and when we mention the names of some of the bulls by which the animals were got, such as Mowthorpe, Rockingham, Belshazzar, Bulmer, Lord Marlbro', and several others, we think our readers will not require much further observations from us to prove its superiority. To the following list therefore we recommend them for further information.

Mr. Parkinson's sale at South Clifton, in this county, but on the opposite side of the Trent, was held on Thursday, the 11th; but as it was well known that that gentleman did not intend to offer the whole of his stock, but principally some of his young ones, the attendance was not quite so numerous as we had been led to anticipate. The gentry from a distance, however, were occupied the greater portion of the morning in examining and inspecting the stock about to be offered; and although many of them came from a considerable distance, yet they expressed themselves as highly gratified with the merits of the respective animals. A capital luncheon was prepared at the farm, to which all persons were invited to partake, and at a little before two o'clock Mr. Wetherell was again employed in the exercise of his vocation. The stock offered was capital, including the blood of Homer, Mowthorpe, Cossack, Sir Thomas Fairfax, Jenner, Hero, Prince, Ernest, &c., and ultimately obtained prices which were highly satisfactory to their well respected owner.

Mr. Hutton's sale, at Gate Burton, about a mile from Littlebro', was the next in succession, and took place on Friday last. The stock here, although some of it could not boast of lengthy pedigrees, as having descended from some of the first-rate animals which have been bred in this country, was excellent in quality, and in the best possible condition. But what gave an interest to it was that although not well bred, the cows have proved themselves excellent milkers, which is a desideratum not easily to be obtained with the finest bred animals. After the stock had been inspected in the lawn in front of the owner's mansion, a capital luncheon was partaken of by a large and respectable company. At a little after two o'clock Mr. Wetherell's tongue and glass were in active operation. A deal of the stock was descended from Rockingham, Ganthorpe, Gracchus, Bolsover, Paragon, and Lictor; and ultimately obtained prices which far exceeded the most sanguine expectations of their much esteemed owner. At the close of the sale some little unpleasantness took place between Mr. Wetherell and Sir William Cooke, relative to the purchaser of Blossom, No. 18. It appears that Mr. Wetherell had bid 60 guineas for the animal, and knocked her down to himself, without hearing Sir William's bid. At the close of the sale, however, Sir William demanded her, or otherwise that she should again be offered for competition. At first Mr. Wetherell refused to put her up again, but offered to give her up. This Sir William declined. At length she was put up again, when a spirited race ensued between Sir William and Mr. Wetherell, which was ultimately decided by Mr. Wetherell again knocking her down to himself at 100 guineas.

Earl Spencer's sale was held on the farm premises at Wiseton, near Bawtry, on Saturday last, and was attended, as might have been anticipated, by an extremely numerous and respectable company. The acknowledged ability of Lord Spencer in the selection of his cattle for breeding the improved pure short-horns, was a reason alone sufficient to ensure a spirited competition in the sale of any animals from his herd. In consequence, however, of it being the noble lord's intention to dispose only of a part of his herd, the attraction was somewhat diminished, although Lord Spencer had announced that the sale would comprise a selection of his herd in general, and as nearly as possible like those he reserved for future breeding. It is admitted by all breeders that the principal part, if not the whole, of this stock consisted of some of the best and purest herds in this or any other nation. The list below will show that here were the descendants of Monarch, William, Firby, Wiseton, Roman, Ranunculus, Evander, Wizard, &c., from which have sprung animals which are now located in most parts of the globe. Few have devoted so great a portion of their time and money in bringing the Durham breed to that state of perfection which it has at the present time attained as Lord Spencer, and no one more deserves the thanks of the public in promoting every measure calculated to advance agriculture both as a science or an art. At great personal attention, and at an immense expense for very many years, his lordship has shewn that he is a true farmers' friend: and it is pleasing to find that his lordship is everywhere held with that esteem he so justly deserves. The whole of the stock connected with this extensive establishment were kindly allowed to be inspected by the public, together with such improved agricultural implements as are employed on the farm. The machinery adopted for providing food for so great a number of animals, together with a powerful and excellent peg thrashing-machine, were, apart from the stock, very extensive sources of attraction, and evidently excited great astonishment amongst many who previously had never contemplated finding so complete an establishment for the purposes for which it is intended. The peg thrashing-machine is decidedly the most perfect and complete instrument of its kind we ever either saw or heard of; it not only thrashes the corn, but separates the chaff from the grain, afterwards screening it, and carrying it into a chamber, from which it is received into sacks placed against a conductor for the purpose. This is performed by steam, and at one operation. Shortly after one o'clock about nine hundred of the company present partook of a most princely luncheon, with a bountiful supply of very superior wine and malt liquor. About two o'clock Mr. Wetherell commenced the main feature of the day, and after a few words, began with the sale of the stock as will be seen below. Lot 50—the bull, Wizard—was not sold; and also lot 29; the former being put up at a reserve bid of 100*l*., and the latter not being in good health was not offered for sale. The cause of Wizard being put up at a reserve bid will be accounted for from the following note attached to the catalogue:—" Wizard was attacked by an inflammation in his hock on the 30th of August, which lamed him for a short time. He will therefore be warranted sound, and may be returned if he should fail. But as this circumstance may, notwithstanding the warranty, tend to diminish the competition for him, he will be put up with one reserved bidding, to be declared by Mr. Wetherell at the time of the sale, instead of being sold without reserve, as he otherwise would have been."

Mr. Henry Watson's sale took place at his farm, at Walkeringham, near Retford, on Monday last, and was equally, if not more numerously, attended than any of the foregoing, in consequence of its being known that the whole of his superior stock was to be disposed of. Towards noon, carriages, horsemen, and pedestrians were seen drawing towards the centre of attraction from every point; so that by twelve o'clock Walkeringham was completely thronged. The field where the animals were exhibited was more like a cattle fair than a sale. The whole stock, as was well known, was of a very superior order; having been selected and bred with the greatest care during several years last past. This gentleman's stock has taken several of the principal and first class prizes on several recent occasions, not only at the principal provincial agricultural societies, but also at the Royal English Agricultural Society. Several of the herd were descendants of Barningham, Cossack, Blyth, Ben, Comet, Comus, Hubback, and Lord Adolphus Fairfax. This latter animal's name was inserted in the catalogue, and had he been alive, would most probably have fetched a large amount; but our readers, many of them, will remember that he was found dead in his stall on the 22nd of July last. At one o'clock the company partook of a splendid cold collation, under a capacious tent erected for that purpose; after which, at a little before two, the sale commenced.

Of course it would be impossible to particularize the whole of the companies present at the above sales, but the following may be taken as a few of them:—Earl Ducie, Earl Spencer, the Earl of Carlisle, Viscount Galway, Sir Charles Keightley, Sir Wm. B. Cooke, Sir C. Tempest, Rev. T. H. Shepherd, Rev. W. C. Fenton, Rev. C. Hudson, Rev. J. Cooke, Rev. St. George Kirke, Rev. John Drake Becher, Rev. C. G. Smith, Rev. J. K. Miller, Rev. Thomas Checdle, — Dilk, Esq. H. B. Simpson, Eaton; H. B. Hickman, Esq., Thonock; Richard Milward, Esq., Thurgarton Priory; Charles Thorold, Esq., Welham; George Chapman, Esq., Welham; John Parkinson, Esq., Leyfields; H. Watson, Esq., Walkeringam; James Cross, Esq., Gringley; Richard Hodgkinson, Esq., Morton Grange; Monsieur St. Marie, agent to the French government; Hon. Capt. Spencer; Wm. Hutton, Esq., Gate Burton; John Beasley, Esq., Northampton; C. Clarke, Esq., Aisthorpe; — Dixon, Caistor; — Parrott, Esq. agent to Sir T. B. Leonard, Essex; J. Downs, Esq., Essex; J. Wilkinson, Esq., Lenton; — Birchall, Esq., Preston; H. T. Turner, Esq., agent to Earl Zetland, Aske Hall, Richmond; T. W. Newstead, Esq., Dunham; E. W. Wilmot, Esq., Worksop; Henry Thompson, Esq., Kirkley Lodge; John Bradley, Esq., Blyth; J. Rogers, Esq., Ranby; J. Booth, Esq., Killerby; Messrs. Clover and Sturgeon, London; Messrs. Slater, Carlton; Mr. Pell, Tupholm; Mr. Eastwood, Lancashire; Messrs. Smith, Raisen; Mr. Tucker, Wilts; Mr. Jonas Webb, Babraham; Mr. Strafford, artist; B. B. Colvin, Esq.; W. R. Baker, Esq., Herts.; William Hutton, Esq., Gate Burton; Robt. Field, Esq.; Mr. Hay; John Crossley, Esq., Lancashire; James Topham, Esq., Lincolnshire; J. Gillott, Esq., Oxfordshire; J. Gambles, Esq., Norfolk; J. Hutchinson, Esq., and J. Wilson, Esq., Banffshire; H. L. Maw, Esq. Setley; Wm. Bartholomew, Esq., Mr. Pell, and John Skill, Esq., Lincolnshire; Jas. Ladds, Esq., Bedfordshire; Wm. Torr, Esq., Riby; Messrs. Duddings, Saxby, and Panton, Lincolnshire; Mr. Bottomley, and Amos Cruikshanks, Esq., Aberdeenshire; Mr. Bates, Wiltshire; W. Torr, Esq., Riby; Mr. Job and Mr. Short, Martin; Messrs. Hall, Wiseton; Jos. Allison, Esq., Bilby; William Hepworth, Esq., Pontefract; Mr. Tindal, Wheatley; Mr. Sampson, Scaftworth; &c., &c.

The sales realized as follows, viz.:	Guineas.
The Earl of Carlisle's................	2341
John Parkinson's, Esq..............	1124
William Hutton's, Esq...............	1943
Earl Spencer's.....................	2259
Henry Watson's, Esq.	3510
Total....	11177

The following are the particulars:—

THE EARL OF CARLISLE'S SALE, CASTLE HOWARD.

TUESDAY, SEPT. 9.

COWS AND HEIFERS.

Lot.	Name.	When calved.	Sire.	By whom bought.	Gs.
1	Vestris	1835	Bright		Not sold
2	White Fashion...	1838	Mowthorpe..	Lord Ducie ...	35
3	Effie Deans......	1838	Viceroy	Mr. Thompson	36
4	Waxy	1837	Rockingham	Mr. Ripley ...	30
5	Hecuba..........	1839	Retriever.. .	Mr. Ripley ...	28
6	Isabel	1835	Belshazzar ..	Mr. Strafford .	36
7	Lady Graham....	1838	Blast........	Mr. Wood	53
8	Snowdrift........	1837	Rockingham	Mr. Dennis ...	38
9	Sweetbriar.......	1838	Snowball	Mr. Maw	26
10	Barbara Allen....	1837	Belshazzar...	Mr. Clark	47
11	Fancy	1837	Mowthorpe ..	Mr. Thompson	31
12	Frenzy	1837	Rockingham	Mr. Sugden ..	30
13	Patch the 4th....	1840	Arch-Duke ..	Mr. Dixon....	45
14	Lady Hovingham	1838	Rockingham	Mr. Dennis ..	39
15	Orelia	1839	Harry	Lord Ducie ..	50
16	Oyster Girl	1842	Bulmer......	Lord Ducie ..	37
17	Myrtle	1832	Grazier......	Mr. Allen	37
18	Mary the First ...	1840	Belshazzar ..	Lord Ducie ..	115
19	Mary the Second.	1840	ditto	Lord Ducie ..	180
20	Mary the Third ..	1840	Bulmer... ..	Mr. Mackintosh	59
21	Lady Sprightley..	1839	Mowthorpe ..	Lord Ducie....	61
22	Eglantine........	1840	Bellerophon .	Mr. Mackintosh	51
23	Honeysuckle	1842	Premier	Lord Ducie ..	51
24	Fawn............	1838	Artificer.....	Mr. Parker....	24
25	Streamlet........	1842	Belshazzar...	Mr. Giles......	45
26	Vesper	1842	ditto	Lord Ducie....	27
27	Sunrise	1841	Burlington ..		Not sold
28	Fair Lady	1841	Prince Albert	Mr. Dixon.....	43
29	Fancy	1838	Cramor	Mr. Slatter....	41
30	Kitchen Maid ...	1842	Posthumous .	Mr. Colvin	26
31	Red Rose........	1836	Benjamin....	Mr. Allen	26
32	Lilly	1842	Bulmer	Mr. Allen	25
33	Daphne	1842	Ditto	Lord Ducie	38
34	Fickle	1842	Ditto	Mr. Jackson ..	18
35	Bee's Wing	1842	Slygo	Mr. Jackson not sold.	
36	Lady Harriet	1842	Bulmer......	Mr. Giles......	41
37	Lady Howard....	1842	Ditto	Mr. Giles	not sold
38	Faith............	1842	Ditto	Mr. Giles......	61
39	Fame	1842	Ditto	Mr. Glies......	50
40	Seraphina.......	1843	Ditto	Mr. Colvin	40
41	Ophelia	1843	Ditto	Mr. Giles......	38
42	White Favourite..	1843	Ditto	Mr. Maw......	26
43	Monthly Rose ...	1843	Slygo	Mr. Wales.....	29
44	Patch the 5th....	1843	Bulmer	Mr. Wood	31
45	Lady Marion 2nd.	1843	Ditto	Mr. Tucker....	68
46	Sunset	1843	Ld. Marlbro'.	Lord Ducie....	40
47	Fair Lass	1843	Landlord	Mr. Tucker....	20
48	Lovely	1843	Bulmer	Mr. Dixon	22
	HEIFER CALVES.				
49	Olinda...........	1844	Bulmer		Not sold
50	Sister Margaret ..	1844	Vanwinkle ..	Mr. Stafford ..	62
51	Fawnsome	1844	Bulmer	Mr. Maw......	16
52	Idalia	1844	Ditto		Not sold
53	Idothia	1844	Ditto	Mr. Tucker....	46
54	Jessamine	1844	Ad. Stopford.	Mr. Tucker....	22
55	Wanton	1844	Ld. Marlbro'.	Mr. Ripley	40
56	Fairmaid	1844	Ditto	Mr. Tucker	40
57	Lovesome........	1844	Sweet Lad ..	Mr. Giles......	30
58	Lavender	1845	Ld. Marlbro'.	Mr. Ripley	20
59	Daydream	1844	Ditto .	Sir J. Johnson.	21
60	Dairymaid	1844	Ditto .	Mr. Tucker ...	31

No.	*Name.*	*When calved.*	*Sire.*	*By whom bought.*	*Gs.*
61	Mermaid	1844	Ditto	Mr. Giles	26
62	Selina	1844	Ditto	Mr. Ripley	40
63	Hyacinth	1845	Bulmer	Mr. Tucker	35
64	Sweet May	1845	Vandyke	Not sold	
65	Lady Marcia	1845	Ditto	Not sold	
66	Raspberry	1845	Guardian	Mr. Tucker	26
	BULLS.				
67	Ambo	1841	Fantastical	Not sold	
68	Vanwinkle	1841	Valentine	Not sold	
69	Sir George	1840	Bulmer	Not sold	
70	Sweet Lad	1841	Belshazzar	Not sold	
71	Sir Launcelot	1839	Rockingham	Not sold	
72	Lord Marlbro'	1841	Belshazzar	Mr. Tucker	44
73	Fitz Fairfax	1843	Ld. Marlbro'.	Mr. Stuart	
74	Snyders	1843	Slygo	Not sold	
75	Freebooter	1842	Bulmer	Not sold	
76	Sir James	1843	St. Martin	Mr. Tucker	
77	Sweet William	1841	Vanwinkle	Mr. Stafford	
78	Ishmael	1843	Bulmer	Not sold	
79	Gen. Fairfax	1844	Ld. Marlbro'.	Sir John Johnson	
80	Orpheus	1844	Ditto	Mr. Garforth	
81	Anticipation	1844	Sweet Lad	Mr. Colvin	
	BULL CALVES.				
82	Sir William	1844	Ld. Marlbro'.	Not sold	
83	Fanatic	1844	Ditto	Mr. Giles	
84	St. Martin	1845	Vandyke	Mr. Clover	
85	Swiss Boy	1845	Ld. Marlbro'.	Mr. Smith	
86	Lord George	1845	Ditto	Mr. Gofton	
87	Senator	1845	Ditto	Mr. Burt	
88	Frantic	1845	Ditto	Captain	
89	Osiris	1845	Vandyke	Mr. Thornton	
90	Lofty	1845	Huntingfield	Mr. Simpson	
91	Marlborough	out of lot 2		Lord Wenlock	91

The total amount of the above sale amounts to 2,341 guineas. Owing to our losing the last sheet of this catalogue we are unable to give the prices of the last few lots, but the aggregate is correct.

MR. PARKINSON'S SALE, SOUTH CLIFTON.

THURSDAY, SEPT. 11.

COWS AND HEIFERS.

1	Spangle	1844	Homer	Mr. Tucker	34
2	Letitia	1841	Brentwood	Mr. Forrest	41
3	Matilda	1838	Vantel	Mr. Colvin	21
4	Kate	1838	Vanish	Ditto	41
5	Kenah	1841	Lord John	Ditto	35
6	Junia	1835	Darlington	Not sold	
7	Vervain	1837	Colossus	Mr. Ladds	21
—	Her young Heifer Calf			Mr. Forrest	16
8	Vetch	1838	Norfolk	Mr. Ladds	36
9	Carmine	1835	Ambo	Rev. C. Thompson	17
10	Carnation	1840	Mowthorpe	Mr. Ladds	21
11	Queen of Trumps	1837	Nimrod	Mr. Gamble	21
12	Dirce	1839	Chorister	Mr. Colvin	33
—	Her young Heifer Calf			Mr. Stafford	10
13	Desdemona	1845	Prince Ernest	Not sold	
14	Moonshine	1831	Oliver	Mr. Hutcheson	19
15	Princetta	1830	Prince Wm.	Mr. Ladds	20
16	Jewel	1841	Cossack	Mr. H. L. Maw	30
17	Lucretia	1842	Lord John	Mr. Ladds	25
18	Lucy	1843	Austerlitz	Mr. Eastwood	30
19	Flora	1843	Stirling	Not sold	
20	Josephine	1843	Sir Thomas Fairfax	Mr. Colwin	26
21	Jonquille	1843	Ditto	Mr. Wetherell	24
22	Vidonia	1843	Ditto	Mr. Forrest	30
23	Pyrrha	1843	Jenner	Ditto	35
24	Moonbeam	1843	Hero	Mr. Colvin	21
25	Moonlight	1843	Ditto	Ditto	22
26	Chyrstal	1844	Prince Ernest	Mr. Wetherell	36
27	Vermillion	1844	Ditto	Not sold	
28	Vesta	1844	Ditto	Mr. Forrest	28
29	Myrth	1844	Ditto	Mr. Tucker	31
30	Fancy	1844	Ditto	Not sold	
31	Kerchief	1844	Ditto	Rev. C. Thompson	18
32	Dowager	1844	Ditto	Mr. Wetherell	35
33	Pastime	1844	Ditto	Mr. Forrest	37
34	Victorina	1845	Ditto	Not sold	
35	Queen Catherine	1845	Crotch	Not sold	
	BULL CALVES.				
36	Margate	1844	Prince Ernest	Mr. Gillott	35
37	Waltham	1844	Ditto	Mr. Balfour	16
38	Pharos	1845	Sir Thomas Fairfax	Earl of Scarborough	31
39	Laurel	1845	Crotch	Mr. Booth	28
40	Morpeth	1845	Prince Ernest	Mr. Tucker	18

No.	*Name.*	*When calved.*	*Sire.*	*By whom bought.*	*Gs.*
41	Comus	1845	Ditto	Mr. Gamble	21
42	Euston	1845	Ditto	Mr. Hay, N. B.	21
43	Kingston	1845	Ditto	Mr. Gillott	13
44	Splendour	1845	Ditto	Mr. Wilson, N.B.	15
45	Manchester	1845	Ditto	Withdrawn	
46	Cyrus	1845	Crotch	Not sold	
47	Jurist	1845	Prince Ernest	Mr. Minta	16
48	Colchester	1845	Ditto	Not sold	
49	Malton	1845	Ditto	Mr. Hay	23
50	Matadore	1845	Crotch	Not sold	
51	Sultan	1845	Diamond	Not sold	
52	Keswick	1845	Crotch	Not sold	

The prices for the above, which are held in high estimation, are considered moderate. A yearling heifer, and the heifer calf that gained a prize at Beverley, were afterwards sold by private contract at great prices to Mr. Eastwood.

MR. HUTTON'S SALE, GATE BURTON.

FRIDAY, SEPT. 12.

COWS AND HEIFERS.

1	Laura	1837	Commodore	Dead	
2	Gentle	1838	Prince Comet	Mr. Brantingham	27
3	Allenby's Duchess	1840	Faithful	Mr. Bottomby	20
4	Conceit	1840	Dulverton	Mr. Ladds	36
5	Rosebud	1836	Cossack	Mr. R. Smith	16
6	Fancy	1838	Rockingham	Mr. Torr	28
7	Margaret	1838	Ditto	Captain Shawe	41
8	Maniac	1838	Ganthorpe	Mr. Thompson	20
	Bull Calf by ditto			Mr. Stephenson	4
9	Spring Flower	1838	Ganthorpe	Mr. Wetherell	36
10	Isabella	1838	Ditto	Mr. Colvin	31
11	Gruyere	1839	Ditto	Mr. Torr	22
	Heifer Calf belonging to same			Ditto	10
12	Duchess	1839	Ditto	Captain Shawe	25
13	Holyock	1840	Ditto	Rev. C. Nevile	23
	Bull calf belonging to same			Mr. Maw	5
14	Lady Anne	1833	Ditto	Mr. Maw	16
15	Adelaide	1849	Ditto	Mr. Torr	42
16	Cowslip	1840	Ditto	Mr. Torr	29
17	Susannah	1840	Ditto	Mr. Gillott	23
18	Blossom	1841	Gracchus	Mr. Wetherell	100
19	Mermaid	1841	Ditto	Mr. Wetherell	37
20	Blanche	1841	Ditto	Rev. C. Nevile	31
21	Laurel	1841	Ditto	Mr. Gillott	37
22	Fashion	1842	Ditto	Mr. Thompson	47
23	Claudia	1842	Ditto	Rev. C. Nevile	37
24	Juliet	1844	Ditto	Ditto	37
	Heifer calf by her			Ditto	17
25	Sunflower	1842	Ditto	Ditto	39
26	Zenobia	1842	Ditto	Captain Shawe	38
27	Bracelet	1843	Ditto	Mr. Baker	37
28	Madcap	1843	Bolsover	Mr. Ladds	37
29	Purity	1843	Ditto	Mr. Colvin	27
30	Parmesan	1843	Ditto	Mr. Mapletoff	32
31	Evelina	1843	Ditto	Captain Shawe	36
32	Lady Charlotte	1843	Proselyte	Mr. Ladds	26
33	Crocus	1843	Paragon	Mr. Wilson	27
34	Rosemary	1844	Ditto	Ditto	37
35	Raspberry	1844	Ditto	Mr. Skipworth	13
36	Favourite	1844	Ditto	Mr. Gillott	27
37	Sarah	1844	Ditto	Rev. F. Peel	23
38	Augusta	1844	Lictor	Rev. C. Nevile	37
39	Empress	1844	Ditto	Mr. Hutcheson	37
40	Auricula	1844	True Blue	Mr. Ladds	21
41	Cleopatra	1845	Lictor	Rev. J. Cooke	26
42	Cornelia	1845	Ditto	Mr. Mapletoff	36
43	Briseis	1845	Ditto	Mr. Torr	27
44	Susan	1845	Ditto	Rev. C. Nevile	20
45	May Flower	1845	Ditto	Ditto	15
	BULLS.				
46	Lictor	1841	Ranunculus	G. Wentworth, Esq.	70
47	Emperor	1844	Lictor	Mr. Wetherell	250
48	Agricola	1845	Ditto	Mr. Copeland	15
49	Senator	1845	Ditto	Mr. Wetherell	25
50	Consul	1845	Ditto	Mr. Wilson	86
51	Cæsar	1845	Ditto	Mr. Tucker	54
52	Woldsman	1845	Ditto	Mr. Fenton	22
53	Pompey	1845	Ditto	Mr. Wakefield	13
54	Soldier	1845	Ditto	Captain Shawe	40

The 44 cows and heifers fetched 1,368 guineas, and the 9 bulls 575 guineas; making a grand total of 2,082*l.* 3s.

EARL SPENCER'S SALE, WISETON.

SATURDAY, SEPT. 13.

COWS AND HEIFERS.

1	No. 55	1829	Monarch	Mr. Topham	21
2	Cassandra	1834	William	Mr. Gillott	28

No.	Name.	When Calved.	Sire.	By whom bought.	Gs.
3	Fascination	1835	Ditto	Mr. Lakin	22
4	Honeysuckle	1836	Ditto	Mr. Parkinson	41
5	Heartsease	1837	Ditto	Ditto	27
6	Edith	1837	Roman	Mr. Hutton	25
7	Ultima	1837	Firby	Mr. Gillott	32
8	Desdemona	1837	Ditto	Mr. Skipworth	27
9	Henrietta	1837	William	Mr. Parkinson	28
10	Nemophylla	1838	Wiseton	Mr. Lakin	33
11	Sage	1838	William	Mr. Gray	34
12	Quill	1838	Ditto	Ditto	26
13	Gentian	1838	Roman	Earl of Zetland	63
14	Rosemary	1839	Ditto	Mr Stephenson	21
15	Isabella	1839	Wiseton	Rev. C. Neville	20
16	Flirt	1839	William	Capt. Shawe	43
17	Arethuisa	1839	Roman	Mr. Hutton	37
18	Ophelia	1840	Wiseton	Mr. Topham	65
19	Angelica	1840	William	Lord Ducie	47
20	Agrippina	1840	Roman	Mr. Hutton	43
21	Aspasia	1840	Sweet William	Sir W. E. Welley	27
22	Madalene	1840	Roman	Ditto	50
23	Utopia	1840	Wiseton	Mr. Lakin	22
24	Horatio	1840	Roman	Mr. Wetherell	38
25	Petunia	1841	Wiseton	Rev. C. Nevile	36
26	Misidora	1841	Hecatomb	Sir W. E. Welley	50
27	Auricula	1841	Roman	Mr. Walker	33
28	Cilt	1841	Ranunculus	Sir W. Cooke	26
29	Banksia	1841	Ditto	Not offered (lame)	
30	Cecilia	1842	Orontes	Mr. Parkinson	80
31	Jewell	1842	Wiseton	Mr. Thompson	32
32	Emily	1842	Sweet William	Mr. Hutton	26
33	Genoa	1842	Ranunculus	Mr. Gray	35
34	Tin	1842	Sweet William	Sir W. Cooke	49
35	Tragedy	1842	Zenith	Rev. C. Nevile	33
36	Peach	1842	Ditto	Mr. Wetherell	40
37	Passion	1842	Ranunculus	Mr. Trinder	50
38	Fragrance	1843	Olympus	Mr. Wetherell	31
39	Pelisse	1843	Wiseton	Ditto	53
40	Bacchante	1843	Ranunculus	Mr. Walker	26
41	Rebecca	1843	Ditto	Mr. Trinder	66
42	Finery	1843	Wizard	Mr. Maw	21
43	Norma	1843	Ditto	Mr. Forrest	43
44	Oxygen	1844	Ditto	Mr. Gillott	30
45	Clove	1844	Ditto	Sir W. E. Welley	32
46	Posthuma	1844	Ranunculus	Earl of Zetland	29
47	Fuchia	1844	Wizard	Ditto	30
48	Scribble	1844	Ditto	Rev. C. Nevile	22
49	Tansy	1845	Ditto	Ditto	22
	BULLS.				
50	Wizard	1841	lame, but put up and then withdrawn		
51	King Lear	1844	Wizard	Earl of Burlington	200
52	Pontifex	1844	Ditto	Mr. Hutton	61
53	Arcadian	1844	Evander	Mr. G. Johnson	33
54	Zadig	1844	Wizard	Mr. Gray	130
55	Nowreddin	1845	Ditto	Capt. Shawe	35
56	Mazeppa	1845	Ditto	Sir T. Lenard	60
57	Another calf			Mr. Walker	22

The cows and heifers at this sale realized 1,718 guineas, and the bulls 541 guineas; making a total of 2,371*l.* 19s.

MR. HENRY WATSON'S SALE, WALKERINGHAM.

Monday, Sept. 15.

COWS AND HEIFERS.

Lot.	Name.	When calved.	Sire.	By whom bought.	Gs.
1	Matilda		Champagne	Mr. Walker	26
2	Ellen	1834	Remus	Mr. Gillott	37
3	Red Rose	1835	Priam	Mr. Thompson	32
4	Barnpton Rose		Expectation	Mr. Smith	82
5	Flighty	1836	Woodford	Mr. Stafford	30
6	Gohanna	1837	Tartar	Mr. Skipworth	29
7	Margaret	1838	Ditto	Mr. Hutcheson	36
8	Sylvia	1838	Eclipse	Mr. Topham	32
9	Bessy	1838	Thick Hock	Mr. Stafford	68
10	Ruby	1839	Renown	Mr. Townsend	30
11	Strawberry	1839	Second Comet	Mr. Smith	92
12	Princess Royal	1839	Thick Hock	Earl Ducie	230
13	Buttercup	1841	Garrick	Mr. Eastwood	130
14	Madeline	1841	Raree Show	Mr. Barratt	30
15	Dorothy	1840	Plenipo	Mr. Dilk	40
16	Alice	1840	Brother to Waddy's bull	Mr. Gamble	35
17	Thetis	1840	Renown	Mr. Townsend	33
18	White Lady	1841	Charles XII.	Mr. Gillott	29
19	Miss Pickwick	1840	Pickwick	Mr. Wilson	30
20	Zitella	1841	Sailor Boy	Mr. Hutton	23
21	Tulip	1842	Expectation	Mar. of Exeter	60
22	Emerald	1842	Raree Show	Mr. Maw	25
23	Nemesis	1842	Bellerophon	Mr. Bakewell	34
24	Hoyden	1842	Bardney	Mr. Johnson	26
25	Serenade	1842	Raree Show	Mr. H. Smith	30
26	Imogene	1842	Ditto	Mr. Stafford	36
27	Briseis	1842	Ditto	Mr. Stafford	40
28	Miranda	1843	Bellerophon	Mar. of Exeter	73
29	Eglantine	1843	Ditto	Mr. Thompson	44
30	Marion	1843	Ditto	Mr. Dixon	50
31	Marcia	1843	Ditto	D. of Buccleuch	34
32	Venus	1843	Ditto	Mr. W. Smith	100
33	Statira	1843	Ditto	Mr. Wetherell	76
34	Roxana	1843	Endymion	Rev. J. D. Becher	33
35	Rebecca	1843	Belshazzar	Mr. Thompson	68
36	Sophy	1843	Ditto	Sir R. Pigott	51
37	Bustle	1843	Ditto	Mr. Stafford	120
38	Sylph	1843	Ditto	Sir R. Pigott	51
39	Mary Brame	1843	Bellerophon	Mr. Dixon	24
40	Cherry	1844	Rathreagh	Mr. Bakewell	24
41	Ceritor	1844	Ditto	Mr. Bakewell	28
42	Countess	1844	Ditto	Mr. Stephenson	27
43	Yarico	1844	Ditto	Mr. Stafford	35
44	Thais	1844	Ditto	Mr. Stafford	40
45	Mayflower	1844	Ditto	Mr. Wetherell	26
46	Cowslip	1844	Belshazzar	Mr. Crossley	27
47	Rustic	1844	Endymion	Rev. J. D. Becher	17
48	Syringa	1844	Rathreagh	Sir R. Pigott	31
49	Beauty	1844	Brigadier	Mr. Skipworth	19
50	Anticipation	1844	Lord Adolphus Fairfax	Mr. Stafford	45
51	Bellona	1844	Ditto	Mr. Stafford	52
52	Harvester	1844	Ditto	Mr. Eastwood	60
53	Britannia	1844	Ditto	Mr. Wetherell	71
54	Warren Rose	1844	Ditto	Sir R. Pigott	47
55	Bee's-wing	1845	Ditto	Mr. Stafford	65
56	Maud Mary	1845	Ditto	Mr. Stephenson	30
57	Octavia (dead)				
58	Stella	1845	Ditto	Mr. Walker	28
59	Thalia	1845	Ditto	Mr. Maw	25
60	Howri	1845	Ditto	Mr. Johnson	20
61	Symphony	1845	Rathreagh	Mr. Fenton	17
61	A heifer	1842	Raree Show	Mr. Barthomew	19
	BULLS AND BULL CALVES.				
62	Lord Adolphus Fairfax	1840	Sir Thomas Fairfax (dead).		
63	Rathreagh	1841	Collard	Mr. Ladds	63
64	Fairfax Royal	1844	Lord Adolphus Fairfax	Mr. Cruikshanks	150
65	Rathmoylan	1844	Endymion	Mr. Gamson	41
66	Van den Bosch	1844	Rathreagh	Mr. Watson	25
67	Robin Hood	1844	Lord Adolphus Fairfax	Mr. Hay	67
68	Foig-a-Ballagh	1844	Ditto	Mr. Dilk	61
69	Boccaccio	1845	Rathreagh	Mr. W. Bower	100
70	Mangrabin	1845	Lord Adolphus Fairfax	Mr. Brown	25
71	Ranger	1845	Rathreagh	Mr. H. Smith	36
72	Senator	1845	Lord Adolphus Fairfax	Mr. Bartholomew	28
73	Mesmer	1845	Ditto	Mr. Edgington	53
74	Rubric	1845	Ditto	Mr. Wilmot	16
75	Terminus	1845	Ditto	Lord Galway	33

The cows and heifers fetched 3,812 guineas, and the bulls and bull calves 698 guineas.

THE PROPER DIRECTION OF THE TRACES IN HARNESS.—It is universally admitted that the best way of applying the power of horses is by means of shafts or traces, to carriages. The best position of the traces, or shafts, when a horse is made to exert himself to draw in a carriage, is so well known and understood by those who are daily in the habit of "hanging to," that it needs scarcely be noticed. The trace, when a horse leads forward to draw, should become perpendicular to the collar, and parallel to the plane of the road on which he is moving. In moving up a hill the trace should become parallel to the plane of ascent. When he is standing at ease, the direction of the trace should be a little upwards; because when urged to draw, he leans forward, and in so doing he lowers the forepart of his body, which will tend to bring the trace parallel to the plane when his power is fully applied. If any deviation from the parallel be admitted, it is desirable such deviation should incline upwards rather than downwards. If the direction were downwards below the parallel, the power of the animal would have a tendency to increase the friction by pulling the wheels into the cavities of the road. After contemplating these remarks, the following suggestions present themselves :—The radius of the fore-wheels should be less than the height from the road to the point of draught on the shoulder of the animal. The shaft or pole should be hung on a level with the centre of the wheel. The least horse, or rather the horse of lowest stature in a team, ought to be selected for the shafts, and he ought not to be so low as to cause them to incline downwards towards the road. In selecting a team, the tallest horse should be placed first, and the others ought to be so placed as to descend regularly down to the stature of the shaft-horse, in order to preserve a continued ascent in the line of traction. If a regular line of ascent be not preserved, as it will not, by placing a low horse between two tall ones, it is not difficult to show that a portion of their power will be lost in acting against one another, and thus render their united effect not so powerful as it might be by a different and proper arrangement. To the individuals acquainted with the elementary principles of mechanics, these suggestions will appear natural and obvious ; but, in practice, it is known that the temper, age, and steadiness of the animal mostly regulate the situation in which we find him placed in the team ; and therefore deviations from the rule laid down respecting stature will often be necessary, and perhaps desirable. In teams of perfectly well-trained horses, the rule may be adopted with advantage.—*Elements of Road Engineering, by a Practical Surveyor.*

SHALLOW CULTIVATION.

We copy the following interesting paper, upon a subject on which much misapprehension, not to say ignorance, exists, from the Journal of the Royal Agricultural Society. The paper is written by Mr. Henry Parker, of Fairford, Gloucestershire, and is entitled, "On the Advantage of very Shallow Cultivation on a light Moory Farm in Gloucestershire."

Having had considerable experience in the cultivation of moory land, and having for several years turned my attention to the best method of procuring early spring feed, I proceed to state my mode of management upon a farm of 200 acres of arable land of light, poor, thin moory soil, with a subsoil of either blue or white clay, peat, or white gravel.

ROTATION OF CROPS.

First	year,	Early turnips	No. 1
Second	,,	Wheat	2
Third	,,	Vetches and turnips, or Swedes	3
Fourth	,,	Barley	4
Fifth	,,	Meadow grass, *Lolium perenne*, var.	5
Sixth	,,	Meadow grass, second year .	6

FIRST YEAR, CULTIVATION FOR TURNIPS.

No. 1. This portion being always the second year's seeds of No. 6, I breast-plough and burn, throw the ashes equally over the land ; breast-plough again rather deeper than before, harrow and drill with the turnip seed (sufficiently wide to admit of the horse-hoe) sixty bushels of artificial manure, consisting of lime, wood, and turf-ashes, in equal quantities, leaving it lightly rolled ; and when the plant is high enough, I commence using the horse and hand hoes, which I continue to do very frequently throughout the summer, thereby encouraging the growth of the turnips, and enabling me to begin feeding them off in the month of August.

SECOND YEAR, CULTIVATION FOR WHEAT.

No. 2. The turnips of No. 1 being consumed, I breast-plough to mix the sheep manure with the soil, horse-plough very lightly, drill $2\frac{1}{4}$ bushels of red Lammas wheat per acre, leave it till the spring following, and before the horse-roll can be used, send women to tread it, and, if occasion requires, tread it again ; after which I have it twice hoed. I have found more benefit from this mode of pressing than any other, being done at a time when wheat, on this description of soil, requires assistance.

THIRD YEAR, CULTIVATION FOR TURNIPS.

No. 3. The stubble of the wheat-crop of No. 2 being cleared, I breast-plough, plant two bushels of winter vetches per acre, hoe them the spring following ; when fit, feed them with sheep. Breast-plough, rake up, and burn everything that would be in the way of the drill or horse-hoe ; drill in, with the turnip seed, ten bushels of bones per acre, lightly roll it, and adopt the same management with regard to hoeing as described in the cultivation of No. 1. After the turnips of this field (No. 3) have been eaten, I again use the breast-plough, and leave it till the time of planting barley, when I—

FOURTH YEAR, CULTIVATION FOR BARLEY.

No. 4. Breast-plough, harrow, drill four bushels of barley, and sow two bushels of meadow-grass seed, *Lolium perenne*, var., and four pounds of red or broad clover per acre ; harrow and roll. The meadow-grass being intended for early, and the clover for late food.

FIFTH YEAR, MEDOW GRASS.

No. 5. The turnip crop of No. 3 being now nearly consumed, and the couples requiring a change of food, I am enabled, by about the 6th of April, to place them on my early spring food; which being eaten, I leave for seed ; and when the lattermath is fit, again hurdle it off with the ewes during the day, removing them every night to the turnips of No. 1, which are now being stocked to plant with wheat.

SIXTH YEAR, MEADOW GRASS.

No. 6. This being a two-years' ley, I feed it the whole year ; the early part of the season allowing the sheep to remain in the same field ; but the latter part, removing them every night as described in No. 5.

MANAGEMENT OF THE FLOCK.

I will begin with the month of August, when I have commenced feeding the turnip crop of No. 1. The flock would now consist of 150 stock ewes, 75 ewe and 75 wether lambs ; the stock ewes going during the day to the lattermath of No. 5 or 7, returning at night to No. 1, to leave extra manure and firm the land for the succeeding wheat crop ; the lambs remaining wholly in No. 1, eating corn, and having their turnips cut till consumed, when the wheat is planted and the flock removed to the turnips or Swedes of No. 3, where they remain till about the sixth of April. The turnip crop being now nearly consumed, the wether tegs are sold to the butcher, the ewe tegs left to finish the few remaining turnips of No. 3, and the ewes and lambs removed from the pen used for yeaning to the early spring feed of No. 5, now fit to receive them, which, from not having been stocked the preceding year after harvest, but allowed to grow, has been protected from the frost, and is rendered more wholesome by the young and old grass being eaten together, so that the sheep do not scour. Food of this description at this early period of the season, upon a poor, thin, moory farm, without an acre of meadow land, I find of most essential service, particularly for my ewes and lambs, having always observed that, although taken from turnips or Swedes, sainfoin hay, and a well-littered comfortable pen to lodge in at night, they have made a decided improvement when placed on this food. I would here remark, that on this day, the 24th of February, while moory land generally is wearing a russet withered appearance, this grass of No. 5 looks green and flourishing, and appears in no way to have suffered from the inclemency of the weather. I have never been able to obtain keep of any other description so early that will not scour, possessing so much nourishment, or capable of yielding the quantity of milk, on this description of land. I do not allow my sheep to have their food without being hurdled to them every day, thereby making it go further, and keeping the flock more in the same condition throughout the year; and that the lambs may go forward, have more liberty, and pick out the shortest and sweetest of the keep, I have "creepers" placed so as to enable them to do so. I have never known this grass killed by the frost, although my wheat in the adjoining field has; neither have I found it possess any evil tendency to draw the soil or deteriorate the succeeding crop. About the 12th of May I remove the sheep from No. 5 to No. 6. I have always considered the crop of seed to be nearly as much, and the quality better, than if it had not been stocked from the manure left, and the land being firmed by the treading of the sheep. Indeed, were this field, No. 5, to produce nothing more than the early food spoken of, so valuable have I found it, that I believe it already to have nearly paid its rent; but, in addition to this, it affords me a crop of seed, the straw of which is consumed by the stock ewes during the winter when on turnips; and from the clover seed sown with the grass, food is obtained the same year after the seed has been carried; and again the following year is fit to be stocked after the early spring feed of No. 5 has been consumed, and upon which, No. 6, the sheep are now placed where they remain till the vetches of No. 3 are fit to hurdle: upon which, with the assistance of the lattermaths of Nos. 5 and 6, I am enabled to keep them until the early turnips of No. 1 are again fit to begin.

By this mode of management an economical system is followed up through the whole course, by being nearly all performed by manual labour, by which means a remunerating crop will be produced and the land always kept firm, which is the only difficulty to be overcome on this description of soil. The farm, when first taken by me, was wet, as much out of condition, and as light and weak as it well could be, parts of it being merely held together by the roots of grass and weeds natural to moory land, but which must be very prejudicial to the production of those crops that are to benefit the farmer.

I commenced by draining, and then pursued the foregoing system of cultivation, by which my most sanguine expectations have been realized, though I was told that the land would be too light and too poor to plant wheat after turnips. I have never found any ill effects from paring and burning, experience having taught me that it produces a manure particularly beneficial to the growth of turnips, thereby enabling me to firm the land by sheep: for were other means used to destroy the turf of the second year's seeds, No. 6, they would seriously injure and weaken the soil, and cause much difficulty in raising the turnip crop, which difficulty I appear now to have overcome, although I plant them twice during the course; and were the turf not destroyed, the effects would be equally injurious. I rent another farm of 400 acres, half of which is a weak soil upon a subsoil of gravel with veins of clay; the remaining half is stone brash.

Fairford, Gloucestershire, Feb. 24, 1844.

NOTE BY MR. PUSEY.

This statement of a practical farmer appears to me very remarkable, as bearing upon the supposed necessity for stirring all soils deeply. So far the other way does Mr. Parker's experience point, that he actually gives his farm only one horse-ploughing, and that a shallow one, during his six years' rotation. The breast-plough, which he uses at other times, is the same instrument as is figured under the name of a paring spade in another part of this number. The workman forces it forward with his thighs, and turns over no more of the ground than a gardener who is taking off the turf of a pleasure-ground. Yet, excepting one horse-ploughing, this is all the stirring which Mr. Parker gives to his farm for six years. The breast-plough, indeed, is perseveringly used by him—twice in the first year, once in the second, no less than three times in the third year, and once again in the fourth. Instead of loosening the soil, Mr. Parker's efforts tend to preserve its firmness, or restore that firmness when lost; and he states that otherwise he could not secure even a turnip crop. Strange as such doctrine may sound, Mr. Parker does not stand alone in his practice. Another farmer (Mr. Edmunds), whose family long occupied such light moory land in the same neighbourhood, tells me they also found that nothing but the breast-plough would leave the ground firm enough to grow wheat. Occupying similar land, I may add that I never plough it deeply but I repent of so doing, and am falling more and more each year, by the advice of neighbouring farmers, into the use of the breast-plough instead of the horse-plough. This manual labour is quite as cheap; for a good workman can pare such hollow tender land at 4s., or even at 3s. an acre. It is possible that the drought of our climate in Gloucestershire and Berkshire may be one cause of the success of this practice in those counties, and that the same soil, if transferred to Westmoreland, would require deeper working. Therefore, without recommending shallow cultivation in districts where deep ploughing has been hitherto practised, I would merely warn beginners against plunging recklessly into the subsoil. PH. PUSEY.

TO AGRICULTURISTS.—HARRISON'S ECONOMICAL PLAN FOR THE IMPROVEMENT OF AGRICULTURE AND THE EMPLOYMENT OF LABOURERS;

WHICH HAS BEEN PRESENTED TO THE AGRICULTURAL PROTECTION SOCIETY BY HIS GRACE THE DUKE OF RICHMOND, K.G., AND APPROVED BY MANY NOBLEMEN AND EMINENT LANDHOLDERS.

The public are most respectfully solicited to take a calm, deliberate, and impartial view of the following address, the general adoption of which would be found to be a sure remedy for many of the distressing evils. It will form the groundwork for the employment of the poor, will open a wide field for improvements for the benefit of the farmer, will be a lasting advantage to the landholder, and will give to this country a name which it ought to have obtained many years since; viz., the finest agricultural country on the face of the globe. Volumes may be written on the subject of agricultural distress; but improved cultivation will be found to be the only cure—

"Omnia diligentia subjiciunter."

To Noblemen, Gentlemen, and Agriculturists of England, Scotland, and Ireland.

My Lords and Gentlemen,

The great complaint throughout the United Kingdom of the *distress and want of employment of agricultural labourers,* has prompted me in addressing you on a subject which I am surprised has been suffered to remain so long neglected by the great enlightened agricultural societies of the present day; viz., the *management of manure in farm-yards.* To grow the *greatest quantity of produce* at the *least possible expense* must be viewed as a subject of very great importance, both to the landowner and farmer, which is only to be accomplished by *properly-constructed farm-yards,* with *tanks, drains, &c.* No farm can literally be considered eligible without it.

On this subject I have addressed the Royal Agricultural Societies of England, Scotland, and Ireland, and also many noblemen and eminent landholders. It must be obvious to every thinking mind, that a great increase of the produce of the soil would very much add to the *employment of the labourer;* and it may be also viewed as a *national benefit.* Nothing in agricultural pursuits has been so *grossly neglected as the management of manure in farm-yards, &c.;* the *abominable waste* of which has been a most painful subject to myself for a long time past, and one to which I have given mature consideration. It is this which has prompted me in addressing the leading agricultural societies on the subject.

From a calculation lately made, it is proved that for want of manure a loss to the United Kingdom is sustained to the amount of from *eleven to twelve millions of pounds annually!* Could this increase of growth be accomplished, or even one half of it, we should hear but little of the *complaints of labourers or of corn bills or corn laws;* our country would be amply supplied from our own soil.

I am very much inclined to think that this could in a great measure be accomplished by a *proper system* being adopted in every farm-yard in which the dung is deposited, so that the liquid manure could be saved, and used at discretion.

The surface of the farm-yard should be of a concave shape, with a round brick tank in the centre, surrounded by a low dwarf wall, and bounded by a drain for carrying off the surface water which may fall from the surrounding buildings. To this tank a pump should be fixed, elevated five or six feet for the accommodation of the *water-cart,* a most valuable appendage to every farm. To this tank bring the drainage of your stables, pigsties, cattle-sheds, wash-house, water-closet, &c. Bear in mind, that that which is despised is often the most useful. This liquid you will find invaluable in the *manufacturing of manure* which is at present suffered to pass off in draining.

Instead of allowing the great mass of manure to remain on the surface of the yard, which robs it of many of its valuable properties, have it formed into ricks round your tank, in the inside of the dwarf wall, so that they may be supplied with the liquid during the time of making, and that the tank may receive the drainage. The exposure of manure to the atmosphere, as is the present custom, is a most ruinous practice, and may be truly called one of the agricultural evils.

Do away with the *detestable practice of burning your couch-grass, &c.* Remember, that what will produce a *cart-load of manure decomposed,* will only produce a *wheelbarrow of ashes:* bring it home to your bartons, also the cuttings and parings from roads, deposits in your ditches, which are principally vegetable matter, rubbish from your gardens, &c., and let all be deposited in your manure ricks according to the following directions; viz., a layer of stable-dung one foot thick, a layer of vegetable matter six inches thick, a layer of lime, grist, and salt two inches thick on the top of this laying; saturate with the liquid from the tank, in a sufficient quantity to pass through the whole. Begin again, and repeat the course as before, with the dressings, and make the ricks to any size you may judge proper, the larger the better; a layer or two of soot near the top of the rick will be desirable.

After you have made them to the size you may wish, and *thoroughly saturated* with the liquid from the tank, cover them close with long dung to keep in the ammonia and prevent the rain from penetrating. The covering should be removed from the centre and the liquid applied once a week, and remain five or six months before used.

In making your manure ricks, introduce a wicker cane-shaped tube in the centre, to receive the supply; a few layers of draining tiles will be also desirable at the bottom, to give the information that the liquid has passed through the whole body, and to convey the waste to the tank. A large supply of this liquid will give unbounded scope to the farmer in the manufacturing of manure.

The ricks should never be suffered to heat beyond 80° or 90°, otherwise you deteriorate its value considerably. This is one of the most important points in the management of manure; the loss sustained by inattention to this subject is incalculable. By this neglect the manure is ruinously degenerated, and great quantities of vermin are generated and taken to the land. I beg to draw particular attention to this remark.

Application of the liquid from the tank will at all times check the evil. This liquid, after passing through the manure, may then be considered a *valuable liquid manure* either for meadow or fallow land.

This powerful mixture only requires to be known to be appreciated, and should be applied immediately after the crops are taken off the ground. To meadow land it will be best applied in damp weather, and to arable at any time; the arable land being first dressed with salt and lime, it will not only manure the soil, but will destroy vermin, decompose the filth left after the crop, clean the land, and prepare it for early cultivation.

It will also be found to be a capital manure for gardening purposes, and would, after this effect had been tried, be appreciated and considered the most valuable part of the manure.

By a general adoption of this plan it would very soon be the pride of every farmer to see his barton well stocked with manure ricks, and very pleasing to the landholder to see a provision made for his land. A very short period will convince every person who may think proper to adopt the plan, that the growth of crops will be very considerably increased, and that their expense and trouble have been amply repaid.

The Earl Ducie's model farm, in 1839, let for £200 per annum, and employed five persons; it now employs twenty, and the produce is increased more than four times, and is valued for the poor-rate at £564 per annum. The farm contains 240 acres; the produce last year (1844) was 120 acres of wheat, 20 acres of carrots, 20 acres of mangel, 20 acres of turnips, 20 acres of potatoes, and 40 acres of clover. The wheat crop is expected to average 40 bushels per acre, 1,200 sacks. The crops this year (1845) are very promising. *Self-support and economy of manure* are the leading points in the management of this farm.

In the manufacturing of liquid manure on the plan I have suggested, *no attention whatever is required from the farmer*. The tank is supplied imperceptibly by under-ground drains from the various resources; it is at all times ready for use, and *without any expense*.

In applying liquid manure to meadow land no injury is sustained to the plant, its application being instantaneous, and no desight in appearance, which is the case with farm-yard manure. The cattle can also feed from the pasture immediately it is applied. Neither is the application expensive; *a single horse and boy being all the strength required.*

Few persons have made the subject of manure a closer study than myself for some years past, having always considered it the *mainspring* of the agricultural profession, and seeing, at the same time, *very gross neglect* and *great scope for improvement.*

In the present day *patronage* is a strong stimulus, and without it persons feeling inclined to persevere in any public business have great difficulties to encounter. My experience enables me to say the plan I have suggested is so very *plain and simple,* as to be in the power of any person to adopt; and, it will be observed, it gives *distinct kinds of manure.*

From the practice I have had, I am convinced that those who may be inclined to adopt the plan will find their manure considerably more than doubled in value.

The application of liquid manures is as yet quite in its infancy.

A clean farm ought to be the pride of every farmer, and this is not to be obtained without attending to the use of manure *properly decomposed,* and also to that of *liquid manures,* as it then *takes no filth to the land.*

A general adoption of *collecting and manufacturing manure* would very much increase labour and prove a decided remuneration to the employer, which is a great object in the present day.

The unbounded scope which is given to the cultivators of the soil in *collecting everything which is decomposable for manure,* has never been properly appreciated; and it is a mystery that a subject of such vast importance should have remained so long neglected, when it cannot be viewed in any other light than being profitable to the employer. Vegetable matter ought to be more highly valued.

The formation of the farm-yard, tank, drains, &c., must be a *part and parcel of the farm,* and provided at the expense of the landholder, who would ultimately receive a hundred-fold for the outlay. *Complicated recommendation* for a general plan to be adopted in the manufacturing of farm-yard manures would, I am convinced, from the long experience I have had with agriculturists, have no general effect.

In the manufacturing of manure for general purposes, *the greater the variety of proper articles combined, the more powerful the manure will be after decomposition has taken place* (see "The Cottagers' Manure Heaps"). One cart load is quite equal to two of farm-yard manure in producing crops.

Having taken the opinions of *many eminent landholders and practical farmers* on the subject of my address; and not *one objection* having been made against it, convinces me that if properly carried out, the result would be most satisfactory.

It must be acknowledged that this is a very *important subject, and one that cannot be confuted*; and if supported by the royal societies, and the leading landholders, it would very shortly become a prominent question with agriculturists generally; and if so, *the result must be prodigious.*

A great change has already taken place in the cultivation of the soil: not one-half the sum has been expended this last year in artificial manures as there was in the year before; and this evil will increase, if not counteracted. It is now very generally acknowledged that the waste of the liquid from manure has been a long growing evil; but with whom does this evil rest? Decidedly not with the farmer. If the proper arrangements are provided by the landholder, the evil will be quickly removed.

If *high cultivation can be obtained at a moderate expense, demand for labour will undoubtedly follow.*

It may also be considered a great neglect in not erecting lime-kilns on farms. By this omission the farmer sustains a great loss; in most cases he has to send miles for lime, and pay more than double the amount the article could be manufactured for on the farm, and does not use a tenth part the quantity he would do if it could be obtained at a lower price; its value for agricultural purposes, when mixed with salt, is *inestimable.*

There cannot be a doubt respecting the preference which would be given to *liming land* instead of the *present cold system of chalking*, if the article could be obtained cheap; it being so quick and effective in its application; the *bountiful use* of which would materially change the system of farming.

A *drawback of duty on bricks* used for erecting tanks, drains, and lime-kilns for agricultural purposes, would be most desirable. A very wide view may be taken of the beneficial effects which would emanate from it by *giving employment to labourers.* Would not Government be inclined to grant this boon, if solicited?

Liquid manure tanks would be very valuable appendages to farms in case of fire, the liquid *from the mixture* being most efficacious in quenching fire.

It is truly distressing to see the *miserable crops* housed by so many farmers, when, at the same time, the means are on the farm for growing a good crop; which the farmer is deprived of for want of the proper arrangements being provided on the farm.

It is very questionable if this country could not, in a very short time, be brought into such a state of cultivation as to produce sufficient grain for its consumption.

See the Chinese, with their immense population, to be exporters of manure.

The use of night-soil as a manure has for a long time been urged by many of the great Professors on practical farmers, but with little effect. The remarks of Professor Liebig alone have been quite sufficient to establish its adoption. False delicacy I think is the principal objection.

A most effectual plan is to be found in using ashes for the removal; this article will secure the ammonia, take up the moisture, and will prove a most excellent mixture—a sufficient quantity should be used, with frequent turning, to produce a drill manure.

I particularly solicit the attention of market gardeners and cottagers to this manure, and to the directions for securing it.

Their land will be completely renovated by its use, and a large crop of onions, which is designated the poor man's hot dinner, and so frequently a a failure, may be insured the following season.

Landlords would find it much to their interest to visit their estates more frequently; they would then have an opportunity of gaining information which would be of mutual advantage both to themselves and tenants. Information from practical men cannot be too highly appreciated.

The thousands of acres of land about to be appropriated to rail-road purposes points out to landholders the propriety of promoting high cultivation.

Improved cultivation will be found to be the most effective remedy for dispersing the great gloom which is now fast gathering over agriculturists.

I beg to recommend a preparation of *lime and salt*, to be prepared in the month of October, *for a top dressing for wheat crops in the spring.*

This mixture will protect the crop from the *slug* and will also be a protection from *game*. The proportions should be one bushel of salt to two of lime, and before using it in the spring add one cwt. of *black sulphur* to every forty bushels, to be well mixed before used, and applied at the rate of 14 or 16 bushels to the acre. The same dressing will be found to answer well for the *turnip crop*, and should be applied immediately after the sowing; this will be found a most excellent preventive from the *fly*, and will be very beneficial to the growth of the crops. *A general adoption* of this plan would remove much anxiety from the farmer.

No farmer ought ever to be without a good stock of prepared salt and lime, which should be mixed three or four months before used. "Time will not injure it." With this mixture crops may at all times be greatly improved, at a very small expense, in preparing which the large knobs of lime should be broken, and the heap frequently turned over. Strength and beauty will also be added to the straw by the use of this mixture.

I also beg to recommend the use of *sawdust* in cases of scarcity of straw, for stall-fed cattle, pigs, &c. It will be found a good substitute for straw in keeping the cattle clean, and not a bad mixture with manure. It will also prevent the waste of urine, and will act well with the vegetable matter. It is easily obtained, and very cheap.

Cleanliness is too much neglected in the management of cattle. Many of the diseases incidental to cattle may be attributed to this neglect, and also to the feeding of cattle on decomposed vegetable matter. Cleanliness and feeding are very important subjects, and ought to claim more particular attention. I beg to solicit a perusal of the following table, which will show the amount of dry organic matter contained in the most usual kinds of food for cattle:

		Water. lbs.	Organic Matter. lbs.	Ashes. lbs.
100lbs. of	Peas . contain	16	80½	3½
—	Beans . .	14	80½	3½
—	Lentils . .	16	81	3
—	Oats . . .	18	79	3
—	Oatmeal .	9	89	2
—	Barley-meal .	15½	82½	2
—	Hay . .	16	76½	7½
—	Wheat-straw .	18	79	3
—	Turnips .	89	10	1
—	Swedish turnips .	85	11	1
—	Mangel wurzel	89	10	1
—	White carrot .	87	12	1
—	Potatoes .	72	27	1
—	Red beet . .	89	10	1
—	Linseed-cake	17	75½	7½
—	Bran . .	14	81	5

In introducing my address to the public, I have endeavoured to simplify my economical plan as much as possible, "profitable farming being my decided object:" and, to avoid observations of its being complicated, I have introduced the notice at the end, to superintend the arrangement and erection of a limited number myself.

My Lords and Gentlemen, I beg most respectfully to solicit your pardon for the liberty I have taken in addressing you on this subject; but, being a very warm advocate for improving the long-neglected evil by lasting and profitable labour, I do flatter myself you will excuse the liberty I have taken.

The remarks I have suggested, I am strongly impressed (if generally adopted), would be very effective in producing an increased demand for labour, and a general and profitable benefit to the farmer.

The improved condition of the soil which must follow would be also an ample remuneration to the landholder for the small outlay required. The result, therefore, can only be viewed as a mutual advantage both to the landholder, tenant, and labourer. Profitable employment must predominate. I have the honour to be,

My lords and gentlemen,
Most respectfully,
Your obedient servant,
JOHN HARRISON.

NOTICE.

A limited number of farm-yards surveyed and constructed on the plan suggested, and instructions given for manufacturing *a very superior and powerful compost drill manure*, which can and ought to be made by every farmer on his own farm, and at a very moderate expense. A sample-box may be seen at the Royal Agri. Society's House, No. 12, Hanover-square, London. A cheaper and finer manure cannot be applied to the soil.

Land laid out, and the *electrical apparatus* for improving the soil constructed and fixed with the required exactness.

Applications addressed to Mr. Harrison, surveyor, St. John's-street, Devizes, Wiltshire, will meet with prompt attention.

AGRICULTURAL QUERIES.

BURNING CLAY.

TO THE EDITOR OF THE MARK-LANE EXPRESS.

SIR,—Being deeply interested in the subject of "burnt clay" as a manure, I should esteem it a favour if through your paper I could get the result of any experiments on an extensive scale, where the application of burnt clay has been fairly tried; what was the mode of preparation; and also the address of any gentleman who has experimentalized therewith. Your kind assistance, Mr. Editor, will oblige A PRACTICAL FARMER.

SIR,—In remote times we have accounts of Wheat being stored away for many years, but at the present day a few years' storing is sufficient to destroy the grain, or at least to deteriorate it so much as to render it unfit for the purposes of the miller. Can you or your readers give any satisfactory explanation for this change, or show that the ancients had any particular mode of preparation, or whether their wheat was of a different variety to the present kinds cultivated in Britain?

I am, Sir, yours, &c.,
A SUBSCRIBER.

SIR,—I have a liquid manure tank which holds ten thousand gallons. I am sorry to find, amongst all the scientific men I have had an opportunity of consulting, such a diversity of opinion as to the quantity of sulphuric acid necessary to fix the ammonia in the same.

If any gentleman experienced in the matter would inform me, through the columns of your valuable paper, what is the requisite proportion of this acid, or if there be any more desirable mode of fixing the ammonia, with the proper proportion, cost, &c., he will confer an obligation on your subscriber,

Meadow Hall, Sept. 12. C. D.

SIR,—Being very desirous to ascertain the best *artificial* manure for producing a luxuriant crop of tares, I will thank some of your numerous correspondents to inform me, from *practical* experience, which they would recommend, for that purpose, of all the many artificial composts now laid before the public.—I remain your obedient servant, A YOUNG FARMER.

SIR,—Being desirous of learning something of the chemical nature of the contents of the street sewers of London, and the probable quantity of city refuse that may be daily draining into the Thames, I should feel obliged if you or your readers could furnish me with any information respecting the same.—Yours &c., ECONOMIST.

SIR,—If any of your correspondents have at any time tried the refuse of gas works for manure, particularly gas tar, perhaps they would favour the writer of this, through the medium of your paper, with their experience of the effect of gas tar as a manure, and how they prepared and applied it to the soil. Or perhaps, Mr. Editor, you would yourself throw a little light on the subject of this inquiry. By so doing you would oblige, sir, AN OLD SUBSCRIBER.

SIR,—Will any of your numerous readers inform me, through your paper, where is the best place to get one and two-horse carts with drags upon them? I have read of a self-acting drag; is there such a thing in actual use? They seem to me to be particularly desirable in hilly counties, and I think it would repay a maker to send one to the Northumberland Agricultural Society's meeting at Alnwick, in October, as it strikes me forcibly he would be sure to dispose of it. Of course I should like to know the cost, &c., of them.—I am, your obedient servant, A FARMER.

SIR,—Attention has frequently been called to the advantages of furze as a food for cattle; perhaps some of the readers of your paper could inform me if the Irish furze is considered superior to the common English furze for that purpose; and if so, whether there be any peculiar management necessary in its cultivation?—

Yours, Mr. Editor,
A CONSTANT SUBSCRIBER.

ANSWERS TO AGRICULTURAL QUERIES.

ON DESTROYING THISTLES.

TO THE EDITOR OF THE MARK LANE EXPRESS.

Sir,—In reply to your young correspondent, who wishes to be put into the possession of the secret for destroying thistles, I beg to inform him the only way to do so effectually is to *eradicate* them: but as there is some difficulty in doing this, owing to the nature of the root, I advise him to adopt my plans, with either of which I guarantee him success. As the perfect extraction of the root is next to impossible, I find the only way to deal with them is to be perpetually cutting them down whenever they make their appearance on pasture ground, which eventually so weakens the root, that it dies: or if they appear on arable land, the subsoil plough will do their business for them; which I can vouch from my own experience of this year. Your young correspondent should pay particular attention to his hedges and dyke banks, at this season especially, to see the thistles there do not ripen and shed their seed, otherwise all his labour to keep them down in his fields will be endless, and produce nothing but mortification and disappointment. This circumstance is not sufficiently attended to by farmers in general. I remain, Sir, your obedient servant, Salopiensis.

THE HEAT NECESSARY FOR RIPENING WHEAT.

In reply to "J. N.'s" inquiry respecting "the heat necessary for ripening wheat, and the amount of time the heat should be applied," it is to be observed that, from the time of the sprouting of a seed to the time when the plant arrives at maturity, must naturally be a varying period, and will accord with the mean temperature of the season, or in other words, if all seasons from the commencement of vegetation to the time of ripeness were of an uniform temperature, the period from one state to the other would in all years be equal; but as the temperature of a particular season may be above or beneath the average temperature of seasons, so will the period alluded to be longer or shorter, according to that circumstance.

With respect to wheat sown the latter end of October or beginning of November, it will certainly vegetate before the winter has fairly set in, but vegetation has no sooner commenced than winter closes upon it, and makes it dormant until the warmth of spring again excites to action the vital principle; therefore, without any sensible error, it may be assumed, in regard to wheat, that calculations for computing aggregates of temperature, may date with us from the end of February, when the stimulus of spring may be supposed to recall to activity the previous dormant life of the plants. Taking, therefore, the 1st of March as our standard to set off from, and ascertaining the mean temperature of the time from March 1st to when the wheat is fully ripe, and then by multiplying the number of intervening days by the number of degrees of the mean temperature of those days, we arrive at an approximation to the truth, of the amount of the degrees of heat necessary for perfecting the wheat plant, which amount, experiments show to be somewhere near upon 8000° F.

To corroborate this opinion, the results of the following experiments are extracted from Law's translation of "Boussingault's Rural Economy:"

"At Alsace, in 1835," says Boussingault, "we sowed our wheat on the 1st of November, the cold set in shortly after the plant had sprung, and the harvest took place the 16th of July, 1836." Calculating from the 1st of March, when the frosts are no longer felt, the period of the growth was, therefore, 137 days, the mean temperature was 59° F., the aggregate, 8083° F.

"Tremois wheat, this same year, required 131 days to ripen, under a mean temperature of between 60° and 61° F. (7925° F.).

"At Alais, the number of days which it requires to ripen is 146, the mean temperature being between 57° and 58° F. (8322° F.).

"In America, at Kingston, New York, vegetation, after being suspended during the winter, resumes its activity in the beginning of April, and the harvest takes place about the 1st of August: the crop is, therefore, growing about 122 days, under the influence of a mean temperature of 63° F. (7680° F.).

"At Cincinnati, the wheat sown in the end of February is harvested in the second week in July, say the 15th day; the crop is therefore 137 days on the ground, under a mean temperature of between 60° and 61° F. (8288° F.).

"At Limijaca, plain of Bogota, wheat was reaped after being 147 days on the ground, the mean temperature being between 58° and 59° F. (8526° F.)."

Yours, Mr. Editor,

J. S. T.

Sir,—In answer to the first letter in your last number from "A Subscriber" respecting storing wheat, he may be informed that in no very remote time, the writer of this has seen Dantzic wheat in bond, which had been stored on a granary in London four years, and was at that time perfectly sweet, and in every other respect in as good preservation as when first laid on; and on enquiring how this was effected, the person to whose care it was consigned replied, "The grand secret is to exclude all air, except when the atmosphere is perfectly dry with a north or east wind, and to take advantage of such time by opening all the doors and shutters and screening it." There is certainly much more damage done to grain of any kind by exposure to the air at improper times, than by always excluding it. I have had wheat laid on to a granary in a perfectly dry state in July, six feet deep, excluded as much as possible from all air, and when used in the following January, it was found to be as sweet as when first laid on; and I have had wheat laid dry on to a granary only half that time, and frequently turned over, yet by improper exposure to the air, it has become much deteriorated. I apprehend that the only secret mode practised by the ancients for storing wheat, or any other grain, was first to have it thoroughly dried, either by natural or artificial heat, and then excluded from air as much as possible in a dry room, and that it was not confined to any particular variety. Hoping to see the time when by means of free trade (which the signs of the times tell us is near at hand) England will, like the Egyptians of old, store up corn in plentiful years, against a recurrence of years of scarcity, or a failure in the potato crops, and we shall then discover the best means for that purpose, and I believe we shall find that it may be done in these our days with as much success as in ancient times. Yours, A Free Trader.

"A Subscriber" in your paper of Sept. 15 asks why wheat at the present day becomes injured and rots quicker than used to be the case in remote times, when it was stored away and kept sound for an indefinite period? Could the wheats so stored away have been similar to the kinds now cultivated? he also inquires. Whether the Egyptians and other people in the earlier ages of the world cultivated other than the bearded and many-spiked wheats cannot now be decided, but the

Romans were acquainted with both winter (or, beardless) wheats and the true spring wheat, which is termed "tremois," or three months, on the continent, &c., in the present day. The great stores of wheat gathered up with a Government influence and for national purposes at the times "Subscriber" alludes to, will be found to have been chiefly in the South of Europe and the North of Africa; and as the Wheats of those districts are both harder and tougher in the present day than those of the North of Europe, and also contain less moisture, it is only natural to infer that there was the same coincidence of circumstances in olden times; and as the natural quantity of moisture in wheat will be increased in the North of Europe to perhaps double the quantity it contains in the South, so also will the chances against its keeping for any long period be more diminished the further we recede from the tropical portion of the earth. Moisture therefore in wheat must be considered as one of the principles which tend to its decay; and although artificial means, as kiln drying, may be used for robbing it of a considerable portion of the moisture, yet it does not appear probable that any such process will ever render the soft wheats of the north so well adapted for keeping as the hard and horny wheats of warm countries. —I am, Mr. Editor, yours &c., X. Y. Z.

PEAT MANURE.

"A. Z.'s" inquiry about peat as a manure, is best answered by stating that peat contains the elements necessary for the formation of a rich manure, when proper substances, such as lime, marl, &c., are added to it, to decompose the tannic acid, and hasten the decay of the vegetable matter. Alone, and unprepared, peat appears to have no fertilizing property; but when properly dried and burned, the ashes have been found a good manure for grass lands and turnips: for turnips they are found to answer best in wet seasons. Quicklime will decompose vegetable substances, including peat; and the following will be found good proportions for making an excellent top dressing for clover or grass:—One cart-load of quicklime, the largest lumps to be not larger than the fist, six cart-loads of peat, and a quarter of a ton of salt; the whole to be mixed together, and to lie in a heap six or seven months, and to be turned over two or three times during that period. Another capital method of converting peat into a manure, is by mixing it with fresh horse-dung, and checking the escape of the ammonia during the process of fermentation, by decomposing the carbonate of ammonia, and converting the ammonia into a sulphate by means of sulphuric acid. Prepare your heap thus:—Four loads of peat, to be mixed in layers with two loads of fresh horse-dung, and, if great heat is evolved during the decomposition of the two bodies, cover up the heap with fresh mould, amongst which has been mixed a portion of sulphuric acid.

Sir,—Allow me to suggest to your correspondent, "Francis Kinder," a mode for extirpating thistles, with which he seems to be much troubled. Let him underdrain two-and-a-half or three feet deep; trench the field with spade or plough to a depth of eighteen inches: next spring, after producing a good tilth, drill manure and Swedish turnips in rows of three feet width, which set out at eighteen inches distance, and keep the intermediate spaces ploughed with a light plough drawn by one horse, and afterwards levelled by a scarifier suited to the width: repeat this operation at favourable intervals of ten or twelve days, and as many times as may be requisite whenever the thistles appear, not omitting the due application of the hand-hoe between the plants, which must be fed off.

In the succeeding year dress high, say thirty to forty tons of good manure per acre, and in the fallow rows of the previous year plant orange globe mangle wurzel, cultivating the land and setting out the plants in the same manner as the Swedes.

In the third year lay the field cross-ways, and plant potatoes nine inches distance, in rows of two feet width; after edge-hoing, let the horse-hoe be used freely before earthing, and never suffer a weed to exist after having been discovered. As soon as the potatoes are taken up, let him plant, drill, or press wheat, which should be properly hoed, and no thistles allowed to blossom in the hedges of his own fields, or those of his neighbour. If this course be adopted, it will not only prove a cure for the complaint which he makes, but likewise lay the foundation for a clean farm and abundant crops. After wheat, let him make an efficient autumnal and spring fallow for Swedes, then take barley, then clover, and conclude his course with wheat; and, if ever a field should become foul (which I very much doubt) let him take root crops instead of corn.—I am, sir, your obedient servant, RENOVATER.

Twickenham, Aug. 30, 1845.

Your correspondent, "A Constant Subscriber," inquires about the best manner of cultivating furze as food for cattle, and also if the Irish furze possesses advantages over the common furze or gorse. The true Irish gorse (*ulex stricta*), considered to be the most nutritious of the gorses, is said to be found in only one locality in Ireland; and, as it would be desirable to cultivate this kind in preference to any other, I should recommend those who are desirous of proving it, to obtain from a respectable nursery some plants of the *ulex stricta*, and propagate from them by layering, which is easily done by burying to the depth of five or six inches the branches around the plants, leaving one or two inches of the tops above the ground. They require very little nicety in the matter of laying the branches in the soil, as they will readily root, whether they be put down in groups or singly. The time for layering is both Spring and Autumn, and the time for transplanting during the month of October. The Irish furze will bear transplanting better than the common kind, as its roots are more numerous, and are much matted together. It will thrive in almost any soil, but a light gravelly kind appears to be its natural soil. The Irish furze may also be propagated by cuttings, but this method is not so sure as layering. The objection to raising the plant from seeds, is, that in procuring seed you may get them from the common gorse grown in Ireland, instead of the seeds of the true *ulex stricta*. Yours, Mr. Editor,

ERIN.

YOUNG WHIP.—For allaying the annoyance of flies to working horses, an infusion of walnut leaves, applied occasionally between the ears and on other of the more sensitive parts of the horse, is used in some parts of the country.

POOR-LAW GUARDIAN.—Expenses incurred for insane paupers may be levied off their estates.

Y.Z.—According to the Act of 10th of July, 1844, a bank ceasing to issue its notes, cannot resume the same.

Some mummy wheat, supposed to be 2,000 years old, sown by Col. North, at Wroxton, has produced upwards of 40 stems from each grain, each stem bearing an ear.

METEOROLOGICAL DIARY.

Barometer.			Thermometer.			Wind and State.		Atmosphere.		
Day.	8 a.m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a.m.	2 p. m.	10 p. m.
	in. cts.	in. cts.								
Aug. 21	29.90	30.05	48	62	52	N. West	gentle	fine	sun	fine
22	30.18	30.20	43	64	53	S.W.W. by N.	gentle	fine	sun	fine
23	30.20	30.05	49	64	55	Westerly	variable	fine	sun	fine
24	30.00	30.04	53	66	56	Westerly	gentle	fine	sun	fine
25	30.04	29.90	48	63	59	S. by West	brisk	fine	sun	cloudy
26	29.90	30.05	52	66	56	West. by N.	brisk	fine	sun	fine
27	30.10	30.20	52	62	56	North	brisk	fine	cloudy	fine
28	30.25	30.30	51	64	54	N. East	brisk	fine	sun	fine
29	30.33	30.33	49	66	55	N. by East	brisk	fine	sun	fine
30	30.32	30.32	49	69	59	N. by East	gentle	fine	sun	fine
31	30.34	30.32	51	71	61	N. East	brisk	fine	sun	fine
Sep. 1	30.34	30.25	55	66	55	N. East	lively	cloudy	cloudy	cloudy
2	30.24	30.20	52	62	57	N. East	lively	cloudy	cloudy	cloudy
3	30.30	30.20	48	58	54	N. East	variable	cloudy	cloudy	cloudy
4	30.20	30.20	47	57	53	N. East	variable	fine	cloudy	fine
5	30.19	30.16	46	57	52	E. by North	brisk	fine	cloudy	cloudy
6	30.17	30.18	50	60	50	Easterly	brisk	fine	sun	fine
7	30.18	30.16	48	65	52	Easterly	gentle	fine	sun	fine
8	30.16	30.16	46	65	51	N. East	lively	haze	sun	fine
9	36.15	30.07	42	68	56	W. by North	gentle	fine	sun	fine
10	30.00	30.12	46	65	57	Easterly	variable	cloudy	cloudy	cloudy
11	30.12	30.02	52	58	56	Easterly	brisk	cloudy	cloudy	cloudy
12	30.00	30.00	53	66	53	Easterly	gentle	fine	sun	fine
13	30.00	29.83	50	64	57	S. East	gentle	cloudy	sun	cloudy
14	29.65	29.56	50	62	48	N. W. West	gentle	cloudy	cloudy	fine
15	29.45	29.64	45	55	51	N. West	gentle	cloudy	cloudy	fine
16	29.70	29.54	44	59	59	S. West	brisk	cloudy	cloudy	cloudy
17	29.54	29.46	59	64	59	S. West	strong	cloudy	cloudy	fine
18	29.35	29.50	57	62	55	W. W. by N.	do. var.	cloudy	cloudy	fine
19	29.70	29.98	48	58	47	W. by North	brisk do.	fine	sun	fine
20	29.98	29.70	40	58	54	Southerly	brisk do.	fine	cloudy	cloudy

ESTIMATED AVERAGES OF SEPTEMBER.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.41	29.41	76	36	57.8

Real Average Temperature of the period.

High.	Low.	Mean.
62.77	49.13	55.95

North and N. East Winds..	6 days.
East and to South	5
South and South West......	7
West and to North	13

Weather amd Phenomena.—*August* 21st. Fine fleecy cumuli—a little rain. 22nd, 23rd, and 24th. Quite fine—the fine weather established. 25th. A pint of rain in the evening. 26th—29th. Fine. 30th. Less wind—cirro-stratus—illuminated clouds at sunset. 31st. Month ends splendidly—with also a steady, high barometer.

September 1st. Three days of gloom—cold—lively N. E. current. 4th. Evening improves. 5th. Cloudy in evening, and low temperature. 6th. Fine and clear. 7th. Superb, gorgeous sunset. 8th. Fine—magnificent—highly tinted clouds at sunset, with a red East—sun very hot. 9th. Beautiful. 10th, 11th. Two gloomy days—Easterly current. 12th. Fine. 13th. Barometer falls below 30 in., and a flutter in the weather commences. 14th. One thunder storm—some rain. 15th. Brisk shower. 16th. Rainy day—brisk wind. 17th. Rough wind and much rain. 18th. Wind and showers. 19th. Airy day—calm and clear evening. 20th. Beautiful forenoon, with brisk air—cirro-stratus—cloudy and wet evening.

Lunations.—Last quarter, *August* 24th, 6 h. 27 m. evening. New Moon, *September*, 1st day, 9 h. 35 m. night. First quarter, 9th day, 5 h. 24 m. morning. Full moon, 15th day, 10 h. 13 m. night.

Remarks referring to Agriculture.—The high state of the barometer occurring with the change of the 20th of August, continued till the 13th, when a change took place. Never was there a more propitious ingathering. At first, farmers hurried in their wheat in the shock; but they soon became more deliberate, and carried wheat, barley, oats in fine condition.

The rainy weather returned too soon for the North, and as we close this notice, it appears more and more confirmed—the showers heavy and frequent.

The Potato disease is extremely arbitrary: two plots are divided as by a line—one black, the other untouched—and yet the tubers shall be equally good in both. It is an *epidemic,* and its cause *atmospheric.* Where wet ground the cause, what *becomes* of the seasons of 1799 and 1816?—where was disease then?

J. Towers.

CALENDAR OF HORTICULTURE—OCTOBER.

Retrospect.—*Weather.*—September, to the day when we commence this article, has proved a splendid corrector of the mischief which was partially effected by the gloom and superfluous moisture of the preceding six weeks. Several hazy mornings, and cold, foggy days occurred since the 20th of August, when dry weather was established; but upon the whole there were four weeks of summer, which operated beneficially alike in field and garden, "crowning the labour of the husbandman," and bringing to maturity most of the valuable fruits. So tardy, however, had been the previous advances, that gooseberries and currants were abundant at the beginning of the month, and would have continued so to the end, had not birds stripped the trees so soon as the unwonted acidity of the berries, occasioned by low temperature and deficiency of sun, had abated; for in the currants particularly, the saccharine principle was never completely developed.

The *disease of the Potato,* so bruited, and thus rendered a source of panic terror, claims the most marked attention; and we shall therefore offer our faithful and candid opinion concerning it. The first notice of the malady in the British dominions appeared soon after the extremely cold weather at the early part of August. Our instruments marked no actual frost; in fact it frequently occurs that the points of leaves and of herbage become strongly dewed, and even coated with rime, when the thermometer gives no indication of frost. One writer, however, in the *Gardeners' Chronicle,* of September 6th, observed—"It is somewhat a remarkable circumstance, that on Friday, the 8th of August, we had an unusual quantity of electricity in the atmosphere, and lightning from all parts of the heavens. We had also three nights' consecutive frost at that time; and on Saturday, the 9th, the disease was first noticed in this neighbourhood." (*Petworth.*)

We ourselves saw it in Berkshire, one week after that date, and the peculiar discolouration upon the leaves advanced rapidly with the second early sort, then beginning to ripen. The symptoms were these—first a dark spot or two, like the sunscald through a drop of water; not only leaflets, but entire leaves became affected, and at length the whole plants appeared as if scalded by hot water, (not burnt), the leaves becoming lax, pendulous, and almost decomposed; emitting at the same time, a faint, disagreeable, and very diffusive odour of sodden vegetation. That the cause was atmospheric no one can reasonably doubt; for the potato-plant, in all kinds of soil, from sandy peat to the densest loam, whether wet or dry, laboured or left without hoe or tillage, drained or with an unmoved subsoil—all, wherever the disease prevailed, were more or less affected, *or escaped entirely.* Soil, as to its abstract condition and temperament, had nothing to do with the attack; though it is by no means improbable, that the long continuance of dark, moist, sunless weather, might have acted most adversely upon the healthy state of the foliage. Be this as it may, our dryest ground offered no ameliorating alternative; though it is a fact, that one might observe a plot blackened in every part, while another, not ten yards remote, presented no appearance whatever of disease.

Accounts differ amazingly; but it is evident that no one can judge from the leaves or stems what may be the quality of the *tubers.* One communication from Petworth, in the *Gardeners' Chronicle,* particularise eleven different varieties, and gives the results; they agree with those which have come under our own observation. Thus: "1st. *Ash-leaved* kidney—*haulm entirely gone;* tubers sound and in good order. 2nd. A sort called the "*July,*" in three different situations: (*a*), light soil, verging on hazel mould, situated high and dry, sloping to south, and trenched; subsoil, sand, stone-rock with fissures—leaves partially affected, haulm almost clear, *tubers quite sound;* (*b*), thirsty sand—similar result; (*c*), moist clay—the same. The other 9 sorts variously affected in the leaf and haulm, but all sound!" Of at least 7 varieties *we* have not found any that are to be complained of. The second early being first attacked, were digged in the 1st week of September, and found good. A winter *deep red* being threatened, were cut over to within 10 inches, and the haulm removed. Of this sort we have as yet no experience. A third, *pink blotched,* cut over—one root was tried September 13th, and found perfect. A fourth, *champion,* quite black, tubers large, sound. Fifth, *Lancashire lemon kidney,* left to ripen. A long row, front of a S. E. wall—soil, a dry, firm loam—the haulm (September 13th) of some quite gone and brown, but not decayed; and others, leaf and haulm partially affected, the stems in many instances with diseased and sound portions alternating. Here and there a healthy plant stands close to another quite withered, yet the tubers are found good alike in all. In one word, so far as experience goes, it warrants the theory, that the disease has commenced above the surface, but not at the apex of the plants; that the tubers have been affected in proportion as they have been *near to the surface,* whether the plant be living or completely dead or dry.

One writer, Mr. Errington, of Oulton, pronounces the attack to be that of *mildew:* we see nothing whatever to lead us to sanction this view of the disease any more than another, which presumes the decay to have its origin in a parasite plant, or "mould" never before observed. The weather throughout the summer has been like the winter which preceded it, of an anomalous character; it is not surprising, then, that its phenomena should correspond.

OPERATIONS IN THE KITCHEN GARDEN.

Potatoes.—Attend immediately to take up all the crops of which the haulm is withered. Before storing, select any that are diseased, and in every case avoid pitting if possible. There is nothing like a good *thatched potato house,* the floor sunk far below the ground level, and so drained that no water can ever stand upon it. The thatch eaves ought to reach and overhang the surface, and their drip should be carried away by proper channels. The door ought to be in a recess, approached by broad steps, guarded also from drip by the projecting thatch, or a broad weather boarding. Potato-houses of this description ought to supersede pitting, because they would provide perfect security against dampness and frost, and yet be quite cold; at all events to a degree that would entirely prevent growth.

Broccoli.—As the white and purple cape is cut, remove the stems, and when dry, burn them for vegetable ashes. Earth up the winter and spring varieties, or lay the plants sloping to north, as before directed.

Beet, carrot, and parsnip, take up a few for temporary supply.

Beans—the mazagan, and long-pods; some persons sow a few to come in early. Peas also are attempted; but in five cases of six, little or no time is really gained.

Cauliflower in frames—give plenty of air in clear, drying weather; plant out, at the end of the month, the stock to grow under glasses, four plants under a glass. Keep the plants closely covered till they take firm root; then admit some air by tilting.

Cabbage seedlings, or others from intermediate nursery rows, are now finally set out in rich, open beds—the plants according to their size, from 12 inches to one foot and a half apart. Make little drills for the rows, and let these be two feet asunder.

Endive—tie up more plants for blanching. *Sow* lettuce, radish, and salads in frames.

Winter Spinach may be pulled, to thin the plants to three or four inches apart. Keep the ground clean.

Aromatic herbs—thyme, lemon-thyme, marjoram, &c., &c., are always best in a herb-bed; keep the spaces hoed, and now sprinkle some light manure over the ground.

Asparagus.—The haulm being yellow, cut it down to within three inches; weed the surface; dig a trench 15 inches deep between the rows or beds, so remote as to avoid the roots; bury the haulm, sprinkle it with salt, and tread it down level; fill up the trenches with the best half-reduced manure that is at command. With the earth from the trenches the beds are covered, reserving a little to serve as an inch or two coating over the manure. This work being done neatly, will leave the asparagus plot in trim condition for the winter. But this is not all, for being done annually, it is plain that the plants must improve by age under a mode of culture so generous. *Salt* is said to be very useful and congenial; but to apply it *over* the soil in spring is dangerous—buried, however, upon the haulm, as above directed, it will blend with the decaying vegetable matter, and be with it, laid over the surface every year.

Dig, and ridge-trench vacant plots, incorporating manure. We suggest the following compost for immediate use:—Horse droppings collected from roads, six good barrow loads; *bones* ground to finest powder, one bushel—about 48 lbs.; coal-soot, half a bushel; incorporate thoroughly, and dig a two-inch layer into soil intended to remain uncropped till February. The chemical elements, beside the organic azotized substances of the fresh droppings, are bone, phosphate of lime, with nearly one-fourth of carbonate of lime, presuming that the bone-dust has been deprived of its fat and gelatine, carbon, oxy-hydro-carbon, sulphate of ammonia, and some soluble bitter extractive from the soot. Soot incautiously applied is injurious, but thus introduced becomes a safe appliance.

FRUIT DEPARTMENT.

Transplant, after the 15th, every kind of fruit-tree. Drainage is the first consideration, especially when a wall border is contemplated, or an orchard prepared; nothing can prosper where there is stagnant water, and the first expense is always the best economy. Eighteen inches of fresh, turfy loam are sufficient, and manure is not wanted. But the trees being carefully planted and staked if required, the roots expanded in the soil, and puddled with water, the work may be completed by a surface mulching of long litter, for this will guard the roots from frost, and promote those first developments of new fibres which are so important in securing the growth of the following spring. Without a good start, a tree frequently languishes during two entire seasons.

Propagate gooseberries and currants by strong *cuttings* of the spring wood, taking off all the buds but one at the base, and three or four at the summit of each.

Vines.—Prune directly that the fruit is gathered, and secure the future bearing-wood of fig-trees, nailing it close to the wall prior to matting, or interlacing the branches with fir-spray.

Gather fruit, and store it carefully. Orchardists are content to place each sort of apple in heaps, covering the whole many inches deep with dry straw, and somehow it happens that they are more successful than other persons, who take infinite pains, and suffer proportionate disappointment.

The *vineries,* if retaining *ripe-fruit,* must have day-fires and a current of air by front and back openings, if possible. Leaves should be removed, they being out of office, and harbouring moisture and mould. With drought and dry air, grapes may be sound at the end of the year, and certainly *richer* in flavour beyond compare, than those gathered when first ripe.

AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR SEPTEMBER.

This has, unquestionably, been a month of bustle and exciting interest to the agriculturists of the country. The continuance of fine, dry weather during its first three weeks or thereabouts was productive of the highest advantages to those engaged in the cultivation of the soil, not only in our backward but also the most forward districts. The former had the pleasure of beholding their crops rapidly coming to maturity, though not to say under the most favourable auspices, arising from the cold nights, the result of the easterly winds; while the latter were enabled to clear their fields of the few patches of outstanding corn. As might be expected, therefore, very great progress has been made in harvest-work; still the whole of the crops cannot be carried north of the Humber for at least ten days to come. The principal matter which we have now to consider, and which is one of the most vital interest both to growers and consumers, is the yield of the present year's wheats. The information which has been transmitted to us from various localities, and that which we have been enabled to gather from personal observation, is of that decided character as to enable us to form something like an accurate estimate of it. That the past, taken as a whole, has proved an ungenial season for the growth of that description of grain, is placed beyond dispute; and, further, it must be allowed that the very period, viz., the blooming time, when fine weather was so much required, was an unusually wet one. No one practically acquainted with the subject will therefore, it is presumed, attempt to deny the truth of our position when we state—and we do so with much regret, looking to ulterior consequences—that a very great falling off is apparant in its yield, compared with that of last year; whilst, on a comparison with many preceding seasons, it does not amount to an average quantity. We have no desire to create unnecessary alarm upon so important a subject; still we feel confident—indeed, these remarks are receiving daily confirmation from all quarters—that what we have here asserted is founded on truth. As might, therefore, be expected, a very important rise has taken place in the quotations of wheat all over the kingdom, partly the result of home deficiency, and the numerous orders received from Holland and Belgium for the purchase of foreign wheat under lock, for immediate shipment to those countries, where, it is affirmed, a most alarming deficiency is apparent in the potato crop. Such, also, being unhappily the case here, it behoves us to enter upon the question of the future value of wheat in England. It is quite evident that the low-priced period has passed away, and that the quotations for some time to come must rule relatively high; still we must not forget to bear in mind that both Holland and Belgium will draw the principal supplies of grain required to make good the deficiency in their own growth, from the Baltic and other foreign ports, where they can be purchased on lower terms than with us. The bare fact of a partial demand being continued, however, must enhance the prices of Foreign wheat, and thus have a direct influence upon those of English grain. Notwithstanding the crop of barley this year is large, the quality is by no means first rate; hence it is not improbable that really fine malting parcels will command good rates during the winter months. Oats are well spoken of, both as respects quality and quantity; while the yield of beans and peas is said to be very abundant and good. Still, the prices of the latter, arising from the foreign demand, have risen enormously, or from 7s. to 12s. per quarter.

The extent of the damage caused by the potato disease is alarmingly great. Not only is such the case in almost every locality in England, but it has extended itself into parts of Ireland, Scotland, and the Channel Islands. It is impossible to say where it will end; but we most seriously regret this circumstance, which must affect the poorer classes of society, and entail a vast amount of misery amongst them. Various remedies have been proposed to stop the disease, none of which have, we fear, been found successful.

In our various grazing districts, where the supply of pasture-herbage has been very large, depastured stock has fared extremely well, and but few instances of loss from the epidemic have come under observation. The turnip crop is turning out quite equal to the generality of seasons, which must prove a great boon to our graziers and others.

During the month the importations of foreign stock have been on an unusually extensive scale, and, generally speaking, of full average quality. Amongst the novelties we may notice the arrival of six oxen, per steamer from St. Petersburg. The freight of these animals, which were in no way calculated for our markets, was £5 per head; while their utmost value did not exceed £12. The exertions on the part of the Dutch graziers have been met with a corresponding improvement in the demand for their stock; however, prices of both beasts and sheep in Holland have, we understand, risen during the last three months fully 20 per cent., with every prospect of a further improvement in them. The imports into the metropolis, since the date of our last report, have been as under:—

	Head.
Beasts	885
Sheep	1,591
Lambs	20
Calves	75
Total for London	2,571

At the outports the arrivals have proved extensive, viz.:—704 oxen and cows, and 200 sheep at Hull from Rotterdam and Hamburgh, together with 30 beasts at Southampton from Spain. Two vessels have arrived in Scotland with about 70 oxen and cows from Rotterdam, and one at Cork with 30 oxen from Vigo, which have been principally disposed of to graziers. The above, added to the imports previously this year, give the following totals of beasts and sheep :—

	Beasts.	Sheep.
United Kingdom	9,429	4,860

In order to show the great increase in this trade, we herewith present our readers with the annexed official return, which embraces the year 1844, ending on the 26th of September of that year :—

	Oxen and Cows.
London	1,462
Liverpool.............	80
Hull..................	640
Southampton	200
Devonport	60
Total..	2,442

From the above, we perceive that the importations have increased this year upwards of four hundred per cent. ! Generally speaking, the beasts and calves have come to hand in good saleable condition, and have carried a full average quantity of internal fat; but in the sheep very little improvement has taken place.

The second crop of grass has proved an extensive one, but the weather having been unfavourable, only a small portion of it has been carried in good order.

The various markets of consumption have been tolerably well, but not to say heavily, supplied with most articles; yet, owing to the large consumption going on, the demand has ruled active, and prices have had an upward tendency. Old hay, from its extreme scarcity, has sold readily at from £4 4s. to £5 14s., and old clover £4 10s. to £6 10s. per load. Supplies of new hay and straw have proved liberal, and prices moderate.

Our advices from Scotland are to the effect that store stock, as with us, has commanded high rates of currency. The demand for it, however, has ruled dull, and only a moderate business has been transacted. In the southern districts the progress of harvest work has been good; but in the north it has been interrupted by the changeable weather. The yield of the crops is represented as amounting to nearly, or quite, an average.

In the south of Ireland cutting and carrying have been brought to a pretty general conclusion, under favourable auspices. In the other districts the whole of the crops are expected to be carried in a few days.

The following is our usual monthly review of the transactions in Smithfield cattle market.

The great increase which has taken place in the arrivals of beasts from the northern districts has had the effect of causing the beef trade to rule inactive, at a decline in the quotations of from 2d. to 4d. per 8lbs. The primest sheep, which have continued rather scarce, have mostly sold at full prices; but other qualities have suffered a depression of 2d. per 8lbs. Lambs, calves, and pigs have moved off steadily, at, in some instances, rather more money for the two latter kinds of stock.

For the purpose of enabling our readers to judge of the actual fluctuations which have occurred in supplies and prices during the last three years, we purpose in this report comparing those of September, 1843 and 1844, with the past month.

SUPPLIES.

	Sept., 1845.	Sept., 1844.	Sept., 1843.
Beasts	17,904	12,400	11,690
Sheep and Lambs ..	138,776	169,200	160,900
Calves	1,870	1,292	1,420
Pigs	2,412	1,884	1,990

The month's receipts of beasts have been derived as follows :

Northern districts	4,900 head.
Eastern do.	2,300
Midland do...............	2,900
Other parts of England....	2,900
Scotland	970
Ireland	350

The remainder of the supplies have reached us from abroad and the neighbourhood of the Metropolis.

The comparison of prices is as under :—

Per 8lbs., to sink the offals.

	Sept., 1845.	Sept., 1844.	Sept., 1843.
Beef, from	2 4 to 4 2	2 4 to 4 0	2 8 to 4 0
Mutton ..	3 4 .. 5 0	2 6 .. 4 0	3 0 .. 4 4
Lamb	4 6 .. 5 6	3 4 .. 4 8	3 6 .. 5 0
Veal	3 10 .. 5 0	3 4 .. 4 4	3 6 .. 4 8
Pork	3 0 .. 4 4	2 6 .. 4 0	3 0 .. 4 0

On each market-day we have noticed a very great improvement in the quality of both beasts and sheep, but more particularly in the latter. The numbers of sheep not being equal to meet the wants of the butchers—many of whom are, we find, purchasing largely in some of the provincial markets, such as Bristol, &c.—prices have been supported; but we doubt much whether such would be the case were there any increase in the arrivals.

Up to Newgate and Leadenhall markets, the arrivals of slaughtered meat from Scotland and different parts of England have been seasonably large, or as follows :—

Arrivals of Carcasses during the month.

	Beasts.	Sheep.	Calves.	Pigs.
Scotland	92	1,260	..	950
Yorkshire	102	1,410	..	1,260
Lincolnshire	118	390	..	..
Norfolk	30	110	..	90
Suffolk	27	120	..	110
Cambridgeshire	80	180	..	150
Essex	109	320	370	570
Surrey	112	540	490	620
Devonshire	..	..	..	140
Wiltshire	133	370	330	350
Other parts	160	600	1,050	800
Totals..	963	5,300	2,240	5,040

Notwithstanding the supplies of meat killed in London have been somewhat large, the trade has ruled firm, and prices have been well supported. Beef has sold at from 2s. 4d. to 3s. 8d.; mutton, 3s. 4d. to 4s. 8d.; lamb, 4s. 6d. to 5s. 6d.; veal, 3s. 10d. to 5s.; and pork, 2s. 6d. to 4s. 4d. per 8lbs. by the carcass.

YORKSHIRE.

Almost immediately after our last weekly report of the harvest had left, the barometer began to fall, and continued to do so, with little intermission, until Tuesday night, when it began to rain, and there has been rain, with very slight intermissions of sunny but cool weather since; and this morning there is a high N.W. by W. wind, accompanied by slight showers. The state of the harvest in the forward districts of the county is briefly this:—Nearly the whole of the wheat and barley is cut; a few oats, and no beans. One half of the wheat, and one-third of the barley, are carried, and will be found in good, though little in a marketable condition. The injury done to the wheat has been, we are persuaded, much exaggerated: it is sound—it is a full average produce; but there is confessedly an inferiority in sample and quality, though not to the ridiculous extent prognosticated by some alarmists, who cry out even in the most plentiful years. Barley will certainly be found deficient both in quantity and sample; but there will be an ample supply, we doubt not, for all wants. There will be bad samples inevitably, for on the best and richest soils it is the worst lodged, and was the earliest lodged, and will be the most deficient. We need not say what will be the consequence of having to depend for samples on the worst description of soils. As regards the potato, "murrain," or "epizootic," or "cholera"—whatever it may be—we are, so far, strangers to it. We have minutely examined, and have to report, that at least on the old red sandstone formation of this county, and on the light soils, no injury is done. Thousands of acres are quite free, so far. Turnips are not a very heavy crop—their leaves are yellow, and the roots are stunted.—Sept. 18.

NEWTON ABBOT FAIR, Sept. 17.— In consequence of the very heavy rain that fell this morning, the attendance was not so great as on former years. Most of the native cattle changed hands at from 46s. to 52s. per cwt. There were about a score of French cattle from Brittany, and about the same number from Alderney: several of the former found purchasers, but we believe only one of the latter was sold. The fat French Beasts obtained from 48s. to 50s. per cwt. Sheep were plentiful, and sold well at from 5½d. to 6d. per lb.; Lamb, 6d.; Pork carcases, 8s. 6d. to 8s. 9d. per score. Cows and Calves met with a dull sale at from 46s, to 50s. per cwt. Store Pigs were in demand. Suckers, 8s. to 11s. each. The show of Horses was unusually small, and but little business was done.

ST. JOHN'S MARKET, PERTH. — There were only 130 carts with butter and cheese, being a limited supply compared with former markets. Butter sold readily from 17s. 6d. to 19s., and cheese from 5s. 6d. to 6s. 6d. per stone Dutch. There was an average number of horses on the market stance, and dealers seemed anxious to purchase, but at reduced prices. In consequence a few exchanged hands, high rates being demanded for good animals, and the market was considered a dull one. Draught horses from 25*l*. to 35*l*., horses for the saddle about 30*l*. The cattle market was well supplied—from 600 to 700 being on the ground, and the average may be quoted at 7s. per stone. There were several lots of fat cattle—one lot brought 14*l*. 10s. per head—and another of two-year-old Highlanders 7*l*. Milch Cows, newly calved, brought from 8*l*. to 11*l*.

MR. TEVERSON'S SHEEP SALE.—The thirty-fourth annual sale of southdown sheep and lambs took place on Monday the 15th inst., at Mr. John Teverson's farm, at Great Wilbraham, by Mr. Martin Nockolds; and although the company in attendance was not so numerous as on some previous years, still a very respectable and influential number of the gentlemen and farmers of the neighbourhood were present, and amongst others we noticed J. P. Allix, Esq. M.P., Col. Allix, General Grosvenor, A. Cotton, Esq., E. Hicks, Esq., R. T. Eaton, Esq., M.P., Messrs. Batson, Hall, Jonas Webb, Goodchild, Chalk, King, &c., &c. The sheep were in pretty fair condition, but it was the general remark that they were not so fat as on previous years, and the prices were very fair: for the shearling ewes from 34s. to 35s.; stock ewes about 28s.; crones 23s.; shearling wethers 32s.; ewe and wether lambs 21s. each. Of the horses, which were in rather poor condition, not many sold. After the sale, about 60 gentlemen sat down to an excellent dinner, which was provided for the occasion, with Mr. Teverson's usual liberality and kindness, in a large barn adjoining his premises, which was fitted up to receive his guests. The chair was occupied by E. Hicks, Esq. The chairman gave as the first toast, "Her most Gracious Majesty, Queen Victoria." "The Queen Dowager," whose amiable qualities endeared her to all. "Prince Albert, Prince of Wales, and the rest of the Royal Family." "Lord Hardwicke, the Lord Lieutenant of the county." "The Army and Navy," to which latter toast A. Cotton, Esq., returned thanks. The Chairman then proposed the "health of the Bishop and Clergy of the diocese," and spoke in terms of great respect of their worthy deceased diocesan, as also of the present one and the clergy in general. The Rev. Mr. Watson returned thanks, and trusted they were satisfied with the manner in which his services were performed; he should always endeavour to perform them as far as his strength permitted, to the satisfaction of all, whether 5,000 or 5 hearers were present; he also spoke in terms of great respect of their deceased and present diocesan, and trusted that a good feeling would always exist between the people generally and the clergy, and that his labours would be a blessing to themselves and families, and all who were near and dear to them. The Chairman gave "The health of the County Members." Song by Mr. Goodchild, "Hear the last whistle." The Chairman then called upon the gentlemen for a bumper, and proposed "The health of their worthy host, Mr. Teverson," which was drunk with the most rupturous applause, the chairman remarking that, whilst they were thus regaling themselves with the supplies so liberally provided for them by order of Teverson, he had also kindly thought of his labourers, between whom and himself great good feeling existed, and they were then enjoying themselves in another part of the house with good old English fare; he remarked that the sale was not much to be complained of, for Mr. Nockolds had informed him that the shearling ewes averaged rather more than last year, and the others were nearly as good. Mr. Teverson returned thanks in very feeling and appropriate terms; he thanked the company for their attendance, and said although he could not boast much of the sale, still there was not much to complain of, considering the times, and hoped that better times would soon arrive, remarking that if they had a better price for their corn, they wanted no better price for the meat. Mr. Samuel Jonas proposed "The health of the Chairman" in terms of the warmest praise, as a kind landlord, which he was sure British farmers would always duly appreciate. It was drunk with much applause. The Chairman, in returning thanks, remarked that it was the second time he had had the honour conferred on him by Mr. Teverson of presiding, and thought it was right that the landlord, farmer, and labourer should so meet, as upon their union and exertions mainly depended the welfare of the nation. After having spent a very pleasant and social evening, the company separated.—*Cambridge Advertiser.*

REVIEW OF THE CORN TRADE

DURING THE MONTH OF SEPTEMBER.

Though the month of September is fast drawing to a close, fully one-third of the produce of grain of Great Britain is still abroad, and in some of the northern parts of the kingdom the corn is yet so green as to render it questionable whether it will ever become perfectly ripe. From the 20th of August up to the 11th inst. the weather was as auspicious as could possibly be wished, and great exertions were made to secure as much of the grain as was in a fit state to carry; owing, however, to the want of genial warmth and the excess of wet throughout the greater part of the summer, the crops ripened very unkindly. September was therefore well advanced before the sickle could be generally employed north of the River Humber; south of that line there is, comparatively, little remaining in the fields. We are, nevertheless, inclined to think that in estimating the proportion saved at two-thirds, we have rated it quite high enough. Under these circumstances it is not to be wondered at that much anxiety should have been caused by the breaking up of the fine weather on the 13th, and the great quantity of wet which has since fallen. Without this unfavourable occurrence it was but too certain that the produce of wheat would have been deficient; it was, however, confidently expected that spring corn and pulse would have yielded well. Now even this is rendered doubtful, whilst the probability of anything like an average return of wheat has been greatly lessened. Independent of the danger to which the crops may still be exposed, positive mischief has unquestionably been done to the quality of all the corn not secured previous to the 13th inst., by the drenching rains, the effects of which cannot, at this advanced period of the year, be expected to be remedied. This fact, and the complaints of deficiency of the yield from all those districts where the produce has been put to the test of thrashing, afford too sure a proof that the crop is decidedly short of an average in quantity. Respecting the quality of the new wheat, the accounts are even more unfavourable than regards the yield; the weight per bushel is estimated to be at least 3lbs. less than last year, whilst, from the thickness of the skin, considerably less meal is produced from a given quantity of wheat. The falling off from these causes alone, irrespective of the acreable deficiency, must make an immense difference; and when we add that many farmers consider the latter to be two to three sacks per acre, we think sufficient has been said to account for the upward movement which has lately taken place in prices. That the advance in the value of wheat already established will be maintained is tolerably certain; and unless we experience unusually fine weather for finishing the harvest in the north, a further material enhancement will in all probability occur.

Next in importance to the wheat crop is, decidedly, that of potatoes. If our prospects in regard to the former be discouraging, those relative to the potato crop are of a far more alarming character. The blight, of which we took notice in our last as having attacked the root in the south of England, has travelled steadily to the northward; and from the reports it would appear that no part of the kingdom has escaped the infection. The loss is by many estimated at half of the produce; and, though we trust that it will not be found nearly so serious as represented, still that there will be an enormous deficiency cannot be doubted. Considering how great a proportion of the food of all classes consists of this root, the extensive failure must inevitably cause a material increase in the consumption of bread stuffs, a point which must not be overlooked in considering the future value of wheat.

We cannot view this state of affairs otherwise than as a great calamity, particularly as regards the agriculturists of Great Britain; any apparent benefit which the enhancement of the value of their produce may be supposed to give will but ill compensate for the deficiency in quantity; whilst the dearness and scarcity of food, caused by circumstances over which man has no control, will be used as an argument to take from the farmer or diminish that remnant of protection afforded under the present corn laws. During the continuance of fine weather in August the price of wheat fell some 5s. to 6s. per qr. from the highest point; but the depression has since been recovered, and from present appearances we are inclined to think the upward movement will continue. Notwithstanding the occupations in the fields, the growers have, till lately, supplied the different markets freely with wheat; latterly, however, they have displayed less inclination to sell, and within the last week or two the deliveries have fallen off materially. Supplies of old have almost wholly ceased; not, we believe, in consequence of the stocks being exhausted, but owing to the conviction that from the superiority of the quality of the produce of 1844 over that of the present year, the former will be much wanted for mixing, and therefore relatively higher than new.

Up to a very recent period there was every prospect of an abundant crop of barley, though at no time was it expected that the quality would be fine. From the extreme luxuriance of the plant much was lodged by the heavy rain in July, which never regained an upright position; in consequence of which it was naturally concluded that the sample would be coarse. In many districts the cutting of barley was commenced quite as early as that of wheat; there was, however, less of the former than of the latter grain carried when the fine weather broke up, and all that which has been exposed in the fields to the storms which have prevailed at intervals since the 13th inst. must have been considerably injured. We are, however, of opinion that if dry weather should succeed, there may still be about an average crop of this grain. So general has been the belief that the crop would prove large, that until within the last week prices of the article remained perfectly stationary, whilst the value of almost all other sorts of agricultural produce rose rapidly. The increasingly unfavourable reports relative to wheat, potatoes, &c., and the fear that the yield of barley will not prove so good as was previously expected, have caused the last named article to excite some attention; and considering its relative cheapness as compared with other articles used for feeding, there is certainly room for an advance. In Norfolk and other large barley-growing counties the best malting samples may still be bought at 33s. to 34s. per qr., and other descriptions on equally moderate terms.

That portion of the oat crop harvested between the 20th of August and the 13th of September was well got in, and the reports speak favourably of both quantity and quality; there is, however, still a large quantity abroad, particularly in the northern parts of Scotland and Ireland. Much, therefore, depends on the weather: should the latter prove auspicious, there would probably be above an usual average; but if what is still in the fields should suffer injury, the excess of produce in the earlier districts would not compensate for the deficiency of the northern crops. That the old stocks have been very nearly exhausted has been plainly proved by the scarcity of the article for months past; so trifling have been the supplies of late, that, though no fears were until very recently felt as to the probable produce, the value of the article has steadily advanced as well in the agricultural markets as at the principal consuming towns.

The yield and quality of beans is very variously spoken of. On the whole, we feel disposed to think that there is not much reason to complain; but what we have just stated, relative to oats, is equally applicable in regard to beans. So completely have the old stocks been used up, that it has for some time past been rare to meet with a sample, even at those places where large quantities are in usual years brought forward; extravagant prices have therefore been paid, and, though the duty has receded to 1s. per qr., the importations from abroad have hitherto been insignificant, showing that our continental neighbours are nearly as bare of the article as ourselves.

Judging from the samples of new peas which have come under our own notice, we should be disposed to assert that all the early varieties were secured in capital condition in the southern counties, but those yet out stand in great danger of being injured. The yield is not generally believed to be large. The opening prices of new white boilers were 38s. to 40s. per qr., but latterly a very lively demand has been experienced, and quotations have risen upwards of 10s. per qr. in all parts of the kingdom.

The foregoing remarks on the wheat trade apply more to the future than the past; and to afford our readers a clear idea of the transactions of the month, a retrospect of the course of the trade at Mark Lane may be useful.

About the close of August, much of the animation which had characterized business for several succeeding weeks had subsided. A short period of fine weather having led to the expectation that the harvest would be got in under auspicious circumstances, affairs remained in this state till Monday, the 15th instant, when, owing to the return of wet, many parties began to consider that it would not be amiss to increase their stocks; the rise then established did not, however, exceed 1s. to 2s. per qr. on the rates current at the end of the preceding month. Between the 15th and the 22nd only two or three dry days were experienced; and so much uneasiness was occasioned by the heavy rain which fell about that period, that the utmost anxiety began to be manifested by millers to secure the finer kinds of new and good old wheat. Meanwhile the supplies had fallen off materially, and on the 22nd there was, with a brisk demand, only a small show of samples from Essex, Kent, and Suffolk. In this position of affairs factors naturally raised their pretensions, and an enhancement of 5s. per qr. was realized, making the total rise during the month about 7s. per qr. Too short a period has elapsed since then to say what effect this important advance may have on the averages. Many parties think that the inferiority of the quality of much of the new wheat will prevent any great fall occurring in the duty; but, should the enhancement already established be followed by a further rise, we are inclined to believe that foreign wheat will be admissible, before the close of the year, at 12s. per qr., or perhaps at even a lower rate. The chance of such an event has naturally prevented any portion of bonded being released, and the arrivals from abroad have been regularly landed under lock; owing, however, to the exports made to Holland and Belgium, no increase in the quantity in warehouse has taken place, whilst the stocks of free foreign (previously very small) have been further diminished by a steady demand for local consumption. Of really fine qualities, such as high-mixed Danzig, Rostock, &c., there is very little remaining, and these sorts have risen in value nearly as much as the best sorts of home-grown wheat. Inferior descriptions have also excited attention of late, and have commanded prices not previously obtainable. In the early part of the month there was no inclination to enter into speculative purchases of wheat, but the orders received from Holland and Belgium imparted a firm tone to business, and some improvement took place in prices even before the unfavourable change in the weather on the 13th instant. Subsequently large speculative purchases were made, and still more important operations would probably have taken place if holders had been somewhat less extravagant in their pretensions. For fair qualities of red wheat, which were on the 1st obtainable at 40s. per qr., the price demanded on the 22nd was 46s.; and good Danzig, under lock, was on the latter day held at 52s. to 53s. per qr. These high rates have checked the inclination to buy, and during the last eight days comparatively few contracts have been closed.

Rather important changes have taken place in the value of flour. The nominal top quotation was in the beginning of the month 53s. per sack; for about a week previous to the 15th instant prices were very unsettled; on that day it was agreed by a majority of the millers to put down the price 4s. per sack, making the highest rate 49s. The subsequent rapid rise in wheat obliged the manufacturers again to alter their quotations on the 22nd, and at present the first London marks are held at 56s. per sack. Country flour has also risen materially within the last fortnight; and good Norfolk household, which was at one time obtainable rather under 40s., has recently commanded 43s. to 44s. per sack, Of foreign free flour stocks are unimportant; the business done has therefore been circumscribed, but the few lots of sweet Canadian and United States have brought 1s. to 2s. per brl. more than could have been previously realized. For Flour in bond an active inquiry has been experienced, partly for shipment to the Netherlands and partly on speculation: the rise from the lowest point in August has amounted to at least 2s. per brl. The total stock under lock in the kingdom consisted, on the 5th of September, of 222,290 cwts.

Hitherto very few of the maltsters have commenced their purchases of barley; and with scanty arrivals of this grain, business has remained in an inactive state. The receipts coastwise into London during the four weeks ending 27th inst. have amounted to about 1,600 qrs. Of this quantity only a comparatively small proportion has consisted of new; and judging from the samples which have been brought forward of this year's produce, we cannot say much in praise of the quality. The highest price yet paid at Mark Lane has, we believe, been 35s., whilst the common runs of malting have been sold at 32s. to 33s. per qr. Notwithstanding the great demand which has been experienced for all other articles used for feeding, old grinding barley has been comparatively neglected. Until almost the close of the month prices remained nearly stationary; latterly, however, an advance of 1s. to. 2s. per qr. has been established. Bonded parcels have met with attention for export to Belgium at relatively higher rates than could have been obtained for the article duty-paid; very little has, consequently, been entered for home consumption. The duty on this article fell on the 11th of September to 8s. per qr.; but this has failed to induce holders of that under lock to liberate any portion.

Some activity prevailed in the malt trade in the early part of the month; latterly, however, business has relapsed into a very dull state, and the turn has been rather in favour of the buyer.

The supplies of oats have fallen short of the quantity required for local consumption; and as the market was previously rather bare, a steady and progressive rise has taken place in quotations. Excepting a sample or two of new, we have received no English oats since our last report; and from Scotland the arrivals have been scanty in the extreme. The quantity furnished by Ireland has also fallen short of what was expected; whilst from abroad, the receipts have been only moderate. In the absence of supplies, it is not easy to give quotations of English and Scotch; but anything fine would readily have brought 30s. per qr. Irish feed, which at the close of August were worth about 22s. per qr., have latterly been selling freely at 24s. to 25s. per qr.; and Archangel, which were then currently sold at 20s. 6d., have risen to 23s. to 23s. 6d. per qr. As yet the averages have not been much influenced; but ere long these high rates must have some effect; and so confident have holders of bonded become that a fall will hereafter occur in the duty, that they have ceased entering for home consumption. The bulk of the recent foreign arrivals have been from Archangel; the quality of this variety is much liked by our dealers, and of the 50,000 or 60,000 qrs. which have come to hand, little remains afloat. In bond this description has recently been held at 18s. per qr., being within 2s. 6d. per qr. of the price at which the article was currently selling three or four weeks ago.

The extravagantly high price demanded for beans has caused a decreased consumption; the amount of business actually done during the month has therefore been unimportant: needy buyers have, however, had to pay extreme rates, say 36s. to 38s. for old ticks, 38s. to 40s. for harrows, and 42s. to 45s. per qr. for handsome small pigeon beans. The duty on this article fell to the minimum point on the 25th, and Egyptian and other foreign sorts in bond have for some time been held within 1s. per qr. of the prices at which the same varieties were offering free.

Owing to a brisk export demand for peas, the value of all kinds has risen very rapidly; indeed, we scarcely recollect so great an advance in so short a period of time on any previous occasion. The fresh arrivals of new white boilers and fine maple sold at 38s. to 40s.; this was before the inquiry for shipment had commenced. On the 18th instant, prices rose fully 3s. to 4s. on these sorts, and 8s. to 10s. on blue; whilst, on that day week, all the white peas brought forward were eagerly bought up on Dutch account, at from 53s. to 55s.; maples commanded 45s. to 48s., and blue peas 60s. to 65s. per qr. It cannot be expected that these extraordinary prices will be maintained; and we should recommend farmers to make hay whilst the sun shines; for when the Dutch demand is satisfied, quotations will in all probability drop nearly as suddenly as they have recently risen. The bonded peas were all sold before attention was directed to free; and some of the old stocks were cleared off at prices which holders a short period before little calculated on obtaining.

The most important feature in the Foreign corn trade is, that all restrictions on the importations of grain and pulse have been removed by the Belgian Government, in consequence of the failure of the potato crop, and the news from Holland, from which it appears that the Dutch authorities contemplated a similar step; at least it is confidently expected that the duties in the latter country will be reduced to the minimum point on all descriptions of grain.

This step taken by our continental neighbours will naturally cause the shipment of wheat which might otherwise have been made to this country, from those ports in the Baltic where they have any surplus for export, to be directed to the Netherlands; and the imports into Great Britain are therefore likely to be smaller than was at one period expected.

The Dutch and Belgian demand has had the effect of raising quotations materially at Danzig, as well as at the nearer ports: and should we require foreign supplies, we shall have to pay high rates abroad.

At Danzig, prices had already risen to 48s. to 50s. per qr., on the 16th September, for really fine qualities; and a further rise was confidently expected. At Rostock, and Stettin, according to the last accounts, there were no sellers below 40s. per qr. free on board; and at other places in the Baltic, as well as at Hamburg, equally high prices have been obtained.

With the exception of a few favoured districts, the crops of grain and potatoes appear to be short over nearly the whole of Europe. In the Northern ports, as already stated, we shall have to compete with Holland and Belgium, should our own crops be found inadequate to our wants, whilst at Odessa; such large purchases have been making for some time past on Italian account, that the value of the article has been driven up quite as much there as in the Baltic.

CURRENCY PER IMPERIAL MEASURE.

SEPTEMBER 22.

WHEAT, Essex and Kent, new, red 58	60	63	White 60	62	66
Old, red	60	66	Do. .. 62	64	70
RYE, old	34	38	New....	38	40
BARLEY, Grinding, 30 32 Malting	32	34	Chevalier	34	35
Irish	26	28	Bere ...	25	—
MALT, Suffolk and Norfolk	58	63	Brown..	56	60
Kingston and Ware	60	—	Chevalier	65	—
OATS, Yorksh. & Lincolnshire, feed	24	25	Potato..	26	27
Youghall and Cork, black..	22	23	Cork, white	23	24
Dublin	22	23	Westport	24	25
Waterford, white	23	24	Black ..	22	23
Newry	25	—			
Galway	22	23			
Scotch, feed	24	26	Potato..	25	28
Clonmel	24	25	Limerick	24	27
Londonderry	25	—	Sligo	24	25
BEANS, Tick, new	40	44	Old, small	46	47
PEAS, Grey	46	—	Maple ..	46	—
White	48	50	Boilers..	48	50

FLOUR, Town-made 53 55 Suffolk 44 — per sk. of 280 lbs.
Stockton and Norfolk 42 44 Irish 44 45

FOREIGN GRAIN AND FLOUR IN BOND.

WHEAT, Dantzic	50	52	fine 48	50	
Hamburg	44	46			
Rostock	46	47			
BARLEY	23	—			
OATS, Brew	16	17	Feed ... 17	18	
BEANS	34	40			
PEAS	44	46			
FLOUR, American, per brl	24	25	Baltic .. 24	25	

IMPERIAL AVERAGES.

Week ending	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.	
Aug. 9th	55	3	29	7	22	8	33	10	41	0	39	0
16th	57	0	29	4	22	2	34	4	41	2	39	7
23rd	57	0	29	9	22	8	33	4	41	8	38	1
30th	56	6	30	0	22	4	35	7	42	1	38	14
Sept. 6th	55	10	31	8	22	10	33	5	42	2	36	9
13th	54	1	31	0	22	3	33	2	42	10	36	5
Aggregate average of the six weeks which regulates the duty.	55	11	30	2	22	6	33	11	41	10	38	2
Duties payable in London till Wednesday next inclusive, and at the Outports till the arrival of the mail of that day from London..	17	0	8	0	6	0	9	6	1	6	4	6
Do. on grain from British possessions out of Europe ..	4	0	0	6	2	0	1	6	2	0	2	0

COMPARATIVE PRICES OF GRAIN.

WEEKLY AVERAGES by the Imp. Quarter, from the Gazette, of Friday last, Sept. 19th, 1845.	s.	d.	AVERAGES from the corresponding Gazette in the last year, Friday, Sept. 20th, 1844.	s.	d.
WHEAT	54	1	WHEAT	45	11
BARLEY	31	0	BARLEY	35	11
OATS	22	3	OATS	20	1
RYE	33	2	RYE	35	9
BEANS	42	10	BEANS	37	9
PEAS	36	5	PEAS	34	6

PRICES OF SEEDS.

SEPTEMBER 22.

Canaryseed was held for more money, but the transactions were of so trivial a nature that it is difficult to state the actual advance. Mustardseed was in short supply, and could scarcely be purchased on as easy terms as on Monday last. Winter Tares were scarce, and held firmly at 8s. per bush.

Linseed, English, sowing 52 58 crushing 40 45 per qr
Carraway .... 42 44 new .. 46 48 per cwt.
Coriander .... 12 18 per cwt.
Mustard, brown, new.... 10 15 white.. 12 18 p. bush
Rapeseed, English, new .. 25*l*. —*l*. per last.
Hempseed.............. 35 38 per qr.
Trefoil .... 17 24 old.. — new —
Tares, Winter .... 7s. 0d. to 8s. 0d.
Tares, old .... — — new— — per qr.
Rye Grass, English...... — — Scotch — — nominal.
Canary, 50 52 per qr. fine 55s.

PRICES OF HOPS.

BOROUGH, MONDAY, Sept. 22.

The market for Hops has undergone no particular alteration, and the duty is called £180,000. On the whole the accounts are tolerably good.

WORCESTER, Sept. 20.—We have no new Hops at market to-day; and *one* pocket only was brought to our fair yesterday, and that was not sold, no price being fixed for it by the grower. Both yesterday and to-day business has been pretty active, the London merchants and factors having made some extensive sales of yearling and old Hops; but our own growth is nearly extinct, both planters and merchants being out of stock, so that business must remain quiet till the market is supplied with the new growth; but, picking being unusually late, an abundant supply is not expected before this day fortnight. The duty remains steady at 11,000*l*.

PRESENT RATES:—

Worcester 1844's . . . . . 122s. to 135s.
,, 1842's and 3's none on sale.
,, 1839's . . . . . 65s. to 84s.
,, Older Hops . . . 40s. to 70s.

HOP INTELLIGENCE.—Towards the end of last week the hops were found to be improving, in consequence of the nights being warmer; but since Sunday morning, rain and wind have prevailed, at some periods very cold, which we fear will prove to have inflicted great damage, and will delay picking. The gales of yesterday blew the poles about very much. General accounts speak of the improved appearances exhibited up to Sunday of the sun's ripening influence, but still that in many places the hops were small. Picking was begun in some districts last Monday, but by next Monday will become much more general. The duty is laid from 175,000*l*. to 180,000*l*. At a hop dinner at Maidstone, last week, we see that it advanced to 195,000*l*., though far from a firm quotation; the general run being some 10,000*l*. and 20,000*l*. below that sum.—*Kentish Observer*.

WOOL MARKETS.

BRITISH.

LEEDS, Sept. 19.—The demand for both combing and clothing wools is steady, and prices are firm at late quotations.

YORK, Sept. 18.—There has only been a small supply of wool at this day's market, and very few buyers in attendance. Prices nominal.

LIVERPOOL, Sept. 20.

SCOTCH.—The demand for laid Highland Wool continues fair at late rates, the supply by no means large. White Highland is still little inquired for. Good crossed and Cheviot continue in demand at full rates; inferior is still neglected.

		s.	d.		s.	d.
Laid Highland Wool,	per 24lbs	9	6	to	10	0
White Highland	do	12	6		13	6
Laid Crossed	do.. unwashed	11	0		12	9
Do.	do.. washed	12	0		13	6
Do. Cheviot	do. unwashed	11	9		13	6
Do.	do.. washed	13	6		17	9
White Do.	do.	24	0		26	0

FOREIGN.—There has been a fair demand for all kinds of Wool this week, at fully late rates; our imports are light, consequently the stocks are getting reduced. The London public sales are announced for the 2nd October, at which there will be about 25,000 bales of fine Wools offered.

FOREIGN.

The market for wool is rather quiet, as the public sales of colonial will begin next week.

We are advised, respecting the market of Buffalo, United States, that "two hundred pounds Western fleece wool of medium quality sold at 26 cents, and a small quantity of a somewhat superior grade brought 27. There is a fair demand for the article to-day; but of the lost received here, we notice that a great proportion are limited above our market, and consequently are obliged to be shipped through to an eastern market. The product of wool, like many other articles of consideration in Ohio, is fast increasing. During June nearly 70,000 lbs. were shipped off via the side-cut canal from Columbus, against 35,000 lbs. last season. The State Journal from which we obtain this fact, does not say what direction it took, but we incline to the opinion that it followed the main bulk of the trade toward the lake for a market."

The accounts of May 10, from Sydney, state that Wool was rather higher, there being but little in the market. The quantity of tonnage for Wool was larger, and freights, therefore, had declined to $1\frac{1}{4}$d. to $1\frac{1}{8}$d. per lb. The exchange was at $1\frac{1}{2}$ discount.

From Vienna, under date of August 30, we learn that the fair had not turned out so well for Wool as was anticipated, though 25,000 cwt. were sold at about previous rates. The rise which some expected did not take place, and those who had purchased since the previous fair at higher quotations had lost by their operations. The accounts from England were not considered favourable, and these had some effect; while the manufacturers of Germany would not pay higher prices, because cloth had not risen. Much would depend on the English harvest, the dealers at Vienna considered, in regulating the demand for Wool and its value on the Continent.

LEEDS, Sept. 19.—For some descriptions of foreign wools there have been rather more inquiries during the past week; but, on the whole, transactions have not been entered into with very much animation, or to any great extent. Prices, however, are without variation.

RAW HIDES, at per stone of 14lbs. / SHEEP & CALF SKINS. Per skin.

	s.	d.	s.	d.		s.	d.	s.	d.
Best steers & heifers	5	4	5	8	Polled sheep	2	6	3	3
Middling hides	4	8	5	2	Half-breds	2	4	2	8
Inferior ditto	4	2	4	6	Downs	1	9	2	0
Market calf	6	6	8	0	Lamb	2	6	3	6

TIMBER.

	£	s.	d.		£	s.	d.
Baltic Timber, per load of 50 cubic feet	3	17	6	to	4	7	6
Yw. Deals, per standard hundred	16	0	0	..	19	19	0
Deck Deals, per 40 feet 3 in.	1	1	0	..	1	7	0
Pipe Staves, per mille	95	0	0	..	105	0	0
Lathwood, per fm. of 4 feet	7	0	0	..	7	10	0
Petersburgh, Riga, and Archangel Yw. Deals, per stand. hundred	18	0	0	..	19	19	0
White	15	0	0	..	15	10	0
Yw. Battens	18	0	0	..	19	19	0
Riga Logs, for 18 feet cube	5	0	0	..	5	12	6
Stettin Staves, per mille of pipe	90	0	0	..	110	0	0
Gothenb. Yw. Deals, per 100 12f. 3in. 9in.	24	10	0	..	27	0	0
White ditto	23	10	0	..	25	10	0
Yw. Battens, per hd. 12 ft. $2\frac{1}{2}$ in. 7 in.	15	0	0	..	17	10	0
Christiania Yw. Deals, per hd. 12ft. 3in. 9in.	29	10	0	..	30	0	0
White	27	10	0	..	28	0	0
Quebec and St. John's Spruce Deals per 100, 12 ft. 3 in. 9in.	16	0	0	..	19	10	0
1st qual. yw. Pine Deals, per st. hd.	14	10	0	..	17	10	0
Second do. do.	11	10	0	..	12	10	0
Red Pine Deals, per hd. 12ft. 3 in. 9in.	22	0	0	..	27	0	0
Red Pine Timber, per load	3	17	6	..	4	2	6
Yw. ditto	3	2	6	..	3	15	0
Birch ditto	3	0	0	..	4	0	0
Elm ditto	4	5	0	..	4	15	0
Oak ditto	5	10	0	..	6	10	0
Standard Staves per mille standard	50	0	0	..	60	0	0
Puncheon ditto	14	10	0	..	18	10	0
Lathwood, per fm. of 4 feet	5	0	0	..	6	0	0

MAHOGANY, &c.

Mahogany,	St. Domingo	8d.	to	1s.	9d. per foot.
	Cuba	8		1	6
	Honduras	7		1	2
	African	5		0	7
Cedar	Havana	5		0	6
	New South Wales	$4\frac{1}{2}$		0	6
Rosewood.	Rio	15*l.*	to	30*l.*	0s. per ton.
	Bahia	12		15	

PRICES OF MANURES.

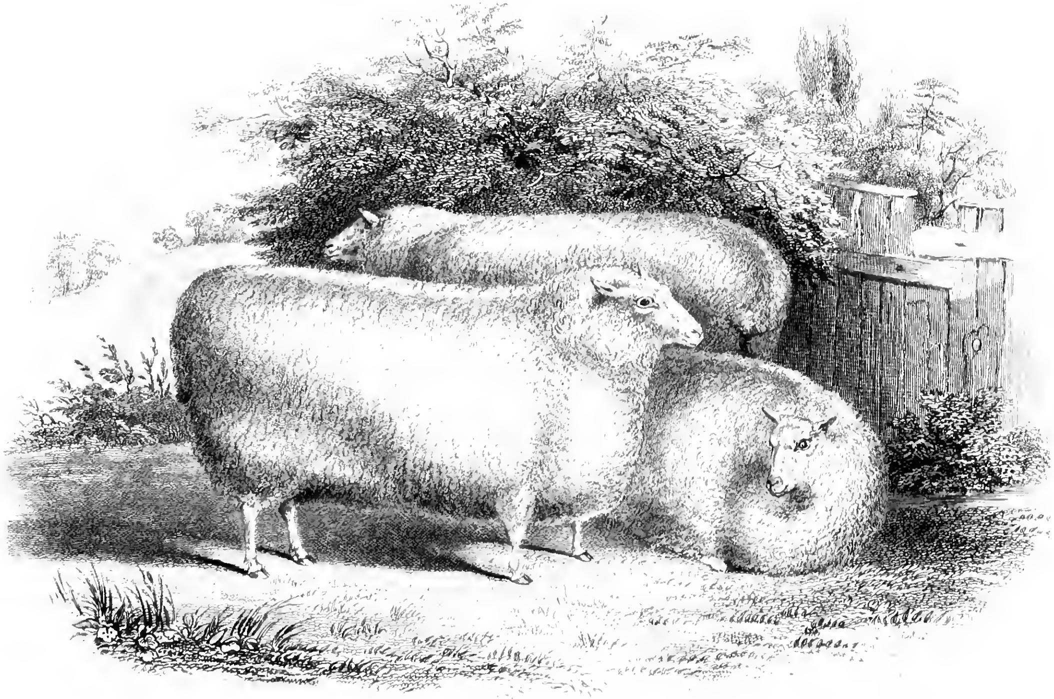
Subjoined are the present prices of several sorts of Manure:—

Hunt's Bone-dust, —s. per qr.
Hunt's Half-inch Bone, —s. per qr.
J. T. Hunt's Artificial Guano, 9*l.* per ton
Hunt's Stuff Graves, 3s.6d. cwt.
Rape Dust, 6*l.* 6s. per ton
Rape Cake, 6*l.* per ton
Rags, 4*l.* to 4*l.* 10s. per ton
Graves, 6*l.* 10s. per ton
Gypsum, at the waterside, 35s. per ton
Agricultural Salt, 32s. per ton
Carbon, 12s. per qr.
Humus, 14s. per qr.
Soap Ashes, 10s. per ton
Patent Disinfected Manure, 13s. 6d. per qr.
Highly Concentrated Manure, 30s. per qr.
Nitrate of Soda, 16s. per cwt.
Nitrate Potash (saltpetre), 25s. to 26s. per cwt.
Petre Salt, 4*l.* 10s. per ton
Willey Dust, 4*l.* 4s. per ton
The Urate of the London Manure Company, 4*l.*4s. per ton
New Bristol Manure, 8s. per qr.
Hunt's new Fertilizer, 13s. 4d. per qr.
Preparation for Turnip Fly, 10s. 6d. per pakt., sufficient for three acres
Chie fou, 21s. per cwt.
Wolverhampton Compost (Alexander's), 12s. per qr., subject to carriage to London, or forwarded from Wolverhampton
Guano, Peruvian, 10*l.* 10s.; Bolivian, 9*l.*; African, 6*l.*6s. to 7*l.* 10s. per ton, according to analysis
Potter's Guano, 10*l.* per ton.
Muriate of Ammonia, 20s. to 24s. per cwt.
Muriate of Lime, 6s. per cwt.
Clarke's Compost, 3*l.* 12s. 6d. per hhd., sufficient for three acres
Alkalies, 28s. and 42s. per cwt.
Soda Ash, 14s. to 16s. per cwt.
Chloride Lime, 28s. per cwt.
Sulphuric Acid, $1\frac{1}{2}$d. per lb.
Sulphur for Destroying Worm on Turnips, 12s. per cwt.
Sulphate Soda, 6s. per cwt.
The Liverpool Abattoir Company's Animalized Manuring Powder, 2*l.* 10s. per ton
Manure Powder, 16s. per qr.
Boast and Co.'s (Bow) Inorganic Manures, from 6s. to 11s. per cwt., according to crop
Boast's Guano, 9*l.* 9s. per ton
Fothergill's Gypsum, 35s. per ton.
Fothergill's Phosphate of Lime, 14s. per cwt.
Superphosphate of Lime, 8s. do.

PRICES OF SHARES.

Shares.	Div. last half year	RAILWAYS.	Price per Share.
		Aberdeen .... 2½l pd	4½ a ¾
24,000	2l p sh	Armagh, Coleraine, Portrush 25l sh 1⅜l pd	2⅞
9,500	10s	Birmingham and Gloucester 100l sh pd	130 a 29
10,000		Do. New, iss. 7½ dis. .. 25l sh 17½l pd	
		Birmingham Extension ...... 1⅜l pd	2¾ a ⅝
30,000		Birmingham & Oxford Junct. 20l sh 2l pd	5¾ a 6½
9,500		Brighton, Lewes, & Hastings, 50l sh 20l pd	
15,000	1l 8s p sh	Bristol and Exeter .... 100l sh 70l pd	85½ a 90
		Ditto New .... 2l pd	10 a 11½
6,640	12s p sh	Bristol and Gloucester .. 50l sh 30l pd	
36,000		Caledonian .... 50l sh 5l pd	12½ a ¼
		Do. Extension .... 50l sh 2½l pd	4½ a 4
50,000		Cambridge and Lincoln .... 25l 1½l pd	4⅛ a ¾
		Do New .... 1⅜l pd	3⅞ a 4⅜
		Canterbury and Dover .... 1⅜l pd	2⅛ a ½
		Cheltenham and Oxford .... 2l pd	3⅜ a 4
42,000		Chester and Holyhead ... 50l sh 15l pd	20½ a ¾
		Chichester and Brighton .. .... 20l pd	
		Clydesdale Junction .... 5l pd	
		Cork and Killarney ... 50l sh 2½l pd	
40,000		Cork and Waterford .... 25l sh 1½l pd	2¼ a ⅛
4,800		Coventry, Nuneaton, Bir. & Leicester, 25l sh 1¼l pd	4¼ a 3⅞
		Cornwall .... 50l sh 3l pd	4¾ a ¼
		Direct Northern .... 50l sh 2½l pd	2¾ a 3
35,000		Direct Norwich .... 20l sh 1l pd	
		Direct Manchester (Remington's) 2¾l pd	4½ a ¼
10,000		Diss, Beccles, & Yarmouth. 25l sh 1½l pd	
21,600		Dublin & Belfast Junction. 50l sh 2½l pd	
19,000		Dublin, Belfast, & Coleraine, 50l sh 2½l pd	
12,800		Dublin and Galway .... 50l sh 2½l pd	5⅜ a ½
17,000		Dundalk and Enniskillen 50l sh 2½l pd	
144,000	3s p sh	Eastern Counties .. 25l sh 14l 16s pd	20¼ a 19⅞
		Do. New .... 25l sh 4l 16s pd	6¾ pm
144,000		Do Perpetual, No. 1.. 6l 13s 4d sh pd	1¼ pm
144,000		Ditto ditto, No. 2 .. 6l 13s 4d 13s 4d	¾ pm
		East Dereham and Norwich .... 1l pd	1⅞ a ½
4,000		Eastern Union .... 50l sh 20l pd	
		Ditto Extension .... 25l sh 1½l pd	4⅞ a ½
		East Lincolnshire .... 1¼l pd	6¾ a 6
18,000	1l 10s p s	Edinburgh & Glasgow .... 50l sh pd	76 a 5
18,000	7s 6d p s	Ditto Quarter Shares ...... 12½l sh pd	
26,000		Ditto New ¼ Shares .... 12½l sh 5l pd	13 ex-d.
26,000		Edinburgh and Northern, 25l sh 1½l pd	
		Edinburgh and Perth .... 1½l pd	2¾ a 3⅜
10,800		Ely and Bedford .. .. 25l sh 1½l pd	4¼
		Enniskillen and Sligo .... 2½l pd	
		Exeter, Yeovil, and Dorchester, 2¾l pd	4¼ a 4
		Glouc., Aberystwith, and Central of Wales .... 1⅜l pd	2⅝ a ⅜
		Goole and Doncaster .... 25l sh 1⅜l pd	6⅛ a 5⅞
10,918	5l per ct	Grand Junction .... 100l sh pd	
10,918	5l per ct	Ditto Half Shares .... 50l sh pd	
10,918	5l per ct	Ditto Quarter Shares ...... 25l sh pd	
		Grand Union (Nottingh. & Lynn) 1⅜l pd	4⅝ a 4
12,000		Great Grimsby & Sheffield, 50l sh 2¼l pd	
20,000		Great Southern & Western (Ireland) 50l sh 15l pd	26
		Ditto Extension .... 50l sh 2½l pd	
		Great Munster .... 2½l pd	
10,000	3l p sh	Great North of England .... 100l sh pd	217 a 18
	10s p sh	Ditto New .... 40l sh 5l pd	
		Ditto New .... 30l sh 2l pd	
		Great North of Scotland ...... 2½l pd	
25,000	1l per ct	Great Western .... 100l sh 80l pd	165½ a 3
25,000	4l per ct	Ditto Half Shares .... 50l sh pd	96 a 2½
37,500	1l per ct	Ditto Fifths .... 20l sh 20l pd	38 a 7⅜
		Guildford, Farnham, and Portsmouth, 50l sh 2½l pd	3¾
20,000		Harwich .... 20l sh 1l pd	
12,000		Hull and Gainsborough .. 25l sh 1⅜l pd	
8,000	1l 15s p s	Hull and Selby .... 50l sh pd	106 a 4
8,000	3s 9d p sh	Do. Quarter Shares ...... 12½l sh pd	
8,000		Do. Half Shares .... 25l sh 2l pd	23
15,000		Inverness and Elgin ... 20l sh 1l pd	
5,000		Kendal and Windermere 25l sh 1½l pd	
16,000		Lancaster and Carlisle ... 50l sh 25l pd	53¼
8,000		Leeds and Bradford ... 50l sh 15l pd	
		Leeds & West Riding Junctn., 1⅜l pd	
		Leicester and Birmingham .... 22s pd	2 pm
		Leicester and Bedford .. 20l sh 22s pd	3⅛ pm
		Limerick and Waterford ...... 2½l pd	
		Lincoln, York, and Leeds .... 1⅜l pd	
5,100	4½l per ct	Liverpool & Manchester .... 100l sh pd	
7,968	4½l per ct	Ditto Half Shares .... 50l sh pd	
11,475	4½l per ct	Ditto Quarter Shares .... 25l sh pd	
4125000l	5l per ct	London & Birmingham .... Stock	221 a 20
41,250	5l per ct	Ditto Thirds .... 32l sh 10l pd	
54,450	5l per ct	Ditto Quarter Shares .... 25l sh 2l pd	28 a 6½
		Ditto Extension .... 1⅜l pd	
43,000	3s	London & Blackwall .. Av. 16l 13s 4d	10 a 9¾
		Ditto New .... 1½l pd	
36,000	30s p sh	London and Brighton ...... 50l sh pd	76 a 5½
4,500		Ditto Consolidated Eighths 50l sh 35l pd	
		Ditto Sixths .... ½l pd	3
33,000	8s 0d p sh	London & Croydon .... Av. 18l 15s 9d	25½ ex-d.
		Do. New .... 13s 4d pd	&ex-nw
35,000		Do. Guaranteed 5 per Ct.. 9l sh 6l pd	
43,077		London & Greenwich .. Av. 12l 15s 4d	10
11,136	10s	Preference or Privilege.. Av. 18l 17s 2d	
46,200	2l 0s p sh	London & South West... Av. 41l 6s 10d	80 a 1
	9s p sh	Ditto Consolidated Eighths, 40l p sh 20l pd	
		Ditto New .... 50l sh 2½l pd	15¼ a ¾
		Ditto New .... 40l sh 2l pd	1½
90,000		London and York ...... 50l sh 2½l pd	6⅞ a ¾
20,000		London and Windsor .... 25l sh 1l pd	
		London, Salisbury, and Yeovil .. 2½l pd	4½ a 5
10,000		Londonderry & Coleraine, 50l sh 2½l pd	6
10,000		Londonderry & Enniskillen 50l sh 2½l pd	3½ a ⅞
8,000		Lynn and Ely .... 25l sh 2½l pd	
		Lynn and Dereham .... 25l sh 1⅜l pd	
13,000	2l 18s 5p s	Manchester & Leeds .. 100l sh 76l pd	216 ex-d
13,000	25s 8d p s	Ditto Half Shares ...... 50l sh 34l pd	
13,000	2s	Ditto Quarter Shares .... 25l sh 2l pd	40½ ex-d
22,750		Ditto Sixteenths ...... 6l 5s sh 4¼l pd	
30,000	1l p sh	Manchester & Birming .. 40l sh 40l pd	89 ex-d
30,000		Do. ¼ Shares .... 10l sh 4l pd	16½ a 15¾
		Do. New ¼ Shares ...... 10l sh 2l pd	13 a 14¼
		Manchester, Buxton, and Matlock, 20l sh 22s pd	9½ pm
4155000l	3l per ct	Midland .... Stock	171 a 60
12,500		Ditto Fifths .... 20l sh 2l pd	
		Ditto New .... 40l sh 2l pd	25½ a ¾
978500l	4l 6s 3d p c	Ditto Birmingham & Derby .... Stock	131 a 3
15,000		Midland Grt. West. (Irish) 50l sh 2½l pd	4¼
20,000		Newcastle & Berwick. 25l sh 11l 10s pd	15¼ a 16½
	2l p sh	Newcastle and Carlisle .... 100l sh pd	
		Newcastle, Durham, and Lancashire Junction .... 1⅜l pd	5⅜ a ¼
20,000	19s 6d p s	Newcstl & Darlingt Junc... 25l sh 25l pd	54½ a 4
	10s p sh	Ditto New (Brandling).. 25l sh 10l pd	44 a 5
		Newport and Abergavenny .... 2½l pd	
		Newry and Enniskillen, 50l sh 2½l pd	2⅞ a 3
24,000		Newark, Sheffield, & Boston 25l sh 2½l pd	6⅛ a ¼
36,000		North British ex Dalkeith and Hawick 25l sh 15l pd	27 a ½
		Ditto New ex Hawick .... 1l pd	7¾ a ⅝
10,256	1l 10s	Northern & Eastern .... 50l sh 45l pd	
3,136	22s 6d	Do. Scrip .. iss. 5 dis...50l sh 35l pd	
12,208	7s 6d	Do. ¼ Shares .... 12l 10s sh pd	
		North Kent & Direct Dover 50l sh 2½l pd	4¼ a ½
		North Staffordshire .... 20l sh 22s. pd	5½ pm
12,000		North Wales .... 25l sh 1¼l pd	1⅝
19,000		Norwich and Brandon .. 20l sh 14l pd	2¾ a 3
19,000		Ditto New .... 10l sh 1l pd	5⅜ a ¼
		Northampton, Banbury, and Cheltenham .... 2l pd	6⅞ a ⅛
		Nottingham, Erewash Valley, & Manchester .... 1⅜l pd	
		Oxford and Worcester .... 2½l pd	13¾ a ¼
		Perth and Inverness .... 2½l pd	2⅞
		Portsmouth Direct ...... 50l sh 2½l pd	5¾ a 6½
2,600		Preston & Wyre .... 50l sh pd	43⅞ a 4½
		Richmond .... 20l sh 1l pd	11 a ½
125,000		Rugby, Worcester, and Tring 20l sh 1l pd	
		Scottish Central .... 25l sh 2½l pd	7⅞
12,000		Scottish Midland ...... 25l sh 1½l pd	3¾ a ½
26,000		Sheffield and Lincoln .... 25l sh 1¼l pd	
7,000		Sheffield and Manchester 100l sh 95l pd	
		Ditto ¼ Shares .... 25l sh 8l pd	
18,000		Shrews., Wolverham., Dudley, Birm., 50l sh 2½l pd	8½ a 9
		Shrewsbury and Trent Valley Union, 20l sh 22s pd	2⅞ pm
		Shrewsbury, Hereford, & North Wales 2¾l pd	4 a ⅛
22,000		South Devon .... 50l sh 20l pd	32½ a 1½
		Sligo and Shannon	
56,000	15s 6d p s	South Eastern and Dover .. Av. 33l 2s 4d	44½ ex-d
28,000	1s 11d p s	Ditto New, iss. at 32l No. 1, 50l sh 12l pd	
42,000		Ditto New 33l 6s 8d .. No. 2, 50l sh 7l pd	
126,000		Ditto New 30l ..... No. 3, 50l sh 2½l pd	8½ a ⅞
		South Midland .... 20l sh 22s pd	7 pm
50,000		South Wales .... 50l sh 2½l pd	5⅜ a 6
		Staines and Richmond .. 20l sh 1l pd	3¼ a ½
45,000		Trent Valley .... 20l sh 2l pd	17¾ a 19½
		Trent Valley & Holyhead Junc. 1⅜ pd	3¼ a ½
		Warwick and Cheltenham .... 1⅜l pd	2⅛
		Waterford and Kilkenny, 20l sh 1l pd	
		Waterford, Wexford, Wicklow, and Dublin .... 1½l pd	1¾ a 2
9,000		West Cornwall .... 20l sh 1¼l pd	

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London.



London Published by Joseph Rogerson 24 Norfolk Street Strand 1845

THE FARMER'S MAGAZINE.

NOVEMBER, 1845.

No. 5.—Vol. XII.] [Second Series.

PLATE I.

LONG-WOOLLED WETHER SHEEP.

Our first plate represents a pen of three twenty months old new Leicester Wethers, bred by His Grace the Duke of Bedford, at Oakley Farm, Bedford. They were exhibited at the Smithfield Club Cattle Show, in December, 1844, and obtained the first prize of Twenty Sovereigns, and the Gold and Silver Medals.

PLATE II.

PLAN OF BOILER-HOUSE, &c., FOR PREPARING THE FOOD OF FARM-HORSES.

(For description see page 407.)

ON HARVESTING BEANS AND PEAS.

As there are some peculiarities in the harvest management of leguminous crops which are either inapplicable or unnecessary in that of any of the ceralia, the methods of reaping and securing both classes of plants being, like their habits of growth, in many respects dissimilar, a few practical observations descriptive of the most approved mode of harvesting beans and peas, as practised in the best bean-growing districts, may not prove uninteresting at this season, though these crops are for the most part already secured throughout the kingdom.

In reference to white corn it has been said very justly that the utmost activity and vigilance of the farmer are indispensably requisite during the busy period of harvest, in order to secure all his grain undiminished in quantity and unimpaired in quality, and that, too, in such a condition or state of dryness that no injury can be sustained by it from heating, either in the stack or in the house; and, if unceasing assiduity and care are so essential to the safe and expeditious harvesting of wheat, oats, and barley, they become doubly incumbent on the husbandman in securing his bean crop, the value of which almost entirely depends on the management pursued in harvest, and the condition in which it is preserved in the stack. It is hardly necessary to observe, in this place, that the harvest management of beans is generally attended with no inconsiderable amount of trouble and anxiety, especially in moist seasons—at least, in late harvests, the crop is peculiarly hazardous in the northern counties of Britain and in Ireland, where the climate is colder and more changeable than it is in most parts of England.

The difficulty so frequently and generally experienced in the harvesting of beans may be ascribed to the two following causes: first, to the nature of the crop itself; and, secondly, to the late period at which, in ordinary seasons, it attains maturity. The bean possesses a strong, succulent stem or stalk, bearing a profusion of soft, green leaves, which it is always a matter of some difficulty to deprive of their superabundant juices at an advanced period of the season; and, if not thoroughly dry preparatory to being stacked or otherwise put together in any considerable quantity, the grain is almost certain to be seriously damaged by the heat or fermentation (a sort of slow spontaneous combustion) which would inevitably ensue among the mass; while the straw or haulm, which, when properly and securely harvested, without being either too dry and sapless by over-ripeness before reaping, or yet so green and succulent at the time of cutting as to endanger its subsequent preservation, constitutes a most valuable species of fodder, is rendered comparatively worthless as such by this incipient fermentation. But, certainly, the most serious difficulties that have to be encountered in the harvesting of this crop arise chiefly from the late period of the season at which it usually arrives at maturity, and the unpropitious weather which is then commonly experienced. In an early harvest, and when the straw is not over-luxuriant, beans become ready for reaping very opportunely, generally succeeding immediately to the cutting of white corn; but in a late season, on the other hand, especially if the preceding summer has been more than usually moist and warm, the plants become very succulent and luxuriant, and continue growing and in a green state until an advanced period—until, in fact, the early frosts of the approaching winter discolour their foliage and terminate their growth. In some early harvests—such, for instance, as that of 1842—the writer has seen beans cut down simultaneously with the corn crops, having been perfectly ripened, even in the Lothians, by the latter end of August; but such early and propitious harvests as that of the year referred to are exceedingly rare in the northern counties, the most usual time for the cutting of beans being from the beginning to the middle of October, and not unfrequently a fortnight later, a period of the year when changeable and unfavourable weather may be expected to set in. Many intelligent agriculturists have, in fact, abandoned and objected to the cultivation of beans in moist climates, solely on account of the risk and difficulty attending their harvest management in late seasons; but, nevertheless, under a proper system of culture, the bean is generally a remunerative crop, and is especially valuable, on the stiff clays abounding in some localities, as an excellent preparation for wheat, often on such soils superseding the necessity of resorting to a bare or summer fallow for the purpose of cleansing and pulverizing the land. Indeed, the extension of thorough draining, coupled with the drill culture of turnips and beans, may be said to render naked fallows not only unnecessary, but unprofitable, in the management of even our strongest clays; such soils, when properly drained, being so well adapted to the culture of beans, while excellent crops of turnips are raised on all the light and medium descriptions of land that have been relieved from the baneful influence of superabundant moisture. It is to be observed, however, that, when autumn-sown wheat is to be taken after beans, it is always a matter of some anxiety to the farmer to have the latter crop ripened and removed from the field at an early period, so as to enable him to get the land ploughed and prepared in due time and in favourable weather for the reception of the seed.

Having premised these few remarks on the subject, I shall now proceed to details; and here it may be proper to observe that the chief recommendation of the methods of harvesting beans and peas which I am about to describe is derived from the circumstance of their being the result of experience in one of the best bean-growing districts in the kingdom. For the sake of perspicuity, it will be necessary to advert to each crop separately, as some observations will occur in reference to the harvesting of one which may not be applicable to that of the other.

The first point that demands consideration in the harvesting of beans is the most proper period for reaping the crop; and, although this is apparently a subject on which unanimity might reasonably be expected, yet, like most branches of practical husbandry, it is one regarding which some diversity of opinion prevails among farmers and agricultural writers. An author, whose opinions on agricultural matters generally are entitled to much weight, observes, in reference to this point, that, "when bean straw turns black, it is fit to cut."* Now, though this is certainly a pretty sure indication of complete ripeness, there are obviously many circumstances that frequently render it expedient and advisable to reap this crop before the whole of the stems and leaves actually become black, in consequence of attaining maturity without the aid of frost or other atmospheric influences; so that the above criterion appears somewhat indefinite, and is, in my humble opinion, generally erroneous, in regard to the most proper state of ripeness in which beans ought to be cut: indeed, there are but few cases in which I would deem it advisable to defer the reaping of this crop until the straw turns black. The appearance of the seeds must likewise be taken into consideration, as well as that of the haulm. When the pods begin to change colour, and the skin of the seeds have acquired a yellowish, leather-like appearance, the beans may be considered as sufficiently matured, and should be cut down as soon after as possible. The grain itself feels hard and firm at this stage, and the farinaceous matter becomes dry and mealy.

But there are some other circumstances which often render it expedient to reap beans before attaining the degree of ripeness denoted by the circumstance of the straw turning black. These arise chiefly from the kind of weather that has been experienced during the preceding summer, its state at the period of harvest, and also from the luxuriance and succulency of the stalks. Should very dry weather, with much sunshine, occur about the time when the beans are ripening, the intensity of the solar heat has a very considerable effect in opening the pods, before the plants have entirely lost their green colour, by which, of course, some loss must be sustained if the crop be permitted to remain uncut until the stems and leaves become black. This premature opening of the pods I have more than once witnessed in dry, warm harvests, a considerable proportion of the seed being thus discharged and dispersed over the ground, both while the plants are standing and in performing the several operations of reaping, carting, &c. In late, damp seasons, on the other hand, it is hardly possible—at least, so far as the northern counties are concerned—to get the crop thoroughly ripened before the severity of the winter begins to set in, especially if the straw happen to be more than usually luxuriant. In this case, therefore, it might be very hazardous to defer the cutting of the crop until the above indication of maturity be exhibited. Beans, it has been observed, continue growing in moist seasons till an advanced period, if not attacked by the early frosts, as has been the case this season in many parts of the country; but the propriety or advantage of allowing them to stand uncut, after a certain time, is exceedingly questionable in our changeable climate. Any benefit that the

* See Stephens' admirable "Book of the Farm," vol. iii., p. 1057.

crop may afterwards derive from the soil or otherwise is counterbalanced by the risk which the farmer runs of losing favourable weather, besides incurring other disadvantages necessarily attendant on a late harvest. There can be no question as to the utility of allowing beans to become well ripened in good weather; for, if reaped prematurely, or before the pods and leaves begin to lose their green colour, not only is it difficult to get the straw sufficiently dry for putting into the stack, but the grain will undoubtedly be of inferior quality, and have a shrivelled appearance as a sample. There is obviously less liability to loss by the shedding of the seeds, or the opening of the pods, when the crop is cut down in a greenish state, than if it were permitted to stand until the stalks and leaves become black and the grain thoroughly ripened: besides, the straw contains the largest proportion of soluble or nutritive matter, and therefore forms better fodder when reaped with a good deal of its natural juices. These advantages are, however, counterbalanced by the difficulty that may probably be experienced in winning the crop, especially in unpropitious harvests, as succulent green-cut beans require to stand a long time in the field before they become ready for the stack. The most proper period for cutting this crop, therefore, appears to be about mid-way between the extremes of complete ripeness and a green, succulent state—that is, when some of the leaves have fallen off, and the straw and pods begin to lose their green colour, and assume a yellowish appearance. At this stage of ripeness the grain is supposed to have received from the soil everything essential to its perfect development: the nutritive properties of the straw are preserved; little or no loss will be sustained by the shedding of the seeds, as the pods, owing to their toughness and firm adhesion, do not readily open; and, lastly, if the crop be cut down and harvested in a judicious manner, a comparatively short period of dry weather will suffice to make it fit for the stack.

Before leaving this part of the subject, it may be useful to observe that the process of ripening is said to be materially accelerated by cutting off the succulent tops of the stalks, after the pods have been formed. This operation may be accomplished with a reaping-hook or an old scythe-blade, and is often resorted to by gardeners. It is said to be advantageous as causing the beans to be more abundant, and about a fortnight earlier than they otherwise would be. The practice is, however, but rarely observed in the field culture of this crop, though, if it possesses the advantages or produces the effects ascribed to it, it would, no doubt, be of considerable benefit, particularly in late seasons, or when the crop is over-luxuriant, to cut off the extreme tops of the stalks, and the operation cannot occasion much expense, as a man provided with an old scythe-blade, attached to a handle, is capable of going over a large extent in a day.

Beans are reaped either by the sickle or the scythe, according to circumstances. With regard to the most eligible instrument for reaping pulse crops, something will obviously depend on the particular mode of culture which is pursued—whether the plants are grown in rows or in broadcast—as well as on the condition of the crop itself. The broadcast method of cultivating beans and other green crops has long been universally abandoned throughout Scotland, but is still very commonly adopted in many parts both of England and Ireland, though in the last countries it is also fast and justly getting into disrepute and desuetude among intelligent agriculturists. It would obviously be irrelevant to my present subject to enter at any length into details illustrative of the many disadvantages resulting from the long-continued adherence of farmers to this imperfect and antiquated system of cultivating green crops, which indeed must appear self-evident to every intelligent and unprejudiced inquirer, whether we consider its injurious tendency in excluding an adequate supply of light and air from the plants, both of which are now well known to exert a most beneficial influence on vegetable growth and development, and are in fact absolutely indispensable to healthy vegetation, or in precluding the possibility of bestowing any tillage upon the land during the growth of the crop, both of which very desirable objects are effectually attained by adopting the drill system of culture. The rows, when formed at a sufficient distance apart (not less in the case of beans than twenty-seven inches), admit not only of a continued course of tillage during the summer months, by the action of the horse-hoe or drill-grubber in the intervals, but also of a free and unobstructed circulation of air among the plants. The soil between the rows is thus loosened and pulverized, which is an important means of increasing the fibres of the roots, and of enabling them to ramify in every direction in quest of the requisite nourishment. The atmospheric air also is thereby permitted to permeate the loosened earth, which, by its chemical influence, hastens the decomposition of the vegetable matter contained in the soil, and prepares it for assimilation by the roots of the plants; and last, though not the least advantage, the action of the horse-hoe between the rows, prevents the growth of troublesome and exhausting weeds, and prepares the soil for the production of succeeding crops. Under this system of cultivation, the bean justly ranks among our best cleansing and restorative crops; whereas when the broad-cast method is adopted, though unquestionably the most economical and expeditious at seed-time, beans, instead of proving beneficial to the land as a restorative or meliorating crop, generally become more prejudicial than advantageous, in consequence of the difficulty of effectually extirpating thistles and other weeds that may make their appearance among the plants during the early stages of their growth.

When beans are grown broad-cast, they may be cut down by the scythe; and after lying for some time in the swathe to dry and wither, they are to be bound into sheaves in nearly the same manner as white corn. I am aware that the sickle is most generally employed in reaping this crop; but when the stalks are not laid or broken down, I cannot see any impropriety in scythe-reaping, nor any material obstacle to its adoption. It is admitted that when the crop is heavy, and has been somewhat broken down and entangled by the joint action of the wind and rain, the scythe is in a great measure inadmissible; even its reaping with the sickle is, in this case, attended with no slight difficulty. The latter instrument is, however, preferable to the former; but, as already remarked, when the stems have maintained an erect position, the scythe may be advantageously employed, both because the operation is thus more expeditiously and economically performed, and the straw is cut closer to the ground, which is of itself a most important consideration. Beans sown broad-cast are easily cut down with the scythe, if the ground be even on the surface. Drilled beans are most generally reaped with the sickle, the smooth-edged hook being preferred for the purpose, as it cuts the stalks through without uprooting them. In some early harvests, after a dry summer, when the beans have been well ripened and not very luxuriant, I have seen the stalks pulled up by the roots, this plan being in this case more expeditious than the ordinary mode of reaping; but pulling is of course impracticable in the great majority of instances.

When beans are grown broad-cast, and reaped with the scythe, the dissevered stems are laid in swathes or rows, though not in such a regular manner as is done in mowing oats or wheat, the scythesmen being often obliged to cut in various directions to suit the different positions in which the plants may be inclined. In fine settled weather, and when no danger of rain is apprehended, the beans may be allowed to remain in the swathe until they become sufficiently dry for removal to the stack-yard. It will be necessary, however, to turn them occasionally. The stalks are also sometimes collected into small bundles immediately after being cut, but are left untied. In this case the bundles must be frequently turned, particularly in moist weather, in order to prevent the grain from receiving any injury, and to insure all parts being equally and sufficiently dried. Preparatory to their removal to the stack-yard, the beans are bound into sheaves or bunches of a medium size, and set up in stooks for a few days, to facilitate their further winning. It is to be observed that in reaping this crop with the scythe, the usual attendants, such as gatherers, binders, &c., are unnecessary; as beans are seldom bound for some time after being cut, in order to allow as much as possible of their superabundant juices to evaporate, and to secure the speedy withering of the stalks and leaves by the influence of the sun and winds.

As has been already remarked, drilled beans are almost invariably reaped with the sickle, the smooth edged sort being best adapted to the work; in fact, a fragment of a hook, or one from which the point has been broken, is found to answer the purpose very well. The serrated sickle cannot, for obvious reasons, be advantageously employed in reaping this crop. The proper method of cutting beans is quite different from that of wheat or oats. In the former case, the reapers begin at one end of the field, each taking two adjoining rows, and follow each other in regular succession towards the opposite extremity. In the act of cutting, the operator takes the standing stakes under the left arm, and moving gradually backwards, cuts them through with the instrument. The beans are thus cut down in successive handfuls, and laid upon the ground to dry. Whatever method of reaping may be adopted, too much pains cannot be taken to have the plants cut close to the ground, for the two-fold purpose of securing the greatest possible quantity of the straw, which, when properly harvested, forms a most valuable species of fodder, and of preserving any pods that may be growing near the lower end of the stems.

Beans are, in every case, to be bound into sheaves preparatory to their removal to the stack-yard; but, in order to accelerate the winning process, they are generally left untied for several days after being cut, to allow the straw to dry and wither. The plants, it has been said, are cut in large handfuls, and these are placed separately upon the ground, across the drills, with the tops all inclining in the same direction, in which state they are allowed to remain till the leaves and stalks become somewhat withered and dried, the time requisite for which must, of course, depend entirely on the state of the weather, and the degree of ripeness which the crop had attained before reaping. These handfuls are then collected by women and boys, and, when the beans are sown by themselves, bound into medium-sized sheaves with short straw-ropes previously formed for the purpose, and distributed over the field for the convenience of the binders; but should a proportion of peas have been sown along with the beans, as is sometimes done with a view to improve the quality of the fodder, the sheaves are to be tied with ropes formed of the peas-straw, twisted into a band by the binder as he proceeds with the work. The beans are then set up in stooks or shocks, formed by placing the sheaves in an upright position in opposite pairs leaning against one another, and every stook may consist of four or more pairs of sheaves, as may be considered most expedient under the circumstances, but without any covering of hood-sheaves on the top. The object of setting up beans in this way is to hasten and complete the winning process, by enabling the upright sheaves to receive the full benefit of the sun and air, and to prevent any damage being suffered by the grain from the dampness of the ground.

The time requisite for beans to remain in the field until ready for putting into stacks depends chiefly on the degree of ripeness which they had attained prior to being cut, as well as on the sort of weather subsequently experienced. The usual period is from ten days to a fortnight, when the crop is cut in a medium state between complete ripeness and a green succulent condition; but a month not unfrequently intervenes in some quarters between the operations of reaping and stacking. If allowed to stand uncut until the straw and pods become black, a comparatively short period will suffice in good weather. It is obviously of the utmost importance to get the beans sufficiently dry as speedily as possible after being reaped, in order to clear the field, and prepare the ground in proper time for the sowing of wheat. When the latter crop is to be sown in autumn, and an unfavourable change of weather apprehended before the beans can be got properly dry for the stack, it has been recommended as a useful practice, to remove them, after being bound into sheaves, to a neighbouring field, to complete the winning process, in order to clear the land for the operation of ploughing; but it is needless to observe that this expedient, though sometimes adopted, occasions an amount of additional labour which few farmers are willing to incur. In general cases, therefore, the beans, when sufficiently dry, are carted at once to the rick-yard, and there formed into stacks in nearly the same manner as other grain crops. There should be no precipitancy in removing this crop from the field, for, next to barley, there is no kind of grain that requires to be so well won previous to stacking as beans, and there is none so liable to injury from heating when put together in any considerable quantity, owing to the succulency of the straw. Beans are not readily damaged in the stook when the precaution is taken of frequently going through the field and setting up the fallen sheaves. Indeed, in some seasons, it is not unusual in the northern counties to have this crop enveloped in snow both prior and subsequent to the reaping, and yet no material loss to ensue if the farmer be endowed with sufficient patience to wait for the return of propitious weather to dry the straw properly before putting it into the stack. During a continuance of unsettled weather, it is found a useful practice to put four or five stooks together in a sort of wind-row, which, by their mutual support, enables them to withstand the action of the wind and rain, until it becomes proper to remove them to the stack-yard. In this way, the stooks on several adjoining ridges may be placed upon one, which, in addition to the advantage referred to, admits of ploughing the cleared space.

When sufficiently dry this crop may be conveyed to the same stack-yard in which the other grain is stored, and put up into stacks in the usual way. The bean stacks should always, however, be of a much smaller size than the others, and formed with a light top or roof; and unless the straw be got perfectly dry, each stack ought to be provided with a funnel or chimney in the interior, extending from the foundation to the roof, together with side-openings at the bottom communicating with the external atmosphere. This arrangement insures adequate ventilation, by allowing a free circulation of air through the stack, and thus guards against the risk of heating, which is so detrimental to the quality of the grain and straw. Bean-stacks should always, if possible, be built on raised stands, which not only prevent any injury from the dampness of the ground and the depredations of vermin, but also admits of a circulation of air into the stack from underneath.

If we consider the injury necessarily sustained by beans and other grain crops from being in any degree heated in the stack, we must at once feel impressed with the advantage and security of having all rick-yards well exposed to the action of the atmosphere; and this is especially important in late, damp harvests, when the crops are so difficult to get thoroughly dry. A well-ventilated stack-yard, open to the influence of the winds, is then of the utmost advantage, as materially contributing to prevent or diminish the liability of the corn to suffer from heating in the stacks. In consequence of the prevailing disposition formerly manifested in the selection of sites for farm-steadings, to give the preference to low situations, other things being favourable, for the sake of shelter and the facility of carting home the crops, very many of the existing stack-yards are most disadvantageously circumstanced in regard to the free access of air, though proper ventilation is known to be indispensable to the preservation of every description of grain crop. It is, of course, always necessary to have the stack-yard situated contiguous to the farm-buildings, in order to economise time and labour in removing the corn to be threshed; and for this and other obvious reasons, the great advantage of having the homestead exposed to drying winds, and a free, unobstructed circulation of air, should not be overlooked. Hence, too, the evident impropriety of having the stack-yard in any case surrounded by a high wall or hedge, or shaded by a number of large trees. Corn of every description can be stored with safety, in a barn-yard which possesses the advantage of a free circulation of air, considerably earlier, or with less regard to complete dryness, than could be attempted under different circumstances, the risk of heating being much diminished in the former case; in short, a well arranged stack-yard, possessing the double advantage of a free access of air and of a thoroughly dry bottom, is of incalculable benefit to the farmer, particularly in moist harvests. In determining the most eligible site for the erection of a homestead, it is seldom considered whether or not the selected situation will afford a good stack-yard; but this, though no doubt a secondary and minor consideration, compared with the conveniences of a central position in relation to the arable land, facility of access, &c., should not, however, be disregarded.

When beans are carried at once to the barn-yard, they should be placed on the exterior rows, or in those that are most exposed to the prevailing direction of the wind, in order that they may receive the full benefit of the air. But when the crop is not thoroughly dry, nor the stack-yard well ventilated by its situation, it is found to be a much safer practice to stack the beans by themselves on an open or somewhat elevated spot, in any of the fields not in tillage and convenient to the farm buildings, whence they can readily be carried to the barn when required for threshing. In this case, the stacks may be arranged in one or two lines, according to the quantity of the crop; and if the field is in grass, the beans must be enclosed by a paling, to protect them from sheep or other animals. It is proper to observe, that this method of securing pulse crops in moist seasons is by no means a new expedient, it being frequently resorted to in the bean-growing districts in the north, and always with much advantage in late harvests, when the stalks cannot be got thoroughly dry. The best quality of grain is thus obtained, and the straw also is most valuable as fodder. Both bean and pea straw are eagerly consumed by horses, cattle, and sheep, and when properly harvested, are little inferior to hay as an article of food; but if moulded, or otherwise injured in the stack by heating, the animals commonly reject both sorts of haulm, and they are then serviceable only for the purposes of litter and manure.

Even in such exposed and airy situations, bean-stacks should be formed of a comparatively small size, four or five good single cart loads-being quite sufficient for each. The diameter of these stacks may be from ten to twelve feet at the bottom, which is considerably less than that of most corn-stacks. As a further security against the evil consequences of heating, bean-stacks should always be built with an opening or funnel in the middle. This may be effected by means of three upright posts of an equal length, fastened at the top with a straw-rope, and the lower extremities drawn out in a circular form round the centre of the foundation. The posts must be of sufficient length to extend from the base to near the summit of the stack, so as to ensure perfect ventilation throughout. A straw-rope is also wound around the upright posts for some distance from the ground, for the purpose of preventing the sheaves from getting into the open space in the interior. One or two openings must be formed from the centre to the circumference at the bottom, that there may be a communication between the funnel and the external air, so as to admit a free circulation up the middle of the stack. This desirable object may be attained by means of one or two low trestles placed in the most advantageous position at the base, around which a few sheaves are packed; and by several other expedients, which may be resorted to according to circumstances, the great object in all cases being to afford a free passage for the admission of air into the interior of the stack. As a further security against heating, it might be useful to form one or two small openings in the body of the stack, between the bottom and the eaves. These arrangements will ensure the most perfect ventilation ; and if the beans be damaged in any way after such precautions have been adopted, the straw must have been in a very damp state when put together. With such openings in the centre of the stacks, it may be affirmed that this crop can be harvested and preserved in any kind of weather, and in little more than half the time which it commonly requires to stand in the field after being cut. Ample ventilation is essential to the preservation of beans, not merely on account of the succulency of the straw, but as they are seldom threshed till the end of winter, and have therefore to stand for some time in the stack.

In building bean-stacks, the tops of the sheaves are sometimes turned outwards instead of the butt-ends, being the reverse of the invariable practice in the case of white corn. This method is adopted with the view of preserving the pods at the bottom of the stalks from the action of the weather and the depredations of rooks and other birds, as in general the pods grow much closer to the lower than to the upper end. This mode of building, however, occasions some additional trouble to the workman, in consequence of the centre of the stack being always considerably elevated above the circumference, owing to the butt-ends of the sheaves being innermost; but this circumstance, however disagreeable to the builder, contributes in no small degree to the preservation of the grain and straw, as no stacks keep the corn in better condition during winter than those in which the sheaves have a considerable inclination downwards from the centre towards the circumference. The reason of this is too obvious to require any explanation. It is of course altogether impractable to turn the ear-ends of the sheaves outwards in stacking wheat or any other of the ceral crops. But pulse are very different in their manner of growth; indeed the largest and best filled pods are commonly found about the lower part of the stalks, several inches at the summit being generally destitute of any. It is customary for some farmers in the bean-growing districts of the north, when the method here referred to is not adopted, to cover the bodies or stems, as well as the roofs of their bean-stacks with straw, as a protection against the weather and birds. When neither of these plans is resorted to, the pods exposed on the outside of the stacks should be cut off with a reaping-hook, or an old scythe-blade, after the beans have somewhat subsided. The tops or roofs are thatched with straw, and secured by ropes formed of the same material, as soon as circumstances will permit after the stacks have been built. These operations are performed in much the same manner as in the case of wheat or oat-stacks, and being sufficiently understood by most agricultural labourers, need not be further adverted to in this place; but I may observe, that, as the quality of beans is much impaired by the entrance of moisture, it is obviously of much importance to have the roofs of the stacks well defended against the admission of rain-water.

It is proper to observe, before closing these remarks, that the method of harvesting beans which I have now described is applicable chiefly to late and moist harvests, in which the greatest difficulty is always experienced in properly securing this crop, and doubtless most readers have already arrived at the same conclusion. It requires, in fact, no more than ordinary care and exertion on the part of the farmer to harvest his beans in a fine season ; but in one of an opposite character, on the other hand, there is no crop so precarious to secure. Next to barley this grain is the most liable to injury from bad weather or mismanagement, or both combined, and, like it, is also very easily damaged in the stack, owing to the straw not being sufficiently dry before removing it from the field, or to the absence of adequate ventilation to prevent heating. I feel confident, however, that there are but very few seasons, if any, so adverse and unpropitious, in which the bean-crop may not be effectually secured in any part of the kingdom by the mode of harvesting which I have endeavoured to describe in the preceding pages.

Having thus adverted at some length to the harvest management of beans, I shall now proceed to offer a few observations in reference to the method of securing peas. Although these plants are somewhat similar in their habits of growth, and belong to the same natural order or family, namely, *Leguminosæ*, yet there are several points of difference in the usual modes of harvesting them. When peas become ripe, the haulm withers and turns brown; the pods also lose their green colour, and begin to open. The crop should be reaped as soon as possible after these indications of maturity have been exhibited, otherwise considerable loss may arise from the shedding of the seeds in the subsequent handling. Peas are cut by various methods, according to the system of culture adopted, and other circumstances. Field peas are commonly sown broad-cast, but they are also occasionally, and ought perhaps to be invariably, sown in drills or rows, for the same reasons by which the propriety of drilling turnips, beans, and other green crops is supported. The seed is sometimes advantageously mixed with a proportion, generally a fourth part, of beans, the strong erect stalks of which are useful in supporting those of the peas.

It is always a matter of some difficulty to reap peas either with the scythe or the sickle, as the haulm is generally much entangled. In some localities the half of an old scythe-blade, attached to a short handle, is employed for the purpose with advantage. After being cut with this instrument, the peas are rolled up into small bundles provincially termed "wads," in order that they may be more speedily and perfectly dried, both in the straw and grain, as well as to guard against their being injured by the dampness of the ground in wet weather. In this state they are allowed to remain until the straw has become thoroughly dry, when they are carried either to the stack-yard or to the barn. When the sickle is employed in reaping peas, an old blunt hook is generally preferred; and with this instrument the plants are partly pulled and partly torn, being seldom cut quite through like corn crops. Peas are rarely bound into sheaves immediately after being cut; the most general practice being to place them in medium-sized bunches upon ropes or bands formed by twisting together a few of the stalks; and after remaining in this state for some time to dry and wither, they are tied up to facilitate their removal. The sheaves may possibly require to remain in the field a few days after being bound, to become sufficiently dry for the stack; but in this case they are not set up in stooks like white corn, it being merely necessary to turn them once a day, in order to prevent any injury from the dampness of the ground, and to insure uniform and complete dryness.

The stalks and leaves of peas being very succulent, they require much attention to harvest them properly in damp seasons, and, as in the case of beans, it would be injudicious to put them in a stack until thoroughly deprived of all moisture. Even when considered sufficiently dry, it is a useful precaution to form the stacks of a small size, and with a funnel or chimney in the interior for the purpose of ventilation, as in securing beans. It is almost needless to observe that the grain of this crop is often very materially injured in quality by mismanagement in harvest. The haulm, too, when properly harvested, forms a valuable species of fodder for every description of live-stock; but if subjected to the action of much rain, and not regularly and frequently turned while lying upon the ground, the requisite state of dryness will be both tedious and difficult to secure: and the straw, if subsequently heated in the stack, becomes valueless and unwholesome as an article of food, and can be employed only as litter.

As considerable difficulty is often experienced, particularly in the northern counties of the island, in harvesting and preserving pulse crops, I could not, perhaps, better conclude this paper than by quoting the following useful method of securing peas and beans in very late and unpropitious harvests. It is taken from the old statistical account of the parish of Peterhead in Aberdeenshire, written by the Rev. Dr. George Moir:—

"The greater part of the peas of this crop (1784) was entirely lost, and never taken off the ground for want of good weather to dry the straw. I had myself that year a field of between six and seven acres, of which four acres were beans and two and a half were peas. The peas, after they were cut down, were frequently covered with snow; and in turning them a great part of the grain was lost. I waited till near the end of November, and seeing no prospect of preserving them in the ordinary manner, I took three Norway trees, of ten or twelve feet in length, tied them at the top with a rope, and extended them at the base. The peas were built round the trees at the outside; four small arches were left at the bottom: all was hollow within the trees, and open at the top before the rick was thatched. The air which rushed in went to the top; and in a few days the straw, which was formerly wet, was as dry on the inside as on the outside. The whole crop of peas was contained in three ricks; the grain that remained and straw were entirely preserved; and if the experiment had been tried sooner, the whole of the grain would have been saved. Many, by hurrying in their beans to the corn-yard, lost both them and the fodder. I delayed touching mine till the last day of November; and in the night-time, with moonlight, and a brisk breeze of wind from the west, got them all out of danger. Beans are a hardy grain, and will remain long on the field without receiving injury from the weather. I know no part of husbandry in which farmers are more apt to err than in the management of their beans, by taking them too quickly off the field. If not sufficiently dry, and even blackened, the fodder and grain are both spoiled."

It is obvious that the above simple and efficient method of preserving beans and peas in late harvests, and during a continuance of unpropitious weather, is equally well calculated to secure barley and oats under similar circumstances. T. S.

LORD ELDON ON LEASES.—The late Lord Eldon was an advocate of leases, both in theory and practice. In a letter dated Eldon, Durham, 1836, and published in his life by Horace Twiss, his lordship alludes to the improvements made by all of them in their farms, and then says, "For this I thank you; and I cannot but attribute these beneficial effects, in a great measure, to the alteration which you have made in the tenure of your farms, in taking them for a term, instead of from year to year. It is evident to me, as it must, I think, be to you all, that a tenant who is liable to be removed in a year from his farm cannot satisfactorily to himself make those improvements which he will do when he is sure that he can remain on his farm long enough to reap the benefit to himself of those improvements. I thank you all for your improved management."

THE FARMERS' CLUB.

RESUMPTION OF THE MONTHLY MEETINGS.

ON STORING ROOTS.

The first of the monthly meetings of the Farmers' Club for the present season took place at their rooms in Bridge-street, Blackfriars, on Monday evening, 6th October, Mr. Baker, of Writtle, Essex, in the chair.

The subject of discussion was, "The best mode of storing potatoes, turnips, carrots, and beet-root;" and the unfortunate failure in the potato crop of this year gave a more than ordinary interest to the evening's proceedings.

The Chairman, in commencing the business of the evening, said, the duty of opening the subject of discussion had on the present occasion devolved upon himself, and, after the lapse of time which had occurred since their last meeting, he should have been happy if he could have congratulated them upon a more numerous attendance. Although this was, however, not the case, he was sure, from those he saw around him, that what they wanted in numbers they would supply in intelligence (*cheers*). He would now proceed according to their usual practice, which was that one person should take the lead in opening the subject of discussion, and that any other gentlemen who had remarks to make should offer them in rotation. Their great object was in arriving at the truth, and although one might display talent in one way more than another, this did not argue any superiority. each being expected to bring his quota to the common stock of information, and thereby contribute to the general benefit; for it was with knowledge as with other matters, the little from the many making the large amount in the aggregate. This was the case with regard to intellect, acquirement, and information; very small amounts, by being brought into one focus, would make in the whole a very large capital (*hear*). Without further comment, therefore, he begged to proceed to the particular subject of discussion for this evening. Some difficulty had been experienced in finding gentlemen who would carry out the objects of the club, and the duty of bringing forward the subject fell upon his shoulders to-night (*hear, hear*). The particular subject selected for this evening was the storing of root crops, which divided itself into several heads; and that which appeared to demand especial attention just now related to potatoes (*hear*). In touching upon this point it might appear that he was treading upon the province of a gentleman (Mr. Knight) who had paid great attention to the growth and cultivation of potatoes (*hear*). But if, having given some consideration to the subject, he could throw any light upon so important a matter, he should be happy to do so. One thing was perfectly certain, and that was that potatoes never kept well except in the absence of light. Light was most injurious to them, and therefore should be excluded. Many modes of preservation presented themselves; one, by placing them in houses from which the light was excluded, and in which sudden transitions of atmosphere were prevented; for the potato was more susceptible of frost than any other vegetable. It was, therefore, especially important that they should be protected from frost, and obscured from light. They were in addition subject to a process of fermentation; and if that fermentation went on to any considerable extent, it produced that species of rot which had of late years become so very destructive. In a few years this had proceeded to such an extent as to induce people to consider whether it would not be advisable to return to the original stocks, as it was found that those which were raised from seed were less affected than others. In the animal creation it was found that breeding in and in from the same stock, however good that stock might originally be, was highly injurious; and it was exceedingly probable that that which was observed to prevail in the animal creation held as a rule also in the vegetable kingdom, and that vegetables continued to be grown without change of seed or soil would soon degenerate in character (*hear, hear*). He thought this showed that there was an analogy running throughout the whole of creation in this respect, whether animal or vegetable (*hear*). If the animal creation were subject to such laws, why should not the vegetable also? Indeed he thought it was quite evident that it was so (*hear.*) The argument from this was, that it was necessary to change both seed and soil; and it was found that if this were done, the characteristics exhibited in the outset were restored. One method to which he had resorted for preserving potatoes was that of keeping them in houses formed by lumps of dried clay moulded in the same manner as bricks; the clay was mixed up with mulch, and rammed into moulds eighteen inches in length and six inches in depth. A building made of these lumps, used just as bricks would be used, the walls being formed one foot in thickness, would resist any frost, however severe; and potatoes so stored, from the tendency of the lumps to resist frost, would pass the winter perfectly unscathed. This arose simply from the clay lumps being entirely non-conductors of heat. He wished to be understood as only mentioning this as his own system. The fact of their escaping in such houses led, however, to his partially understanding the cause of the injury which potatoes so frequently sustained; this fermentation being the result of a gas generated from the moisture and acting upon the potato, produced the disease which was so destructive. Since he had used these houses, and found what was the result, he had always been very particular in keeping his store or plant potatoes therein; the consequence was, that he had invariably succeeeded in obtaining good plants where his neighbours had in many instances failed (*hear*). With regard to clamping potatoes it should be observed that wherever steam was seen arising from them as from a hay-stack, it might be taken for granted that fermentation was going on. A good method of preventing this fermentation in clamps was to put straw between them at a distance of every six or eight feet; which would act as funnels for conveying away the moisture. Faggots might also be advantageously used to the height of the clamps; and if there was any fermentation, these faggots would act in the same way as a chimney to allow the moisture to escape. He had never lost any potatoes since he had adopted these plans; he had reasoned upon principles applicable to such matters, and found himself right in all his conjectures. A great deal had been said and written upon what was termed "the new disease" in potatoes, and a very elaborate article had appeared on the subject in the *Pictorial Times*, in which it was stated that upon examination of the diseased potato by the microscope, it was discovered that the injury was caused to the root by a *fungi* of a parasitic class, which attached itself thereto, and that the decomposition was thereby produced which was communicated from one to the other. This he thought a very superficial view of the matter; it was all very well to tell us, because we found *fungi*, that those *fungi* were the cause of the disease. But it was quite evident to him that these fungous plants were not the cause, but the consequence of it (*hear, hear*). If such were the fact in other cases, there ought to be no exception taken to the rule in the case of the potato (*hear, hear*). The potato-crop had in the past season been subject in an unprecedented degree to great changes of temperature. The months of March, April, and May were unusually cold and very ungenial to the growth of the potato; June was altogether as hot. Great transitions took place in the state of the atmosphere, which it was very probable might have had a material effect upon its growth. In July the weather became wet and cold to an extraordinary extent, and the thermometer went down almost to the freezing point, and as quickly rose again to a high temperature. This went on until the 19th of August, and on that day excessive rains set in, attended by great electric phenomena and violent storms, not only in this country but on the Continent. In the following week there was some excessively warm weather, in which the harvest was commenced in many parts of the country, and in that week this disease in the potato was first discovered. He believed that it was first heard of in Yorkshire; but from all that he could learn, it was discovered throughout the country about the same time, and that immediately after the extraordinary change in the weather to which he had alluded. It was well known that all sudden changes were highly injurious to vegetation. In the case of turnips they were often productive of mildew; and parasitical plants were then observable as in the potato disease. In the autumn months, when there were alternations from hot days to cold nights, diseases were very apt to be produced in plants, particularly in turnips. He imagined the cause of the disease in potatoes to be this—that the alternations from hot to cold and from wet to dry injured the potato-blade, and that the sap circulating in the blades becoming diseased also, the potato itself became affected, and the parasitical plant then showed itself. It appeared to be invariably the case that as soon as the leaves of the plant became affected, the root was attacked by the parasite. Plants, like animals and insects, had their parasites—that was to say, their destroying principle. Parasites which affected one would not affect the other. With respect to the ash-tree, it was found that the sap balls never appeared on it until it began to decay; but the moment decay commenced, the sap balls made their appearance; but they were never found upon a healthy tree. They often found in trees which were diseased, a sort of *ascarides* or peculiar lice; but they were never fonnd in trees which were not diseased. He thought it must be apparent therefore, that the *fungi* observed in the potato were not the cause, but the consequence of the disease; for they did not attack it unless in a diseased state. He had had a good deal of communication with a gentleman who practised horticulture extensively, and who living in comparative retirement was not a great deal heard off; but whenever his name was mentioned, it was always with the highest respect, for he was a man of great observation—he meant Dr. M'Lean, of Colchester (*hear, hear*). This gentleman had made horticulture his peculiar study; and although he (Mr. Baker) had the honour of bringing forward this subject, most of the facts which he should put forward on this part of the question had been communicated to him by Dr. M'Lean. One of the observations which this gentleman had made in his own garden was, that potatoes planted near the wall had escaped the disease altogether, while those near the path had been very much affected. The fact was, that the water flowed from the path to a considerable extent upon the potatoes; but near the wall they were out of the reach of the wet, and went altogether unscathed. Now this was a case in point; for had the disease been one of an epidemical character, all would have been affected alike; whereas, in the case mentioned, those near the wall being in a warmer and dryer situation, escaped (*hear*). It was also found that some particular sorts of potatoes were not affected at all, while others suffered most severely. As far as his experience went, the kidneys and best varieties of potatoes were more affected than the hardier kinds. He was informed that potatoes grown upon dry soils had generally escaped. In his (Mr. Baker's) own garden he grew a good many of the ash-leaf kidneys—a very early potato which he reserved almost entirely for seed. Now he found these quite as much affected as the later kinds, so that it must be evident that the disease must have originated long before it became apparent. The conclusions he drew from these observations were—first, that as the parasite was never found upon healthy potatoes, it was the consequence and not the cause of the disease; secondly, those which were diseased would become infected with this parasite by contact with those previously so infected, but that those not diseased would not become so infected even by contact; thirdly, that the *fungi* were the effect of the disease, and not the cause of it (*hear, hear*). He now came to the consideration of turnips, Swedish turnips in particular. They knew perfectly well that it was their disposition to go into a state of fermentation, which made them more difficult to store than any thing else. If there was any degree of moisture, they would soon go into active fermentation. There were principles regulating vegetable matters which did not apply particularly to them, but which, nevertheless, applied to them in a particular degree; and the chances were for or against the storer according to the good or bad management in storing them: one person would have them entirely rotten, while another would have them as fresh as when taken out of the ground. They should be topped and tailed in the usual and ordinary manner, and the earth should be left on; much depended on this. In storing turnips, it was only necessary to put a little straw between them as in the case of potatoes; or they might be placed between hurdles, with boughs to keep them upright. Having thus formed one heap, you might so go on and form another and another *ad infinitum;* all that was necessary on the approach of frost was to pile up a little mulch or a little haulm on the sides of them, for wet would not hurt them provided it was not too much. If they were clamped, that was to say, covered in with earth, their position was much the same as when in closed buildings. The great difficulty was to avoid fermentation, for if fermentation once set in, all was over. It was often observed in clamps that the top portion would suddenly sink down. When this took place, it showed that they were rotting below. His own experience induced him to believe that they were much better not put in houses at all. Mr. Baker here alluded to a little work of his own, "On the Farming of Essex," in which he had alluded to some of these subjects, and good-humouredly remarked, that as it had not sold very well, any gentleman present should be welcome to a copy of it, if he would take the trouble of advancing to the table. He also referred the meeting to the practice of Mr. King, which was identical with his own, of storing turnips, namely, avoiding the use of hooks to cut off the tops and tails, simply wringing them off, and placing them in piles of about forty bushels each, seven feet wide, and four feet high. What he had stated was from his own experience, and he always found that an ounce of experience was worth a pound of reading (*hear, hear*); for those who read merely, frequently omitted that which was of a very essential character in practice (*hear*). Although he did not approve of clamping, he admitted that they were better clamped than exposed to the frost in the open field.

Mr. CHEFFINS wished to know to what height Mr. Baker would recommend that the clamps should be carried?

The CHAIRMAN said seven or eight feet, with a sloping top, exactly as one would build a house. Mangold wurzel also should never be cut; the tops should merely be wrung off, as he had recommended in the case of turnips; and this being done, they should be piled up to a cone, and barley straw packed round them. He had found these plans very advantageous, for as the mangold went away for feed, the straw became useful as litter for the bullocks. This was a much better mode of storing mangold wurzel than putting it in houses, for then the moisture arising from it by evaporation was often very destructive to the timbers, and he had seen two or three buildings totally destroyed by the effects of this evaporation. He thought he had now come nearly to the length of his tether; all the information which he had to-night brought to the general stock was of a practical nature, and such as was deduced from his own experience (*hear, hear*). With regard to carrots, he could not say that he had much experience in storing them; he had thrown them loosely in a barn, and had lost a great many; he should, however, be very happy to receive information on this subject, for he had not himself been a grower to any considerable extent.

Mr. POOLE wished to ask how the clay bricks to which Mr. Baker, their chairman, had alluded were put together?

The CHAIRMAN: With the same material as the bricks or lumps were made of, or with coarse mortar.

Mr. CHEFFINS said he thought that their own material was best.

Mr. ISAAC EVERITT wished to ask how high the walls of the clay lump houses ought to be carried?

The CHAIRMAN said he generally carried them ten or twelve feet high. He had, in fact, recently built himself a dining room of this material, and quite lately a hot-house (*hear, hear*).

Mr. CHEFFINS said he thought it was desirable, for storing roots, not to carry them higher than five or six feet.

The CHAIRMAN said he should not think of carrying them to a less height than eight or ten feet. Buildings of this description were very economical. He paid about 6s. a hundred for making the lumps, eighteen inches in length, twelve in width, and six in depth.

Mr. ISAAC EVERITT, in reference to what had been said with regard to wringing off the tops of turnips and mangold wurzel, remarked, that in Norfolk they always cut them off, and found no inconvenience from the practice. The fact was, they generally employed women to do the work, and pulling them off sadly blistered their hands. They used an old reap hook for the purpose, and did not experience any injury from the cutting.

Mr. HOBBS said he was, from his own experience, disposed to back up the views of their Chairman; he thought that if there was any difficulty in stripping off the leaves of mangold wurzel with the hands, it must arise more from its being a very bad sort (*hear, and a laugh*) than from any other cause (*expressions of dissent from Mr. Everitt*). He was obliged to grow mangold wurzel for the feed of his stock, and had, therefore, endeavoured to cultivate and treat it in the best manner. For some years he had been in the habit himself of having the tops cut off; but for the last three or four years he had found it much to his advantage merely to clean off the earth from the roots, and strip off the leaves with the hand, which was easily done with a good sort (*hear*). Thus treated, he did not find it nearly so liable to decay as when closely cut off with a sharp instrument; and for the sake of economy he thought it was preferable to follow Mr. Baker's plan. The leaves should be at once carried away, and not left in the fields to decay. He generally paid about 6s. per acre for trimming, and he found that at that rate labourers could earn 1s. 10d. or 2s. a day; they could, in fact, earn from 2d. to 4d. a day more by that than by the common day work. With respect to potatoes, his experience was, that mangold-wurzel potatoes had generally escaped the prevalent disease, as had also the Welsh potatoes; he therefore thought that they ought to treat these roots as they did animals, and occasionally introduce a little new blood, so to speak (*hear, hear*). He had hoped that they should have a little information on the best mode of storing carrots, as, for his own part, he was more ignorant on this part of the subject than with regard to any other crops; and they were very profitable to grow, if they only knew how properly to store them. He looked to the Essex farmers for more information on this point, as carrots were most valuable to mix with mangold wurzel and Swede turnips.

Mr. Isaac Everitt said, in his part of the country they merely cut off the leaves of mangold wurzel, without tapping the root; and the more mould that was left on them in reason, the better they kept: at the same time, if the weather was very wet, it was better to leave off work for a time.

Mr. Morton, connected with the Whitfield farm (Lord Ducie's), said, that his experience led him to prefer cutting off the leaves of beet-root to twisting them off as people killed fowls. Turnips he generally stored by ramming in straw between the rows, and mangold wurzel in stacks about ten feet high, taking care that it was dry; if wet, the stacks were sure to sink down. A little dry frost would not hurt it, if the wet was kept away. He did not see any difficulty in storing carrots, if they also were put together dry. With regard to potatoes the question was a very serious one. In the neighbourhood of Bristol his experience had been very different from Mr. Baker's, for there he had found that the coarser kinds, such as were given to bullocks, were much more injured than the finer sorts. He had found, in fact, that the finest potatoes, which were not fit for eating until the month of July, were in that part of the country very little injured (*hear, hear*). He quite agreed with Mr. Baker, however, in thinking that a cold or damp soil was the primary cause of the disease, by preventing the sap from passing down to the root. The mode of preserving potatoes in Gloucestershire and the neighbourhood of Bristol was, by storing them in piles or cones of about two and a half tons each, with a little earth and straw put loosely over them. He had been in the habit of storing carrots in a similar way, and never lost a ton out of 700 or 800 (*hear*).

Mr. Hobbs thought carrots should be treated much in the same way as Swedish turnips.

The Chairman thought the exclusion of the external air was a great point to be considered.

Mr. Knight, of Edmonton, said he should begin at the bottom of the list of subjects which had been brought under their attention, namely, with carrots. Some of his neighbours practised with regard to carrots what was called the "sandy" system of Bedfordshire, which was to store them in layers, and cast a little sand or dry light mould upon them, and in some instances a little straw.

In reply to a question from Mr. Hobbs,

Mr. Knight said they generally ran them up in cones three or four feet in height. The discussion of this evening, which had been so ably dilated upon, was a most important one, especially the portion of it with which their Chairman had commenced; at least he felt it himself especially so, from being more particularly interested in it (*hear, hear*). He confessed, however, that he had not at present been very much enlightened, and he could not help thinking that they had heard more of theory than practice. He hoped he should be excused for making this remark, for they came there for the purpose of expressing their opinions, and in now doing so, he was far from inte[illegible]g any thing offensive either to their excellent [illegible]rman or any one else present (*hear*). With regard to the observations of Mr. Baker respecting houses in which to store potatoes, they should there go hand in hand, for he had himself a potato-house—and there was no better in Middlesex—built, five-and-thirty years ago, of the clay lumps to which the chairman had made allusion; it was about 100 feet in length, and from 18 to 20 in width. For the last thirty-five years he had used this structure as a store-house for his potatoes, and had never experienced any loss, except in the very severe frost of the winter of 1814. He had lately begun storing, and had at the present time about 70 tons in this clay-house; it would hold, when full, as many as 200 tons. With regard to the communication of the disease, he was sorry to differ from Mr. Baker; he (Mr. Knight) believed that the bad ones would contaminate the others; he hoped he might be wrong, but he feared it would be otherwise. He had written to Dr. M'Lean, of Colchester, on the subject of preserving seed, for he was fearful that we should not be able to secure seed sufficient for another year. The system he was himself adopting was that of putting them in banks, and sifting a small portion of fresh slacked lime upon them, with some straw on each side: the potatoes thus treated appeared to be going on very well. The idea was suggested to him by a friend, Mr. Newman Hayes, who had himself followed it out about three years ago, and he found that he had never had finer plants than he had that season; out of 60 or 70 acres not a plant missed, and he attributed this to the use of lime as he (Mr. Baker) had described. If he found it succeed in the case of those upon which he had made the experiment, he should adopt it generally; if it did not, he must abandon it. Whether it succeeded or whether it did not succeed, he should take care that the result of his experience should be made known. With Mr. Baker's observations respecting the necessity of a change in seed from time to time he fully concurred. It was the custom of the Edmonton and Essex growers to have a portion of their seed from Scotland, Lincolnshire, and Yorkshire; in fact, they changed their seed very frequently. With regard to potatoes generally, he thought they had been degenerating for the last ten or twelve years; they have not that durable quality about them which they used to have. Potatoes formerly would stand almost any weather: there was no dry rot, wet rot, or anything of the sort, five-and-thirty years ago. They certainly appeared to him to have degenerated; and he feared that unless they got their seed from another part of the world, there would be no improvement. He hoped to see vessels coming in soon with potatoes from Canada and different parts of America. The Quebecs had disappeared entirely, and the Champions were nearly all gone too. With respect to storing turnips, he was not in a position to throw any light upon the subject. The course he pursued with mangold wurzel was to give so much an acre for having the roots taken up, as Mr. Hobbs did; and boys then took a knife, and trimmed up the tops. He had not witnessed any ill effects from using the knife for this purpose; he thought, however, that perhaps the plan of twisting them off was the preferable of the two; but when the mornings were frosty, and the fingers cold, the work people did not much like it. He quite agreed with what had been said regarding potato clamps. His plan in clamping was to put old baskets and haulm at about every five feet, and if there was any disposition to ferment, then let out the steam (*hear*).

Mr. Wood said he would just take Mr. Knight's place for a minute for the purpose of saying that he could add nothing to the information of the evening (*hear, and a laugh*). It might be thought perhaps, when Mr. Hobbs had stated his inability to give any additional information on the subject, that he (Mr. Wood) might have kept his place (*hear*). He had always thought until to-night that it was better to get the mould off mangold wurzel as much as possible; but he had learnt this evening that it was much better to leave it on. It had therefore been a profitable evening to him, if to no one else (*hear, hear*). From all that he had heard to, night, he gathered that the best thing that could be done in storing roots was to exclude the frost, and allow evaporation to take place in such a way as to prevent fermentation. If these precautions were taken, he thought the question as to the best mode of getting the leaves off was of little importance (*hear*). His own mode of removing the leaves of mangold wurzel was to pull them off by a sudden jerk, neither cutting nor twisting them. He had generally been very fortunate in keeping it good; although the year before last a sudden frost having set in before it was stored, nearly all the roots went rotten.

Mr. Everitt said that if a frost did happen to take them, they might be carried with perfect safety if sufficient time were given for the sun to dissipate the frost (*hear*).

The Chairman said now that all the gentlemen who were desirous of addressing the meeting had spoken, he would advert in reply to one or two points of their discussion. He had said that he had preferred the plan of wringing off the tops of turnips or mangold wurzel to the system of cutting; and he was quite satisfied that his theory was correct, especially with regard to Swedish turnips. For cutting the tops closely off suffered the juices to evaporate; and it must be evident that those juices were the most nourishing portion of the root to the cattle which fed upon them. Mangold wurzel might not be injured to the same extent as turnips. Some seven or eight years ago, a mill was erected in Essex, for the manufacture of sugar from beet-root. In the second season, in consequence of the success which attended the first, a much larger quantity was grown, so much indeed that it could not be all manufactured before Christmas, and after that time it was found that no sugar could be got from it—it could not be extracted. This circumstance opened his (Mr. Baker's) eyes to the reason why beet-root always becomes more nutritious to cattle than at any other, namely, because the saccharine properties then became fixed in it (*hear, hear*); and they well knew that it was these saccharine properties which had the effect of fattening cattle. Carrots were more liable to fermentation than any other kind of root, simply perhaps because they lay closer than any other description; and the best way to prevent this fermentation was to place them in such a manner as to give a free admission to the air. To accomplish this end, the mode of placing them in rows between hurdles, with straw to protect them from the frost, was well adapted. No part of their discussion had been theoretical excepting that which related to the disease in potatoes. Mr. Knight was of opinion that the unsound potatoes would communicate disease to the sound ones. But he was unable to say on what principle the fresh slacked-lime would prevent the disease, or whether it would prevent its communication. Lime was undoubtedly an antiseptic, but beyond that all was at present conjecture.

Mr. Knight said his opinion was, that if any part of the potato was diseased, the lime from its drying nature would stop it, and by so doing prevent the communication to others.

The Chairman said that although there might be differences on points of this kind, they were all agreed on the general principles of storing roots; and he thought they ought, in accordance with the custom of their Club, to deduce from this discussion some general principle. With this view he begged to submit the following resolution: "That it is the opinion of this meeting, with regard to turnips, that they should be pulled as soon as they have ceased growing, or at a period not later than the middle of December; and that after pulling, the roots should not be cut either at the top or the bottom, but that the tops should be merely wrung off, and the greater portion of the adhering earth removed. That they should be cast and stored between hurdles or in narrow rows, taking care that the air be admitted, but that the heaps be protected from the frost. That the utmost precaution should also be used against storing them in large quantities together, or in enclosed buildings. As respects mangold wurzel, the same precautions should be used, and still greater to the exclusion of frost, by carting one month earlier, as less fear is to be entertained of injury by fermentation than in the case of turnips. But in all cases the roots should be immediately carted after being pulled, and not exposed to the action of frost during the night. With regard to potatoes, it appears to this meeting that the absence of light and air is essential to their preservation, and that great care should be taken to prevent injury from frost or fermentation. As regards the disease by which the present crop of potatoes is affected, there is not sufficient evidence before the Club to enable them to decide as to the means or mode of prevention of an increase in the same" (*hear, hear*). If they approved of this resolution, he hoped some gentleman would propose its adoption.

Mr. Knight had great pleasure in proposing the resolution, which certainly expressed his sentiments.

Mr. Hobbs seconded it.

Mr. Wood said the resolution did not altogether meet his views, as it was very difficult to fix any precise time for pulling turnips or mangold wurzel, and he was of opinion that all roots should be pulled and stored as soon as, or rather before they had obtained their full growth (*hear*). The points of excluding the air and frost were, of course, highly important.

After a short discussion on the resolution, it was put, and carried unanimously.

Thanks were then voted to Mr. Baker for his conduct in the chair, and the meeting separated.

THE ADVANTAGES OF DRAINING.

At the recent meeting of the Highland Society, at Dumfries, Mr. Elliot, of Hardgrave, delivered an admirable speech on agricultural improvement. The following portion of this address upon draining seems well worthy the attention of agriculturists. Speaking of improvements, Mr. Elliot said:—

Amongst the foremost of these, thorough-draining must take its place, and most readily do I accord my praise to Mr. Smith, of Deanston, as being the first who taught us how to convert, by this means, mossy, barren soils into fruitful fields (*applause*). But, gentlemen, do not think that I despair of agriculture in the race which is running; quite the contrary (*hear, hear*). Every where I see springing up enterprise and energy; and in the erection of every tile-kiln I fancy I see the day-spring of agriculture (*applause*). And I trust that every one hearing me, whether landlord or tenant, will do all in his power to press forward in the march of improvement, resting assured that in the increase of our population we have a guarantee that the money spent upon the soil, like bread cast upon the waters, will be returned again—ay, and with a liberal hand (*applause*). I have to apologise for having detained you so long (*no, no*); but it is a subject which I feel to be of vast importance, indeed a subject which I look upon as of the greatest consequence, and if I had the power, as I have the will, I would not sit down till I had roused every dormant energy in those who have heard me, that they might willingly come forward in the great work (*loud applause*); for be assured, landlords and farmers, you have no surer way of receiving your rents, no safer investment for your capital, than in laying it out on the improvement of the soil (*applause*). And, at the same time that you are enriching yourselves, you will have the pleasing reflection that, through your labours, the labourers and their little ones are eating the bread of plenty, and drinking the cup of contentment (*loud applause*).

The Chairman said—We are much obliged to Mr. Elliot for the manner in which he has treated the question. I am sure he will have aroused those who before were wanting, to perform the important work which he has suggested (*hear*).

Professor Johnston said—I am quite sure that the general statements which Mr. Elliot has made must have produced an impression upon the meeting. At the same time I know the farmers so well, that I am sure nothing will so much satisfy them, or the landlords either, as showing that the proposed improvement will put money in their pockets (*hear, hear*). Now Mr. Elliot has drained largely, and I know successfully (*applause*), you will excuse me, therefore, if I ask what are the results of his own draining? He is one of the most enterprising drainers in Dumfriesshire, and is, therefore, a noble example. I should like him to let the strangers here know what are the results during the eight years which he has been employed in draining? I would ask first, what have been the general results of draining on the whole farm?—how much has it increased the produce?

Mr. Elliot said—I have a statement which shows the improvement. Before, my land was partly wet and partly dry; one-half nearly has not been drained; but the principal improvement on the whole has been by draining. The result I will read to you:—

PRODUCE OF THE OAT CROP ON THE FARM.

1st year,	1837	4·4	after one sown
2nd ,,	1838	5·6	,,
3rd ,,	1839	6·5	,,
4th ,,	1840	6·8	,,
5th ,,	1841	8·4	,,
6th ,,	1842	7·6	,,
7th ,,	1843	8·5	,,
8th ,,	1844	8·3	,,

BARLEY CROP.

1st year	8·2	after one sown; a small quantity this year sown on a piece of the best land.
2nd do.	5·4	after one.
3rd do.	6·2	do.
4th do.	10·2	do.
5th do.	10·1	do.
6th do.	11·7	do.
7th do.	10·5	do.
8th do.	11·8	do.

Thus showing that I realized by draining an increase of more than double the original produce (*Applause*).

Professor Johnston.—It appears from Mr. Elliot's statement that he has doubled the produce of oats and barley in eight years. Now I know he can give us further information. The second question I would ask is this: he has stated, that if the whole farm was drained, it would have produced a greater increase. Now, can Mr. Elliot give us the detailed result of one part of the farm—what it was worth when he began, and what it is worth now?

Mr. Elliot—One moor I drained which every one who knew it declared to be perfectly useless. It was not worth 2s. an acre. There were ninety-one acres of it; and one gentleman present who observed it told me that it never could be improved. I drained it, however, at an expense of nearly 600*l*. A great part of it was covered with water-lilies, rushes, whins, heather, and gall-roots; but the first year, after liming and fallowing, it yielded 3,500 bushels, nearly 40 bushels to the acre (*Applause*). The second crop was equal. This year I have a crop of oats, after turnips, upon 12 acres of it, yielding 46 bushels to the acre; of potatoes I had a heavy crop, and of turnips also a good one (*Applause*). Another moor of 43 acres I drained at an expense of nearly 300*l*. The first crop, after fallowing and lime, gave 42 bushels an acre. This was upon land that was previously not worth 2s. an acre (*Loud applause*).

In answer to a question from the Chairman, Mr. ELLIOT said his land was situated at an elevation of about two hundred feet above the level of the sea.

PROFESSOR JOHNSTON explained, in answer to a question sent in to him, that four and three-tenths, and so on, occurring in Mr. Elliot's speech, meant that one seed gave four and three-tenths—that where he had only four once, he now got eight seeds off the same land.

FLAX CULTURE IN SOUTH BEVELAND.

I should have noticed the observations on this subject which appeared in your paper of the 27th ult., ere this, if I had not been otherwise engaged. I am glad of the opportunity your correspondent. "T. C. M.," gives me of comparing the expenses of agricultural labour in Holland with that in Ireland. He gives an extract from a paper read before a Farmer's Club in Beveland, which, in my opinion, is far from being sufficiently explicit.

Flaxseed.—It appears that 7s. per bushel is the price that is charged for seed, therefore it will be but fair to allow that price for the seed produced; and as he allows £3 19s. 2d., they must produce in Beveland only 11½ bushels to the acre. Now, I have more than once proved, by several experiments, through your columns, that 29, 30, and 32 bushels of seed have been produced off one acre last year, in Norfolk, and I consider I need not say more to prove that we can beat the Dutch in producing flaxseed.

Rippling.—The charge for this is more than is paid in Ireland.

Scutching.—There is nothing in this statement which appears to me so extraordinary as the amount placed opposite this process, £2 10s. for the scutching of 32 stones of flax; I am aware that flax can be got scutched by the hand in Ireland for 10d. per stone, and I never charged more on my own mill than 1s. per stone for rolling and scutching, which was done in a superior manner to hand scutching.

Payment to Overseer.—This item is too sbsurd to be further noticed by English farmers, or myself, as it appears to me a farce to talk of an overseer to teach people to grow what (according to the account) has been grown these thirty years in their view. [The report quoted by "T.C.M." names as requisite an overseer to teach them, not how to grow flax, but how to handle it after growth—a part of the process which was new to them.]

Interest on Capital.—The capital or outlay appears to be £4, and as the flax can be in four months from the date of sowing turned into cash, I should say 10s. 8d. rather more interest than our English farmers would charge for £4 being expended on their land for four months.

Flax produced.—I must confess when I look at that part of your correspondent's letter where he says, "he never saw better crops of wheat, barley, or beans on such an extent of land than he saw on the Beveland-farm," I am at a loss to account for the deficient, or, I should say, half crop of flax produced on such productive barley-land. It appeared that the produce of 3 bushels of seed sown (which I must suppose covered 1 acre) has been 75 six-pound stones, or 32 Irish 14-pound stones; and as that is little better than a half crop (which I have more than once proved by reference to gentlemen in this country, as well as in Ireland, who have had from 50 to 70 stones per acre), I shall not trouble you with more particulars to convince British farmers that, from your correspondent's description of the Holland management, we can produce more flax, as well as seed, off an acre than they can.

Price of Flax produced.—Now, of all the parts of the statement of your correspondent, none surprises me more than this, as I am more at home for the last fifteen years (since I quitted farming) with this part of the subject than any of the other. I have seldom, if ever, seen Dutch flax below £50 per ton; in most cases the prices run from £60 to £80, and often £100 per ton; although your correspondent fixes his price at 5s. 8d. per stone, or £45 per ton. The *Times*' "Commissioner," in his letter from Ballinasloe, has given some interesting information on the subject of flax cultivation; and it may not be out of place, when the prices of the lowest qualities of flax are noticed in your paper, to notice his remarks. He says, "Flax from the estate of Sir R. O'Donnell gained the second prize at the Ballinasloe Agricultural Show, and presented a curious contrast to another grown near it, by the untaught peasants, who looked at the fine flax, valued worth £120 per ton, in despair; when their mismanaged production was valued at £28 per ton; but they appeared to be anxious to manage their flax crop properly;" and he adds, "skill and knowledge here, therefore, showed a difference of about £90 per ton in the value of the produce of a flax field." Now, there is an excuse for those peasants having, on the first trial, mismanaged a crop that is as foreign to the county Mayo, as it is in Surrey, but that the farmers of Beveland, who can grow such magnificent crops of wheat, barley, and beans, can be so ignorant in flax management after thirty years' experience in its cultivation, appears to me strange indeed. However, as your correspondent makes it appear, that the expenses of growing and preparing 1 acre of flax for market in Holland, amounts to £7 4s. 3d., I give the following particulars as to the expense incurred in growing 1 acre in Ireland. Mr. J. Acheson, Tanderagee, sent me the following:

	£	s.	d.
Flax seed required for 1 acre—2 bushels, 2 pecks, at (Beveland prices) 7s.	0	17	6.
6 people will weed one 1 acre at 8d. per day...........................	0	4	0
12 ditto will pull and water the produce at 8d. each......................	0	8	0
1 horse will draw it to the water, 3s. 4d. per day........................	0	3	4
7 people will take it out and spread it on the grass, 8d....................	0	4	8

	£	s.	d.
7 ditto will lift, tie, and make it ready for the mill, 8d	£0	4	8
6 men will ripple it at 1s. per day	0	6	0
6 men will save and thrash the seed, 1s. per day	0	6	0
1 horse will draw it to the mill	0	3	4
Expenses incurred scutching 32 stone of flax at 1s	1	12	0
	£4	9	6

As the weeding, pulling, spreading, and lifting is done by girls in Ireland, they are never paid more than 8d. per day, and very often 6d. Now, after what we have heard of cheap living and labour on the continent, and the economy and cleverness of the Dutch, does it not surprise the reader to learn that the expense of growing one acre of flax in Holland will be £7 4s. 5d., when, in the most prosperous manufacturing district in the north of Ireland, the same labour can be got done for £4 9s. 6d. I do not mean to say that Mr. Acheson never pays more than £4 9s. 6d. an acre for his flax, for he pays, I know, much more, because he never has a half crop. A thick good crop will take more hands to pull, lift, water, and spread it, than a half or thin crop, and, as a consequence, more money than £1 12s. for scutching; however, in order that British farmers may perfectly understand the exact expenses in Ireland in growing flax, I shall explain it by supposing I have an acre of land that has been well drained and in clean condition, and had been well manured last year for potatoes or turnips, with good rich farm-yard manure, and a crop of barley had been produced of it this season. I would have it deeply ploughed before November, and about the middle of March ploughed again; therefore it would cost me as follows:—

	£	s.	d.
2 days' ploughing	0	15	0
1 ,, harrowing, sowing, & rolling	0	7	6
Rent of 1 acre	1	5	0
Poor rates and taxes	0	7	0
Sundry expenses already made out	4	9	6
Scutching additional 21 stones of flax	1	1	0
	£8	5	0

Having shown the exact expenses of one acre of flax in Ireland when managed with economy, by those who know the proper system of cultivation, I consider it but fair towards flax growing to say that there are hundreds in Ireland like the Rev. G. Ash, of Bellaghy, who had—

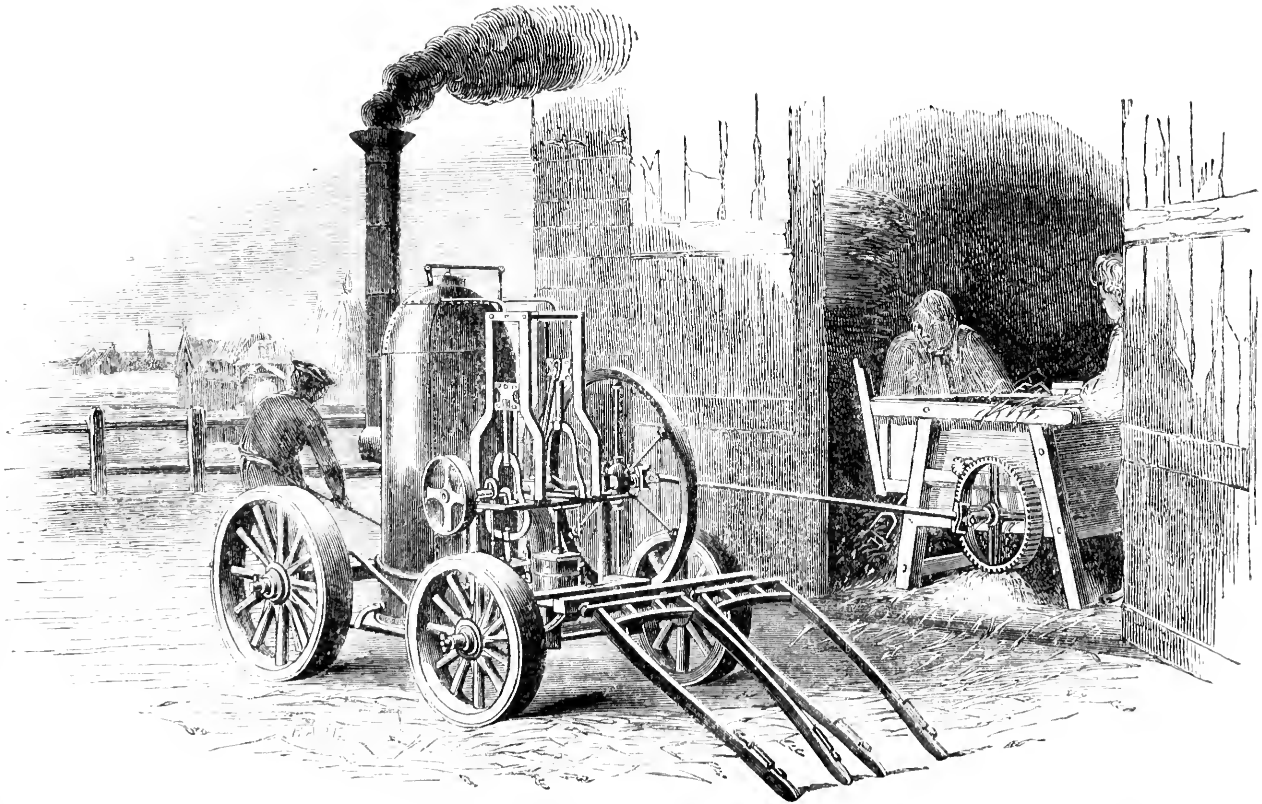
$53\frac{1}{4}$ stones of flax on 1 acre, which at 8s. 6d. per stone, would amount to	22	12	1
And on a crop similar to this there has been many instances of more than 25 bushels of seed grown on 1 acre in Norfolk and Ireland, at 7s	8	15	0
	£31	7	1

As this is a proof that the Beveland farmers might profit by Irish instructions, I hope your correspondent "T.C.M." will not forget to inform them of the fact, and I also hope he will be more particular in the future letter he promises to furnish you with.—*J. H. Dickson.*

COTTAGE GARDEN SYSTEM AT CALVERTON.—On Tuesday last the cottage-garden tenants under Mr. Ward assembled at the house of Mr. Fletcher, the sign of the White Lion, Calverton, to pay their half-yearly rent; and as this was the first meeting of this description, the event was celebrated by a supper, gratuitously and generously presented by the landlord. The occupiers of these small plots of ground expressed their gratitude for the advantages offered them by the allotment system, and the worthy landlord enjoyed the pleasure of seeing his fellow parishioners fully appreciating his efforts to render them more comfortable in the world. One circumstance connected with this allotment of land is worthy of notice, and that is, the land let by Mr. Ward being contiguous to the dwellings of the occupiers, is on that account more valuable for letting; but the noble-minded landlord allows his tenants the full enjoyment of this advantage, and only charges 2*l.* an acre, a sum that would be charged to any large farmer occupying the same with an extensive farm. At Calverton, three other individuals besides Mr. Ward have set an example worthy of imitation, and let out cottage-gardens upon a moderate rent; and we hope in the villages around, where the system has been adopted, that the owners of land will see the propriety of acting upon a principle of justice, and, in future, they will allow the poor framework-knitter and labourer to have a small plot of ground to cultivate for himself, upon a rent on equal terms with the farmer. By an adoption of the cottage-garden system at Calverton, it is considered that in one year a poor's rate is saved, which, if there be five rates in a year, amounting to 455*l.*, is something like a saving to the parish of 91*l.* Surely, if, in all the parishes in the county, the poor's rates could be lowered in a like proportion by adopting such a system, it will well become landed proprietors to take the subject into their consideration. There is not only a saving in the poor's rates effected by this system, but the poor man, having something at stake in his garden, becomes industrious, honest, and virtuous; for, as he rises in the scale of independence, he feels the value of his own little spot, and becomes anxious to sustain, in the opinion of his neighbours, his own credit and reputation.—*Nottingham Journal.*

WENTWORTH AGRICULTURAL SHOW.—The fifth annual agricultural meeting and show of the Wentworth Farmers' Club was held at Brampton Bull's Head, near Wath, on Tuesday last. This society is under the immediate patronage of Earl Fitzwilliam, and extends over a district of fifteen miles round Wentworth. Owing to the lateness of the harvest and the occurrence of Market Weighton fair on Thursday, the snow was not a good one on this occasion. The weather was beautifully fine, but the attendance of visitors scanty. In the show yard the first department that attracted attention was that of the horses, of which, as regards numbers, the show was good; the quality, generally speaking, of a middling character. There were a few very fine brood mares, and two or three nice foals. Of bulls there was but a very small number, but all of them were of excellent quality; the same may be said of cows. The two-year old heifers were the best class of cattle, there being an excellent show, both as to numbers and quality. Sheep were scarce, and, excepting a remarkably fine three-shear ram, belonging to Mr. Stevenson, of High Melton, there was nothing worthy of notice. Of pigs there was a fair show, but nothing extraordinary. The extra cattle and implement department were thinly lined. There was also a ploughing match in a field between the Brampton Bull's Head Inn and the charity school. A silver cup, value five guineas, given by Earl Fitzwilliam to the farmers' sons under twenty-five years of age who should plough in the best manner with the swing plough, was obtained by Mr. Joseph Gillatt, of Bolton. After the show, several of the agriculturists and their friends dined in the School-room at Wath, J. Fullarton, Esq., of Thryberg, occupied the chair, a post usually filled by Earl Fitzwilliam, who was unavoidably absent at Wentworth House. After the repast, the usual loyal toasts were given; and subsequently the chairman proposed "Prosperity to the Wentworth Farmers' Club," "The health of Earl Fitzwilliam," "The successful Candidates," "The unsuccessful Candidates," "The Judges of the Show," "The Stewards," and other toasts connected with the society. Charles Wood, Esq., M.P., who was present at the dinner, offered a premium of £5 for the best essay on agricultural matters, the subject to be chosen by the committee, and due notice of it given to the members of the society. The party broke up at about six o'clock in the evening.—*Leeds Mercury.*

DEAN'S SHREWSBURY PRIZE STEAM ENGINE, DRIVING HIS REGISTERED THRASHING MACHINE.



Whenever the task devolves upon us to draw attention to the successful issue of the labours of our ingenious and persevering friends, the Agricultural Implement Makers, it is always a pleasant one. The annexed Engraving represents Mr. DEAN'S Engine and Thrashing Machine, as seen at work on the estate of the Earl Craven, at Comb, where their capabilities were thoroughly tested, and, according to the report subsequently given, *fourteen bags and two bushels* of wheat were effectively thrashed in half-an-hour. This, though not the first attempt to supersede horse labour, by using steam as the motive power for driving machinery in the farm yard, may yet be regarded as a novelty, in consideration of the success of the experiment. The Engine is a double one, having two working cylinders. The boiler is fitted with copper tubes to prevent fouling, and is altogether constructed with the view of generating an abundance of steam with a small consumption of fuel. Simplicity in the general arrangement of the working parts appears to have been carefully attended to. On this particular point we think we cannot do better than conclude our remarks by quoting from the report of Mr. Prosser, C.E., dated May 19, 1845, in which he says—"The engine worked *well*, and is as *free from danger as any engine can be*. And the fact of its being so long in charge of a person who had previously had no experience in the management of steam engines without getting in some degree out of order, is the best testimony that can be adduced in favour of its superior construction and workmanship, and of the *ease with which it is managed.*"

ON THE PLANTING AND AFTER MANAGEMENT OF THORN HEDGES.

The planting and management of thorn hedges comprehend operations so simple, that it might be supposed minute directions on the subject would not be necessary to secure their successful performance; yet in passing through the most favoured districts of the country, instances of mismanagement so frequently present themselves in this department of rural economy, that it cannot be altogether supposed that they proceed from inattention. This is the more improbable in districts where the management in other departments is uniformly good. These circumstances therefore induce me to suppose that an essay on this subject, describing the several processes in minute detail, would not be devoid of interest to a considerable proportion of the farming community.

The title of this essay excludes the consideration of the various other plants which are occasionally employed in the construction of the live fence, besides the hawthorn; but this is believed to be of the less importance, as that plant is greatly more valuable for the purpose than any other with which we are acquainted. Branching out into innumerable ramifications, and armed in all directions with strong thorns, it may be so managed as in the state of a hedge to present a barrier impenetrable to any kind of cattle, and not without difficulty to be passed even by such disorderly persons as might wish improperly to intrude upon the rights of others. Fitted by nature to assume a close and compact texture, which it possesses most fully during the expansion of its leaves, but retains too in a considerable degree after these have fallen off, it is not without the advantage of breaking the force of stormy winds, and mitigating the severity of the weather in favour of the vegetable and animal life which it is appointed to enclose. It is so hardy and patient of direction as easily to admit of being trained in the manner that may be desired; and unless there be some defect here, it will retain in that state of culture, much of its native elegance and beauty.*

The common hawthorn is almost always propagated by seeds, but sometimes by cuttings of the roots, which when about half an inch in thickness, and one foot or eighteen inches in length, and planted with the root end undermost, speedily make large plants. When old thorn plants are taken up, the roots may always be used for forming new hedges; but it must be acknowledged that as they do not all send up shoots equally, some remaining a year in the ground before they do so, the preferable mode is to plant them in the nursery for the first year; or if this is not done, they ought to be planted thick, so as to make allowance for some not pushing till the second year, and for some not pushing at all.

When the hawthorn is to be raised from seed, the haws should not be gathered until they are dead ripe, which will be in October or November. As many haws contain more than one seed, they ought not to be put in the ground entire; but if they are to be sown immediately, they must be macerated in water until the pulp is separated from the nuts; and the latter should then be mixed with dry sand, to keep them separate, and to enable the sower to scatter them equally over the surface. But as the seeds do not come up till the second year, a saving of ground is made by keeping them the first year in a heap, mixed with a sufficient quantity of soil to prevent them from heating, and to facilitate the decomposition of the pulp. These heaps are kept in the open air, and exposed to the full influence of the weather; care being taken to turn them over frequently, at least once a month, so as to equalise this influence. When the seeds are not to be prepared in a heap, they should be sown in November or December, as soon as separated from the pulp; but when they are to be separated by decomposition, in what is technically called a rot-heap, they need not be sown until February, or even the March of the second year; by which means, fifteen or sixteen months' use of the soil is saved. They may be sown thinly in beds, the seeds being scattered so as to lie about one inch apart every way, and covered about a quarter of an inch. The nursery culture required afterwards is mere routine. At the end of the first year's growth, the strongest of the plants may be thinned out from the beds, and planted in nursery lines; and in the autumn of the second year, the remaining plants may be taken up for the same purpose. Hawthorns ought always to be two years transplanted before they are employed for hedges; younger and untransplanted plants, though cheaper to purchase, are always the most expensive to the planter, as they require temporary protection for a longer period.*

Whether the plants are placed in any intermediate situation or not, after removing them from the nursery, and before planting them in the fence, their roots must not be unnecessarily exposed to the atmosphere, otherwise in so young plants the vegetative principle will be greatly injured or altogether destroyed. As soon therefore as they come from the nursery, they should be taken out of the parcels in which they are then packed, and put into the earth in rows, the soil being at the same time firmly placed about their roots.

Thorn plants for hedges should in general be two years transplanted before being used for that purpose. There is no impropriety, however, in using younger plants, further than the greater length of time which must elapse before they form a useful and efficient fence. Plants of this description when planted at a proper season of the year, upon land well prepared, and afterwards carefully kept clean, seldom fail to make a good fence. Such young plants are, as already observed, long in a state of infancy, and require much care and the most complete protection to bring them to a state of perfection, and are also liable to be much injured or totally destroyed by many accidents that would produce little effect on stronger plants. Much time might be saved in the rearing of hedges, and the fences be much more perfect and useful, if older plants were employed. Three years old is certainly the youngest that should be planted; and if the thorns are even older, so much the better. The prevailing idea that plants of that or even a

* Maclawrin on hedges.

* Loudon's Arboretum Britannicum.

more advanced age will not succeed well, is entirely unfounded.

The preparation of the soil for hedges is one of those points intimately connected with and essential to their success. It were unreasonable to suppose that hedges will grow luxuriantly, and soon become fences, if the ground on which they are to grow be not previously prepared for their reception. Except in very few instances, however poor the soil may be, or however strong the cohesion of its parts, no attempt is made to break that cohesion by tillage, or improve the quality of the soil by manures. The young plants are for the most part laid upon the old surface, and their roots covered by the earth used in forming the bank, which is a usual accompaniment of the hedge. Under favourable circumstances as to climate and soil it is true that the hawthorn is an exceedingly hardy plant, capable of surviving much ill treatment; but as the object in planting the hedge is, that it should as soon as possible form an efficient fence, it is deserving of attention to secure the requisite means being employed for effecting that purpose. Where the hedge is to be planted on land that has been under the usual course of cropping of the farm, no further preparation is generally necessary as to fallowing and cleaning it; but where this is not the case, the ground upon which the thorns are to be planted should undergo a complete preparation, by deep ploughing or trenching by the spade, and by the application of a liberal allowance of manure. It is frequently necessary to plant a hedge either on or close to the ground occupied by a former fence; and in such cases the preparation of the soil is still more important. There the soil may not have been exposed to the beneficial influences of air and moisture for many years, a circumstance quite sufficient to secure the failure of any plants which may afterwards be planted in it, until proper means have been employed to fit it for their reception. It may further be remarked, that, however suitable the means may be which are adopted for that purpose, a considerable period must necessarily intervene before the soil of an old earthen bank or turf wall can be rendered genial to the growth of plants of any kind. Where, therefore, the line of this new fence coincides with that of the old one, it will be better, if possible, that a slight deviation from this line should be made, to insure the success of the new hedge. The application of lime and manure to such soil is also usually followed by moles commencing their operations in it, which is an additional reason why fresh soil should be preferred. Where the line of the intended fence even crosses one of those old lines, much care will be requisite to prevent the failure of the hedge in that part. Where this occurs, it may be better to remove some of the earth from it, and replace it by soil from the adjoining ground, which has been under tillage, as this will be a more effectual remedy than any preparation which could be given within a short space of time. Should different qualities of soil occur in the line of the fence, the means for the improvement of the different portions must be suited to their individual wants, otherwise a uniformity in the growth of the hedge cannot be secured.

Having fixed upon the line of the fence, it may be laid off by means of poles, like the ridges of a field, and at once marked upon the ground. Should the surface of the ground present no inequalities, it can be laid off with great accuracy in a simple manner; but should an elevation or a hollow (however small it may be) intervene, great care is necessary to preserve the straightness of the line; otherwise the fence may be made to advance upon the true line in the hollow, and recede from it on the elevation. If the line of the hedge runs across ridges, at whatever angle it may form with them, the furrows are to be made up to the height of the crowns of the ridges; and the unequal shrinking of the earth will cause the line of the fence to be either raised or depressed at the furrows, and perhaps to vary a little to either side, unless the utmost care and attention be paid in performing the operation. The instruments used are a common reel and line, and a rule of wood, of about six feet in length, on which feet and inches are marked, with a piece of wood fixed at right angles to one end of it in the form of the letter T, so as to measure off with facility the breadth of the ditch in a direction perpendicular to that laid down; which it is necessary it should be, to be correct. Three poles, such as are used for marking off ridges, will be required for laying off the line of the fence; but if inequalities of surface present themselves, a greater number may be necessary. The instruments used in the execution of the work consist of a common spade and shovel, a mattock and a foot-pick.

The poles being placed in a right line in the direction of the intended fence, one end of the cord is fastened firmly in the ground, at the point at which the fence is to begin; and it is carried along in the direction of the poles until the cord is all wound off the reel, when the other end of it is also securely fastened in the line of the fence. It is of importance to observe that the line or cord runs exactly along the bottom of the poles; and should any obstacle interfere with the adjusting of the line such as twigs, tufts of grass, stems of plants or shrubs, or small stones, they are to be removed before proceeding further. As the least obstruction on the surface of the ground will cause the cord to deviate from the right line, it should be lifted up about three feet high at various places along it, and let suddenly fall to the ground, when, if all obstacles be removed, it will lie perfectly straight. Stones may now be placed at intervals along the cord to prevent it from changing its position, or what is better, small wooden hooks may be employed for the purpose of preventing any change of position, which they effectually do; whereas the stone placed on the line may be incautiously pushed aside, and in this way be a cause of considerable error. After the cord is thus fixed down, the line may be marked off by a spade, the workman performing this part of the operation standing on the ground on which the new fence is to be placed. The rule with the cross head is then used for marking off the breadth of the ditch, measuring from the rut or track just formed, and the line on the opposite side of this interval for the ditch is marked off precisely as described; the workman standing with his face in the opposite direction, so that both sides of the ditch shall incline towards each other as they are carried down. A sod is now raised along the line marked for the thorns, and laid over on its back, it being at the same time well beat down by the back of the spade, and its near edge so placed as if it were a continuation of the side of the ditch. It is upon this sod or raised portion of earth that the thorn-plants are to be placed. A further portion of the surface of the ditch is now taken up, and placed immediately behind the thorn-bed, or place intended for the plants. The sod first raised should be as perfect as possible, for the purpose of forming more correctly the line of the fence, as well as a level bed for the plants; but the more comminuted the portion placed behind is, it is the better for the vegetation of the plants, which are to take root in it. This last process prepares the fence for the planting of the thorns.

As the thorn-plants are taken up from the ground, and just before being planted, it is usual to shorten their tops; this is done by grasping the plant firmly by the left hand, immediately above the root, while with a sharp knife the stem is cut through by a cut inclining upwards, so as to leave, exclusive of the root, about four inches of the stem. This operation causes them to be much less liable to be displaced, or to interfere with the workmen at subsequent stages of the process; and it is also supposed to contribute to the more active vegetation of the plants on the approach of spring. The precaution of not removing the plants from the ground until the place in the new fence is ready for their reception, should be strictly observed; and every means are to be used to protect them from frost while out of the ground, as frosty weather often occurs at the season of the year when fencing is most properly carried on. When, however, the frost continues so long or is so intense that its effects on the soil during the night cannot be removed in the day-time, it is better that the business of planting should be altogether suspended until the return of more genial weather; as it can serve no good purpose to proceed with work which, on account of the unsuitableness of the weather in which it is executed, must be performed again.

When a sufficient space of ground is ready for being planted, and the plants prepared in the manner described, they are placed firmly on the thorn bed, the stem inclining slightly upwards, and projecting a little from the face of the bed; and it is well, especially in dry weather, that the roots of the plants should be dipped into some liquid, such as water or urine, among which a portion of earth is mixed, to cause more of the substance to adhere to their roots. The distance between the plants will, in some degree, be regulated by their size; the smaller plants may be placed on the thorn-bed four or five inches apart, and the larger six or eight inches. The indiscriminate admixture of plants of different sizes is to be carefully guarded against in the formation of hedge-rows, as the smaller plants are invariably kept down by the larger, and do not attain the same proficiency in a given time which they would do if not thus overshadowed; and forming weak places, and finally gaps, as the hedge comes to fulfil the purpose of a fence. It is better, therefore, that the plants should be assorted, each size being placed together in the fence; and in the course of a few years no difference will be observable between them.

Close following the planters are persons throwing earth from the ditch on the roots of the plants, and that taken from near the surface of the ground is to be preferred, for this purpose, to that found at a greater depth, as being more favourable to vegetation. A covering of a few inches in depth will generally be sufficient in the first instance; after which the earth thus placed on the roots, if not of an adhesive nature,is to be pressed by the foot, and any of the plants at the same time are adjusted which may have been driven from their places. Before leaving the portion of the fence carried thus far any length of time, it will be necessary that a further addition should be made to the covering over the plants, to guard against frost reaching their roots. They are not, in any case, to be left overnight without a proper protection; for the plants may not only be frosted in that time, but the earth may be in such a state by the frost as to be unfit for working the next day; and should the frost afterwards continue, the whole of the plants may be destroyed. The usual practice is to carry forward all the work to this stage, before any part of the hedge bank (as the mass of earth placed over the plants is called) is completed. This enables the workmen to get the plants into the ground at a proper time, which is essential to the success of the hedge. When the process of planting is finished, the remaining part of the bank is completed with the earth taken out of the ditch. In performing this part of the work, it is to be observed that the surface of the bank must have a smooth and uniform appearance; which is effected by the regularity with which the materials are deposited, and by beating with the back of the spade, any irregularities of course being pared off before it is thus beaten. The surface of the bank is formed of the earth taken from the bottom of the ditch, which is more suitable for the purpose than earth of good quality; being inimical to the growth of weeds, which would otherwise take root and vegetate, and unless carefully weeded away, greatly injure the plants in the hedge. The substratum thus employed, if of porous materials, will require a considerable degree of beating in order to produce a skin, as it were, on the face of the bank, which will prevent the frost from abrading and trickling down all the fine mould covering the surface.

The dimensions of the bank thus formed will necessarily vary according to those of the ditch from which the earth has been taken. It is in general better that the bank should be small, to facilitate in a greater degree the access of air and moisture to the roots of the plants, thereby hastening their growth. The ditch must be so laid out and formed as to permit of the flow of water along its course; and the sides of it are to be carried down in such a slanting direction as will prevent any part of the fence mouldering down from the effects of frosts. The rule observed for the depth of the ditch is, that it should be half its breadth, and the breadth of bottom about one-sixth of it. Thus if the breadth of the ditch be four and a half feet, the depth will be two feet three inches, and the breadth at the bottom, nine inches. When a stream of water is to run along the ditch, which is not unfrequently the case, it must be made proportionably capacious; for if not made so at first, the force of the stream will soon make way for itself, and probably endanger the thorn-bed. When there are slight inequalities of surface, the ditch must be made deeper at one part than at another; and in some cases the earth is taken away where the ditch is deep, to make up the bank where it is shallow; and it will often be found necessary that the water should be carried away by a drain cut through the mound of earth, and underneath the thorn bed into the adjoining field; in which case it will be necessary to protect the sides of the opening by stones or other means, so that the current cannot carry away the earth, and ultimately disturb the fence.

The season for planting thorn-hedges extends from October till April, that is, during the period when vegetation is inert. When circumstances suit, the autumnal season is to be preferred to the spring, as planting at that season secures the thorns being ready to push forward in the spring at the earliest period. Planting during the winter, as in January or February, is often impeded by frosts, but otherwise these are very suitable months for the purpose. One of the drawbacks attending planting late in the spring is the probability, especially in the case of dry soils, of the young plants suffering from drought, which may prove fatal to them. The aspect in which thorns are planted is usually determined by the situation of the ground; but, other things being equal, a southern or eastern aspect is to be preferred.

Some planters, and most agricultural writers, recommend a small scarcement, as it is called, along the line of the plants; or, in other words, that the face of the bank below that line should project from four to six inches from the line of the top of the bank, or portion above the plants. This practice has nothing but custom in its favour, as no adequate reason has ever been assigned for its continuance. When properly considered, however, it is believed that little doubt can be entertained but it will be seen to be not only useless, but highly injurious to the welfare of the plants whose progress it is intended to promote. While it can serve no good purpose, it will assuredly act as a receptacle for promoting the growth of weeds; and where such an arrangement exists, it will afterwards be seen, when the process of weeding comes to be considered, how much additional labour it occasions.

The planting of thorn hedges has now been described at length. In the great majority of situations, and especially for farm purposes, the form of planting which has been detailed is also that which experience has shown to be most worthy of adoption. By no other method is the process so simple, and while the ditch thereby formed serves all the purposes of a drain or of a conductor for other drains, the bank forms a suitable and efficient protection to the young plants, which is particularly necessary in the early stages of their growth, to guard against the intrusion of animals. The ditch on the one side and the bank on the other form indeed almost a sufficient safe-guard for them until they have made so much progress as to answer all the purposes of the fence themselves; when the bank may be removed, and the ditch partially filled up, a proper opening by stones or tiles being secured in the bottom of it, in the first place, for conveying away any water which may come into it.

But thorns are also, from habit, occasionally planted on the flat surface, when the hedge is in this case called a ground hedge, to distinguish it from the hedge and ditch. According to this method of planting, it is merely necessary to make a trench a few inches in width and depth along the line of the fence, in which the thorn-plants are placed, and which thus preserve their erect position, and seldom have their tops shortened. It is apparent that the plants so situated require protection, by paling or some other means, from the intrusion of animals; and as the paling must be placed at such a distance that cattle cannot reach through their heads to the young plants, it will be seen that this method of planting requires fully as much space as that which has been described, including both bank and ditch. It is further entirely unsuited to all soils requiring draining.

But frequently, in addition to the protection afforded to the plants of the fence by the bank and ditch, a further protection is also necessary to preserve them from injury. In such cases a simple and convenient protection is, a paling formed of wood, placed upon the top of the bank. This may consist of two horizontal rails nailed to or mortised in posts or stakes, placed vertically, and driven into the ground. Two horizontal rails will be sufficient in such a situation for fencing off cattle, but three may be necessary for sheep. The rails are formed of poles, generally larch or spruce, sawn into two or more divisions, according to their size. The upright posts are placed about seven or eight feet apart, and driven to such a length into the ground as to prevent cattle from rubbing them down; and to give additional security, the rails should be placed on the side of the stakes next to the field, where they are fastened by nails. It is apparent that they will in this case not be so easily pushed off, as if fastened on the contrary side. The rails are usually of such a length as to extend over the spaces between two of the uprights, and in this case the ends of all the rails should not be fastened to the same upright; nor should the root or thick end of the rails be nailed together, but top and bottom ends alternately, as the weight of the rails is thus more equally supported, and they are capable of offering an increased degree of resistance to any attempts to break through them.

Another mode of protecting the thorn-plants consists in rearing another hedge on the top of the mound. The whin seems well suited for this purpose, as, from the rapidity of its growth, it becomes a complete fence in the second year after it is sown. The whin seeds are sown on the top of the mound immediately after it is formed, and while the earth is still fresh and moist. A pound of the seed will sow 250 yards, and the season of sowing is the same as that for planting the thorns. In the case of autumnal planting it may, however, be well to defer the sowing of the whins until the spring. The whin does not form a good permanent fence, being of short duration; but this circumstance does not affect its utility as a temporary protection to another class of plants. The whins should be pruned every year, in the month of June, to prevent them from overshadowing the thorn-plants, and also to prevent the production of seeds, the dispersion of which over the adjoining lands might cause much annoyance. The roots of the whin spread to a great extent, and penetrate into every part of the mound; they would therefore, if allowed to remain, interfere with the growth of the thorn-plants, by depriving them of a portion of the nutrient matter of the soil; but they are removed when the latter are so far advanced as to require no further protection.

The period when the land is in grass is that most favourable for the planting of thorn-hedges; but in this case the plants are liable to suffer more injury than at any other period, by cattle browsing on the young shoots of the thorns. The best time, therefore, to commence this work, is just previous to the conversion of the grass-land into tillage; as, by the time it is again laid down to grass, the plants will have attained to a size in which, if they do not form an efficient fence, they will at least be less susceptible of injury than in the earlier stages of their growth.

The hedge being planted, and duly protected from the intrusion of the domestic animals of the farm, attention is afterwards to be directed to the management of it, until it forms an efficient fence. It seems too much the prevailing custom of the day to leave it afterwards entirely uncared for, the farmer too often considering that when he has taken due pains in planting it, he may well leave the remainder for nature to accomplish; and in many cases it would be well if this were done; but it cannot be said that such is the case when the young shoots (as they are pushed out) are cropped by animals of all kinds. Such is the vivacity of the hawthorn that it again pushes forth rapidly fresh shoots, which also are subjected to a similar fate, until the energies of the plants are entirely destroyed, and they become deprived of their vitality altogether. But pruning and weeding are no less necessary than protection. In the early stage of the growth of the plants they are liable to be choked up by weeds, which springing up so much more rapidly than the thorns, suffocate, and often altogether destroy them. It is only, however, in this stage of the existence of the hedge that weeding is much required; as, when the thorns make some progress, they effectually prevent the growth of weeds among them by their shade; but weeds will still grow along the margins of fences, which if allowed to grow unchecked, though they may not injure the hedge, will produce much inconvenience through the farm by the dispersion of their seeds; and nothing is more indicative of slovenly farming than the existence of weeds anywhere on the farm, so that those growing along the sides of fences will always require attention to cut them down. But the pruning is, if possible, still more necessary than the weeding. The pruning of forest trees, and the precise extent to which the operation should be carried, if practised at all, are still problems in arboriculture on which there is much diversity of opinion existing among scientific and practical men; some contending that the process is in any case only rendered necessary by previous mismanagement, others considering that a limited application of the pruning-knife is beneficial, while a third party extend the liberal use of it, not only to all trees, but in all situations. With regard to the application of the pruning-knife to hedge-plants, however, no difference of opinion can exist as to the propriety of the practise. It must be remembered that plants forming hedges cannot be regarded as in their natural state. It is only by artificial means that they are made to serve the purpose of a fence. Instead of encouraging the growth of a single stem, divested of branches as much as possible, the object of the hedger is to produce, under certain restrictions, the most numerous assemblages of branches, at least so far as is consistent with strength and security; and judicious pruning only can effect this. When thorn-hedges are allowed to grow in a state of nature, without the application of the pruning-knife, they, from the closeness with which they are planted, send up long and slender shoots, which only become branched at the top; and as the branches at that part of the stem increase, those lower down become stunted, and make no further proficiency; so that, in a short time, the fence is strong only where strength is not required, and becomes quite open at the bottom, where the chief precautions are necessary to preserve the smaller animals from passing through. The injudicious application of the knife may, however, defeat the end in view, by increasing the number of stems to too great an extent, and thereby producing a weakly edge. Some judgment is therefore necessary on this point.

During the first year of the growth of the hedge, the thorn-plants will require little weeding and still less pruning. If the hedge has been planted in the autumn, the grass between the first inverted sod and the original surface will have decayed so much, as to give little trouble in the early part of the season; but should the hedge have been planted in the spring, the vernal influence will keep alive the grass under the inverted sod, and it will grow rapidly, so that it may be necessary to clear it away in the beginning of summer. The seam between the inverted sod and the original ground will, however, be the only troublesome place of the bank to keep clear of weeds; but it will have been observed, that, according to the course of proceeding already described, it will be at least six inches under the line of the plants, and will be less difficult to keep clean than to eradicate weeds growing among them. This first clearing is done by the means of the hedge-spade—a small instrument, consisting of a handle about three feet long, and a small blade attached to it from four to six inches broad. The weeder stands in the ditch until he has completely cleaned the part of the bank below the thorns; and to clean the upper part he stands on the top of the bank working downwards. This work is more conveniently performed by two persons being employed at the same time, the one above and the other below, in which case any weeds overlooked by the one among the plants is not likely to escape the other. The weeding process should not be delayed until the weeds have taken good hold of the ground, as in that case the displacing of them carries away a great deal of earth from the face of the bank. All weeds should be carefully removed at least once every year, and generally twice, until the fence has made some progress.

In the process of weeding, as here described, it will be seen that the work is altogether performed by the small spade, which, in fact, is only a modification of the Dutch hoe, so well known in the pleasure-ground and the garden for keeping the walks in order. It is seldom necessary to apply the hand, as the spade is of such a size as to be capable of being readily introduced between the thorn-plants; and by successive thrusts of this instrument the weeds are cut down. When considering in a previous page, the propriety of placing a scarcement under the thorn bed it was said to greatly impede the weeding process; and the manner in which it does so will now be apparent. It does not interpose any obstacle to the cleaning of the upper part of the hedge bank; but the weeds and fine earth displaced by that part of the process will find a resting place on this scarcement in their descent, from which they can only be dislodged by the hand; besides, this place cannot be cleared of the weeds growing on itself with the same facility as if the entire of the lower part of the bank was a continuous and uniform surface.

Pruning may commence in the second winter after the hedge has been planted; but at that early period it must still be performed with a very sparing hand. Any of the young stems which may have greatly overtopped their neighbours should be shortened, to secure, as much as possible, all growing alike, and that none of the plants should be overshadowed by others. With this exception, the pruning is yet to be confined to straggling side branches, on which it will have the effect of causing them to send forth fresh shoots from their extremities, which, by repeated trimmings, will thicken up the hedge, and render it close where this property is most required. The main stems are allowed to grow, without much interference on the part of the hedger, until they have attained the height which it is considered necessary that the hedge should afterwards be, when the knife is applied with safety. In using this instrument, it is especially to be observed that the stroke should be made upwards, and not along the top of the hedge. When a hedge under this management has attained the wished-for height, all that is requisite afterwards is pruning the sides, preserving it broad at bottom and tapering gradually towards the top in the form of a wedge. Under good management, a hedge of this sort, in full leaf, has the appearance of a solid wall; and when the leaves are shed, it presents to the eye a set of massive prickly upright columns, so strong and formidable as to resist effectually all attempts to break through them.

Hedges are pruned most expeditiously and effectively by a light knife or hook, placed on a long handle. An instrument of this sort, though a somewhat imperfect one, is readily formed by putting a smooth edged reaping-hook into a handle about four feet in length. In using this instrument, the workman does not stand directly before his work, but at one side, keeping the unfinished part of the hedge before him; and in this position he is able to ascertain, as he goes forward, those parts which project most from the desired line, and from which, of course, the greatest quantity is to be removed. This knife is only applicable in the case of such fences as have hitherto been properly managed, and which require nothing but the annual shoots of the current year to be removed or shortened; for larger branches, a stronger knife is required. With the small knife, already described, and in the hands of an expert workman, it is surprising to such as have not hitherto witnessed the process, the rapidity with which it is carried forward, and the regularity with which it is performed. In both respects the knife is greatly to be preferred to the hedge-scissors, which are still occasionally employed in dressing hedges.

The preservation of the wedge shape in the pruning of hedges is of much importance, as being the only form by which an efficient and durable fence can be secured. When the thorns are allowed to grow up with a close branching top, they will be found invariably to present a mass of naked stems to the eye, but ill suited to the purpose of a fence. A broad and close branching top is an invariable indication of a naked set of stems below, where only closeness is required.

The planting and after management of thorn-hedges have now been described at length, from the collection of the seeds until the well formed hedge has been produced, and with a degree of minuteness which to some may seem uncalled for, but which, it is believed, few who are about to carry the operations into effect will consider unnecessarily tedious. The deficiency of minute detail is usually the besetting sin of writers on farm management, who too often assume that what they are describing is already to some extent understood, and that therefore general directions only are necessary to carry their plans into effect.

But although having perhaps exhausted this department of the subject, it is not less necessary to possess the knowledge of how existing hedges hitherto neglected may be restored, than to be able to plant them afresh. The results of mismanagement are indeed so numerous in every direction to which the eye can reach, that, so far as the present generation is interested in the matter, the renovation of old hedges is probably still more important than the planting of new ones. Frequently hedges of this description are to be seen which have had no attention bestowed to them from the period of planting, but which, under proper management, may still form efficient fences, and that in a much shorter time than new ones would do so. The entire removal of them, with a view of planting others in their stead, would manifestly be exceedingly improper; and to the operations to be employed for the renovation of such our attention shall be now directed.

The precise course of management to be adopted in such cases will in some degree depend on the peculiar circumstances of the case. As a general rule, however, in the management of decayed or neglected hedges, a complete cutting over will be necessary, to insure the production of a fresh supply of stems, which are to be duly trained as they grow up, before they become unmanageable as their predecessors. The height at which such stems should be cut from the surface will be denoted by the previous state of the fence. In general, it is advisable to cut over the stems to within a few inches of the ground, and a number of fresh and vigorous shoots will speedily spring up, and form a close and elegant fence. In the execution of this work, the common axe may be employed; but it will usually be more quickly performed by a strong knife, or bill-hook, as it is often termed; and in practice it will be convenient to have knives of different sizes for this operation, suited respectively to the size of the stems which they are required to cut down. The lighter kinds are unsuitable for cutting down large sized thorns, both on account of their inefficiency, and aptitude to get broken in performing the work; and the heavier kinds are no less unsuitable for cutting down small stems, which are rather knocked aside than cut through by the blow, the exhibition of a greater amount of muscular force being also thereby required than is absolutely necessary for the purpose. In cutting down the thorns the workman stands in the bottom of the ditch, and by repeated strokes of the hedge-knife, in a slanting direction upwards, cuts through the thorns. The knife is grasped in such a manner that the workman can give it the full swing of his arm, in order that he may strike with the greater force. In the case of some of the larger stems, it may be necessary after striking in the slanting direction upwards, to strike the stem a short distance above the former incision in a contrary direction, by which a wedge shaped piece of wood is taken out of the stem and the workman is enabled to cut it down with greater despatch. The smaller stems and branches will be cut through by a single stroke; while for the larger several strokes may be necessary. All branches and bramble spreading out from the stems are to be cleared off before proceeding with the work. As the stems and branches of the hedge often interlace each other, they do not fall down when they are cut; and to enable the workman to drag them down without injuring his hands by the prickles of the thorns, a hook to take hold of them may be formed on the extremity of the back of the blade of the hedge-knife. With this hook he pulls the end of the stem that has been cut off towards him, in order to seize it with the left hand, which having done, he pulls asunder the tops with the assistance of the knife, and then lets the thorn fall gently out of his hand against the bank, after which it falls into the field on the other side.

In many of the attempts which are sometimes made to cut down old neglected hedges, with a view of producing a close fence, it is truly surprising to see the manner in which the workmen proceed, and the total ignorance of the structure and functions of plants of which their operations show them to be in. The stems are slashed with a rude instrument in all directions, and totally shattered over a considerable distance from where they have been cut off; and, strange to say, the practice is defended by those who carry it into effect as being preferable to a cut formed by a single stroke, on the ground that a greater quantity of shoots are thereby caused to push forward, which accordingly soon become a fence. The hawthorn is exceedingly tenacious of life; and under such treatment it puts forth all its energies to withstand the ill treatment which it has sustained. A little observation would, however, have sufficed to show that the shoots procured by such means are altogether wanting in the strength and vigour of those pushed forth in smaller numbers, and that, after a little, the original plant itself decomes sensibly weakened, and, in no long time, finally destoyed.

In cutting or pruning any kind of wood, when it is wished to inflict as little injury as possible on the part which remains, the cut should be such as to occasion no fracture of the stock, and should further be in a slanting direction to throw off moisture which may fall on it. This cannot be accomplished in any other manner than in that above described. A moment's reflection will show that it is impossible for an edge tool to pass through a piece of timber without causing a severe pressure against one or both sides of the wood, because the tool itself occupies space. The teeth of a saw drag the chips out of the cut, and give the space requisite for the instrument to pass; but an edge-tool can only pass by pressure. In cutting the stem of a growing tree, placed upright, if the blow is struck *down*, nearly the whole of the pressure thereby falls on the growing stem, which it shatters to peices, while the part cut off is left sound; but when the blow is struck *up*, as it always should be, the effect is reversed—the growing stem is then left sound and smooth, and the portion cut off shattered. This practice therefore guards the wet from penetrating the stem into the crown of the roots, canker is not encouraged, and the young shoots grow up strong and healthy, and able to contend against the vicissitudes of the weather.*

Instead of cutting off the stems close to the surface of the ground, they are sometimes cut to the height of two or three feet, under the impression that they will sooner become a fence. Except when they are growing with the greatest regularity, it will seldom be advisable to adopt this plan, as the stems have in this case a tendency to send forth shoots from the place at which they are cut off, rather than towards their roots, and this is only perpetuating the evil which it was intended to remove. But even in this case, such a number of branches may be produced all along the stem, by interrupting the flow of the sap, as will soon make a thick and neat fence. For this purpose incisions are made, at different places, into the bark, extending nearly halfway around the stem; and the flow of the sap being thus interrupted in its progress, buds will soon appear and shoot forth, usually close under, but sometimes over, the incision. This simple operation, performed early in the spring by the hedge-knife, or even by a pocket-knife, does not seem to injure the thorn-plants; for the cut being clean and not deep, no canker ensues, and it soon closes up again. Indeed, in most cases the stems are soon so completely healed, that nothing remains but a slight scar in the place. The object being merely to

* Blakie, On Hedges, &c.

intercept the sap in its progress, the wood need not be cut, and it is only necessary to remove the narrow belt of both barks; but care must be taken that no shred of the inner bark remains uncut to continue the circulation. The partial interruption thus produced has not been found injurious to the stem, as it merely causes a lateral exertion in the vessels containing the circulating fluid, to overcome the obstruction; and the sap thus accumulated gives rise to new branches, so that the stem may be cut in two or more places if necessary. By means of these slight incisions, and by occasionally cutting down such stems as project out of the line of the hedge, it may be thickened to any degree desired, and trained into a uniform breadth and thickness not attainable under any other method of management.

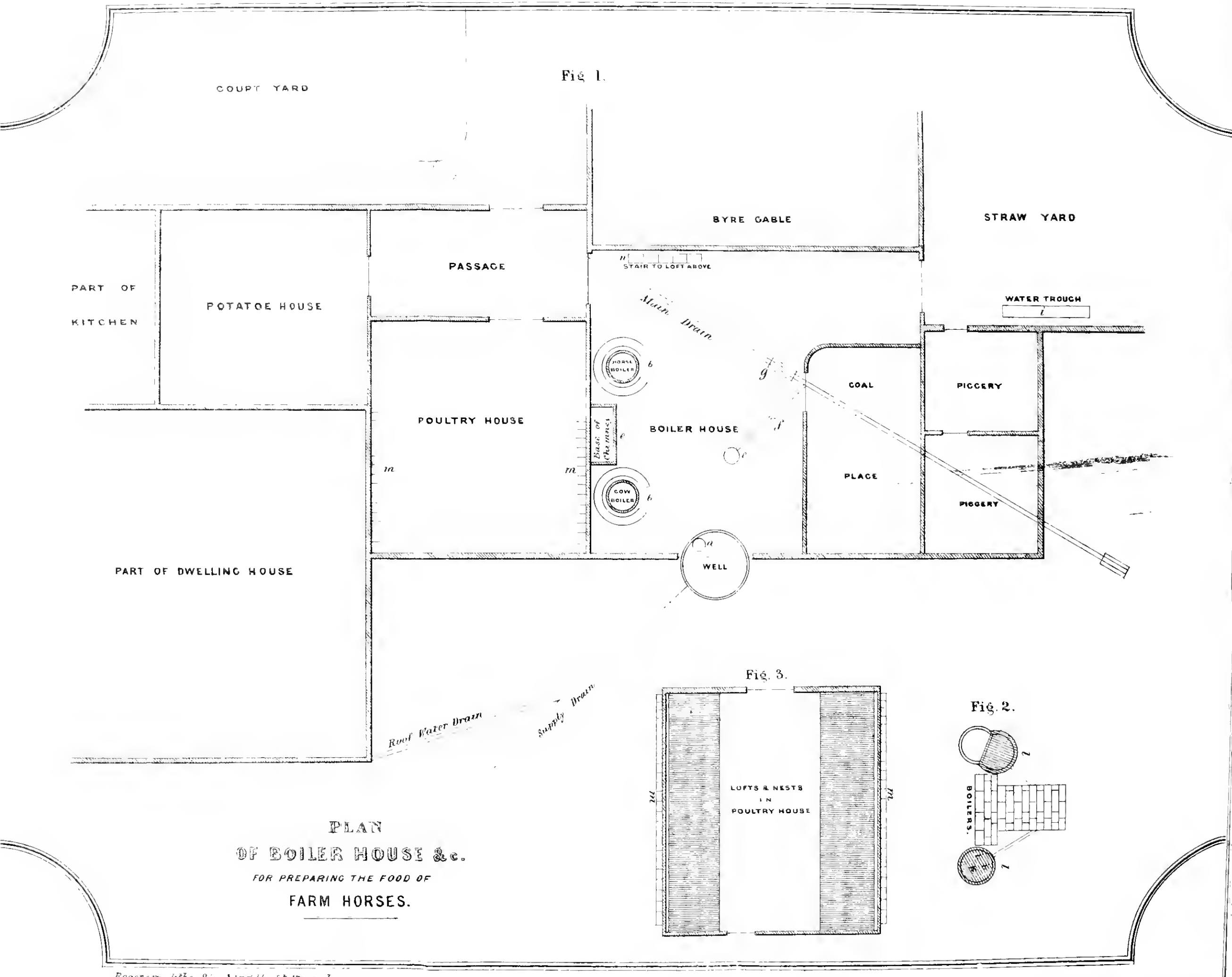
In whatever way the old hedge has been cut down, the directions already given for the management of young hedges are strictly to be attended to afterwards. When the young shoots have made some progress, the side branches are to be trimmed, and the hedge put into a proper shape. The same precautions are also to be observed with regard to the upright shoots, none of which should be shortened until the hedge has attained the wished for height.

The cutting and pruning of hedges should always be performed at a time when vegetation is comparatively inactive, as they are otherwise much injured from an effusion of their juices. Old hedges should be cut down in the winter season; but it is to be observed that the operation should not be performed during a hard frost. The hedge should be cut down when the field next the ditch is to be broken up from grass, as it will become a fence before the field is again laid down from tillage. As the field behind the hedge will not be likely to be in the same part of the rotation as the other, it will be necessary to form a suitable protection, on that side, from cattle. The tops of the thorns cut over will answer well for this purpose, and if the former hedge was strong, the dead fence thus formed out of its branches will not nearly require them all, so that the excess may be employed in forming some other plan, as, for example, in forming a protection to a newly planted hedge, instead of the paling before described. In forming this dead fence, the stems of the thorns are, in the first place, cut into a suitable length, which, for ordinary purposes, may be about three feet; and after being cut, they are arranged in small parcels along the line in the quantity required, observing that some of the smaller branches are mixed with the larger ones, for filling up the intervals between the latter when they are set in their places. A furrow is then made by the spade, in which these thorns are placed on end, and tightly fixed in their places by the earth taken from the furrow being placed about them, and well trodden by the feet. The workman takes care to suit the inclination of the dead fence thus formed to the prevailing winds, slanting it slightly in the direction whence they come, so that it may be better able to stand against them.

Before concluding this part of the subject, another mode of protection may be mentioned, usually termed "stake and rice," as being more desirable than that which has been described; and when the materials exist for its formation, it is to be preferred. It consists of stakes driven firmly into the earth, among which smaller branches are wound as in basket-work; and to complete the whole, a rail is nailed on the top of the stakes, to keep the materials wound among them in their position. The stakes need not be so good as those required for paling, but they will require to be placed somewhat closer together. They must be well driven into the earth, as on their stability in this respect depends the efficiency of the fence. The branches used in winding among them may be those of any of the forest trees which may have been felled, and a portion of the branches and tops of thorns may also be incorporated with these, to increase their power of resistance against animals either rubbing them down, or attempting to break through them; but in using the thorns the hands of the workmen must be well protected by strong leathern gloves. The branches being placed on their root ends, which are slightly pushed into the soil, are warped backwards and forwards round the alternate stakes, in which they are thus placed in an inclined position; observing, as remarked in the preceding paragraph, and for similar reasons, that this inclination should be in the direction of the prevailing winds.

The utility of the fence will be in a great degree diminished if due pains are not taken to preserve it from gaps. In planting young hedges these are guarded against by selecting plants of a uniform size, all of which may be expected to make equal progress; and afterwards protecting any place that appears weakly or thin, from being broken through by cattle. Wherever a weak spot is visible in a fence, it may, in fact, be laid down as an invariable rule, that without delay, a paling or dead fence should be placed behind it for protection, to prevent either mischievously inclined persons or animals from making a passage through it, which, when once done, is afterwards stopped up with great difficulty. In most cases, however, a protection placed behind will so guard the weak plants from intrusion that, in a short time, the place so guarded cannot be distinguished from the rest of the fence. This is one of the numerous cases of the sort, which constantly occur on farm management, when a trifling attention at an early period may save much after inconvenience and loss. Precautions so obvious it seems almost unnecessary to enforce on the attention; but in many districts, strange to say, their observance seems to be the exception and not the rule of usual proceeding.

When old hedges are to be cut down, it frequently happens that they contain a number of such openings, and the period of cutting them presents a fit opportunity for remedying such defects. When these spaces are small, one of the thorns on each side of the opening may be bent down, and entwined with that on the opposite side. If the thorns to be laid down are of a large size, they may be cut half through, as they are then laid down with facility; and it may be necessary to fix the door with hooks in the same manner as gardeners procure layers from valuable plants. Some of the earth being laid over them, they will soon send up a number of branches, which will fill the interval of the gap, especially if the earth so employed has been of good quality,



Rogerson lithe 24 Norfolk St Strand

and enriched by the application of manure. But when the blanks in the hedge are too large to be filled in this manner, they may be planted with fresh thorns, those selected for the purpose being of the requisite size—if old plants are not at hand, large sized ones from the nursery must be employed. In filling up gaps in old hedges, it is necessary to observe that the materials used are to be placed in the line of thorns forming the old fence; for when projecting on either side, as is sometimes the case from inattention, they present an unsightly appearance.

In all cases when spaces are filled up they require protection until the materials used for that purpose cannot be distinguished from the remainder of the fence. The too common practice of filling up gaps and openings at the bottoms of hedges with bramble cannot be too severely censured, as it tends to perpetuate the evil by preventing the thorns from spreading in the direction of the opening, and filling it up.

These, then, are the principal directions which on this important branch of farm management it is considered necessary to place before the reader; and it may be safely asserted that attention to them will secure efficient, lasting, and handsome fences. There is no less an authority than that of the author of "The Gentleman Farmer" for asserting that, under proper management, those hedges will last 500 years, a circumstance which should ensure proper attention being paid to them.

J. Sproule.

THE WINTER AND SUMMER KEEPING OF FARM HORSES.

By Mr. James Carmichael, Raploch Farm, near Stirling.

(From the Transactions of the Highland Agricultural Society.)

The management of live stock of every description certainly never was better understood, nor more generally attended to by the agriculturists of any age or country, than by the British farmers of the present day. Nor can there be any stronger proof of the justness of this remark than is everywhere exhibited in the high degree of perfection to which every species of live stock have now been brought with reference to all the physical properties of strength, symmetry, and size, necessary to develop the natural usefulness and utmost value of the various animals composing the stock of every farm.

But seeing that some of these animals are wisely designed for human food, whilst others are doomed to perpetual labour only, there is reason to fear that present gain may at times prompt individuals to pamper the ox and pinch the horse more than sound discretion or the real interest of the parties would justify. Not that any one, farmer or no farmer, is so inconsiderate towards such faithful servants and disinterested labourers as to deprive his horses of the necessary supplies of food, whilst he at the same time requires their daily aid in the varied operations of the farm, yet the effect may be very much the same upon the health and physical condition of the horse, whether his food be limited in amount, or be deficient in quality, or improperly administered.

Nor can the inconsistency be denied of the complaint general amongst agriculturists of the great expense of keeping their horses, whereas not one word is uttered against the sums annually laid out for artificial food in preparing their cattle for the shambles, strangely forgetting that as surely as the one animal repays (which, by the way, is not always the case) all this expense, so also does the other, even with compound interest, though undoubtedly in a very different form.

How unphilosophical and unjust, then, to grudge that noblest of quadrupeds, the horse, the full amount of nutritious provender with the physical structure and the constancy of his laborious toils absolutely require, and without which farming would indeed be a difficult and gainless undertaking.

But as economy is at all times highly commendable, and now become absolutely necessary in every department of life, the main point of inquiry here is, *How farm-horses may be kept in the best working condition during summer and winter;* that is, what are the quantities and qualities of provender best adapted, without want or waste, to the proper maintenance of work-horses in fair condition for their work at all seasons.

It must, however, be obvious that this proposition admits of an almost endless variety of answers, seeing that every district has its peculiarity of work and produce, and, therefore, the forage of agricultural horses must be confined to the crops of the farm, so far as these comprise the ordinary produce of straw, hay, and oats, with cut or uncut green food. In the *heavy-land* districts, where *beans, red clover*, and *turnips*, enter into the rotation of crops, the mode of keeping horses is very simple and satisfactory in every respect. It is this:—From the month of June, or whenever the clover, intermixed with rye-grass, is sufficiently advanced in growth to admit of being cut, which is generally determined by the blooming of the rye-grass and formation of blossom-buds on the clover, the horses gladly return to this succulent food, from the dry straw or best hay, and will soon become plump and sleek on it without a single feed of oats, except on occasions of an extra day's work, throughout the summer, the first cutting serving till August, when they are supplied with cut tares for a week or two, and thereafter kept upon the second crop or *aftermath* of clover till near the end of October or so, and are then placed on their former fodder of bean-straw, which is continued till next return of cutting grass.

In the winter months, however, each horse has a daily mess or mash of boiled or stewed (not steamed) bean-chaff, mixed with light corn and small beans, separated by the winnowing-machine or sieve from the best grain, to which a few turnips and a portion of salt are added, with just enough of water to secure the boiler from injury, whilst the whole is being reduced to a pulpy state, and the pulp is then put into one or more troughs, to remain till the evening, when the mash is divided among the horses, at a temperature of about blood-heat, immediately on their return from the yoke.

Nothing can be more grateful to poor jaded horses, coming in cold with rain, though warm with perspiration, than this repast; and the avidity with which they partake of it, after being rubbed down, is the best proof of its congeniality to their tastes. In fact, they are quite impatient until its arrival, far more so than in the case of an expected feed of oats, and will hardly taste the straw, however hungry, before they have finished their mash, when they become quiet, and pick at the racks, or soon lie down if much fatigued; thus shewing that even the commonest offals of the barn-floor may, when combined with one or two other equally simple ingredients, be formed into substantial and really nutritious food for the hardest working farm-horses, with the additional allowance of one feed of inferior oats and beans in the morning, and another at mid-day, when constantly employed.

In this manner are all the farm-horses of the principal clay-land districts of Scotland maintained in the very best possible condition, without a particle of any other forage, from season to season, care being taken to arrange the supplies so as to leave one or two old bean-stalks remaining to commence the winter season with, because of the flatulent nature of new bean-straw before it has been some time in the stack, or otherwise deprived of its superfluous moisture.

The same plan is adopted in several other corn-land districts, where few or no beans are cultivated, by substituting pea-chaff for that of beans, or, in absence of both, putting oat-chaff, chopped straw, or hay, or the like, into the boiler, along with the small barley, or oats, turnips, and salt, and even buying beans for the express purpose of being thus used for the horses; long experience having shewn that no other form of feeding, nor any other mode of supplying the horse with beans, can equal that of boiling them, when the object is chiefly to keep his bowels right and his body lusty. Boiled beans, interchanged with dry corn, are, therefore, invariably preferred by horse-dealers when at hand, as the readiest method of *making up a horse*, as it is termed, for the market, in at once giving him more flesh and a finer coat.

Beans and peas are, from their wholesome, as well as on account of their nutritious, properties, thus largely used alone or mixed, bruised or whole, with oats, for horses at all the public works, and also by carriers, carters, and cowfeeders, who find bean-meal very fattening, besides being productive of more and better milk than any other grain similarly used; and a mixture of dry beans and oats in any form is, therefore, generally considered much better for horses than oats alone, which, long continued, with other hard food, always heat the system, and thus the animals become rough or *staring* in their coat, however well groomed. Indeed the difference between the two modes of keeping is so perceptible, especially in heavy draught horses, that their very appearance will in almost any circumstances determine the question of their manner of feeding.

It will, perhaps, be objected by some that this dietary must have a tendency to render the horses *soft*, or more easily heated, while under its influence; yet those who have longest practised it (twenty to thirty years) cannot discover any other difference in this respect than what is well known to occur in the case of all lusty horses compared to lean ones, placed side by side in the same team, and both fed on some other quality of food. The highest conditioned, *i. e.* the fattest horse, assuredly will always be the first to perspire, when both fat and lean are placed on precisely the same footing in every other particular save their food, except when the lean horse is overcome by the draught, or fatigued, which he certainly will soonest be, and immediately become covered with a heavy cold dew from mere exhaustion, or want of stamina, whilst his fellow, though foaming, is still fresh, active, lively, and entirely master of his work. In point of general health, however, as may easily be conceived, the advantages are most decidedly in favour of the thus-prepared-food-fed horse, whose powers of digestion are thereby greatly assisted, without being improperly stimulated or overcome. Moreover, his hours of rest are nearly doubled. Having so readily refreshed himself, he lies down to repose, whilst his less fortunate though equally deserving compeer must remain for hours on his weary limbs ere he can possibly appease the cravings of hunger from a crib of dry provender, which must undergo many chemical changes in the stomach before it can be rendered equally alimentary as the prepared food of the other, though mostly composed of the very same ingredients. Yet it is not intended by this course of management to pamper the horses, nor to overload their comparatively small stomachs with too much soft food on any occasion. When the horses appear very hungry, or are apt to swallow their mash too fast, only one-half of it or so is given at a time, and the other half one or two hours thereafter, leaving them in the intervals to partake of their straw or other fodder at pleasure.

Nor is it supposed that such mashes would find favour in hunting stables, although a feed or two of boiled beans would, even there, often prove of greater benefit to some horses, at the close of a long chase, than their ordinary fare. Young colts thrive remarkably well on this food with straw, and even old horses are much healthier with the same feeding in winter, than when kept on cut clover in summer, as this frequently causes the legs of old and idle horses to become *greasy*. Some of the most extensive post-masters, in large provincial towns, have, therefore, adopted the preparing of daily mashes from waste hay-seed, and other sweepings of their lofts, stewed with a mixture of turnips, and the cheapest market barley, duly seasoned with salt. The utility of prepared food, then, needs only to be tried in order to be fully appreciated, though its expense must, in every case, be dependant on the quantity and quality of the several articles employed in the preparation. These may consist of one or all of the various descriptions of corn, pulse, and roots usually given to horses, together with such bean, pea, or oat chaff, chopped hay or straw, bran, or other substitute, as may be most conveniently obtained in the locality, and which are all within the reach of *every horse-keeper*, whether a corn-grower or not.

Bean-straw being almost never sold, unless as an entire crop in the field, and, according to the present *town* mode of horse-feeding, is indeed unsaleable to any except perhaps a few carters, who may prefer it for a month or two in winter, when hay is high priced, it is, therefore, difficult to fix its real value, although, when constantly used by the farm-horses, it comes in the place of oat-straw or hay. The value of these, again, is scarcely less difficult of adjustment than the other, since every district has its own price for land produce. An approximation may, nevertheless, be made sufficiently near the truth to afford a comparative estimate of the different modes of keeping farm-horses on dry and prepared food.

To begin, then, by selecting an individual farm of about 120 imperial acres of arable clay-land, wholly under crop or regular culture, where nine horses, old and young, including a brood-mare, colts, &c., are kept throughout the winter, and where the preparation of the mash is always in the charge of one person, (a boy,) who has fixed quantities of each article strictly pointed out to him, by which he proceeds to put into a cast-iron boiler of 70 or 80 gallons imperial measure, as follows:—

	£	s.	d.
22 lbs. of bean-chaff, valued at 8d. per cwt.	0	0	1½
130 lbs. of yellow turnips, 6d. per cwt.	0	0	7
7 feeds of small corn and beans, say at 1s. 8d. per bushel of eight feeds	0	1	5½
1½ lbs. of salt, or about 2½ oz. to each horse, to which may be added fuel, say in all	0	0	1
Divided among nine horses, is just 3d. per mash. . .	£0	2	3

If hay sells at 3s. per cwt., bean-straw cannot fairly be estimated above 2s. 1d. per cwt.; and finding upon trial that each horse will consume about 22lbs. of bean-straw per day, when fed on the above mash at night, together with one feed of oats in the morning and another at mid-day, the sum of all these items will be—

	£	s.	d.
22 lbs. of bean-straw at 2s. 1d. per cwt.	0	0	5
2 feeds of inferior oats per day, at 2s. 2d. per bushel*	0	0	6½
1 mash as above	0	0	3
Daily cost of keeping each horse	£0	1	2½

Now, as this course of keeping continues from the 1st of November to the end of May, or seven months, the gross amount of the preceding account will stand thus:—

	£	s.	d.
210 days on bean-straw, at 22lbs., or 41¼ cwt. at 2s. 1d. . . .	4	5	11¼
210 days' oats, 2 feeds per day, at 2s. 2d. per bushel	5	13	9
210 days' mashes, 1 per day, at 3d. each	2	12	6
About £1 16s. per month per horse,	£12	12	2¼

* It need scarcely be here remarked that no farmer does, nor indeed can afford to give his best oats to the horses on almost any occasion.

The next estimate proceeds upon the assumption that the horses are kept the whole of this period on hay and corn, to the total exclusion of mashes. The account will—taking the same scale of prices for oats, and 11d. per cwt. additional on hay, as the difference of its greater market value, if sold from the rick as bean-straw would be from the barn-door—then be—

	£	s.	d.
210 days' hay at 22 lbs. per day, at 3s. per cwt.	6	3	9
210 days' oats, 3 feeds per day, at 2s. 2d. per bushel	8	10	7½
About £2 2s. per month per horse	£14	14	4½

But the practical discrepancy must be still greater, inasmuch as the weight of bean-straw is, in ordinary seasons for beans, perhaps twice the weight of an acre of sown grass hay on the same farm; and, if the marketable beans produced on an acre be computed at 20 bushels, at 3s. 6d. per bushel, this will give £3 10s. per acre for beans, which is far more than the aftermath of clover would bring. There is also the additional advantage of beans being a much less exhausting crop than clover, which is often twice cut without any extra manuring. Thus shewing the propriety of growing more beans and less clover-hay, or cutting grass, whenever the land is at all fit for beans; and, doubtless, there are many farms where beans would succeed if drilled or ploughed down, on clean deep soils, although not really clay-bottomed land. Drills are preferable, however, to broadcast, as the beans can then be hoed up, and a greater body of earth given to the roots, as well as being easily cleared of weeds. But whatever the system of sowing may be, the land ought to be rolled some time before the beans appear above ground; for bean-land can seldom be too much compressed at this period, if properly prepared at first.

The stewing of barley or oat chaff, with a little corn and turnips, is also generally used in the keeping of farm-dairy cows in winter, along with oat-straw, reserving the hay till the calf is dropped, when this mash is given up, and nourishing dry food supplied to the cows; resuming the mash again, with the addition of bean-meal, together with hay, till the grass or green-food season returns. But especial care is taken not to mix any bean-chaff in the cow-mash, because of its laxative nature, and of its causing the cow to pick calf. Subsequently, however, it may be sparingly mixed with the other chaff quite safely.

This peculiarity of bean-chaff and straw is rather favourable than otherwise to the habits of the horse, which seem to require aperient food, especially in winter.

Bean-chaff is also highly relished by wintering stock in the straw-yard; and the good effects of occasional fodderings of this chaff, mixed with that of corn-chaff, is very perceptible in the relaxed state of their bowels; and many farmers, having a quantity of the several varieties of chaff left over at the close of the thrashing season, place the whole in an outhouse, or the centre of an oat or barley straw stack, duly salted, and secured for next winter, to be then served out to the straw-yard cattle, proving more acceptable to them than any other fodder.

It is thus manifest that, where beans or peas can be alternated with the other crops of the farm, horses cannot possibly have better winter provender than this straw accompanied with mashes; and, doubtless, it would be a great improvement, and more economical, could any means be devised whereby the corn-straw and all other straw might be chopped, if desired, at the time of thrashing, as it escapes from the thrashing-machine, without allowing the cut-straw or corn to become mixed in the operation, and occupying the corn-floor by the process; for, however convenient straw-cutting machines may be in themselves, they require so much additional time, room, and labour, as to preclude all hope of their ever becoming universal in farm practice. Chopping, or more completely breaking the bean-straw, would certainly prevent much waste in the stables, when the horses naturally select the softest and shortest portions of it, leaving the rest as litter under their feet. On this account, it will probably be objected that a greater allowance per diem of bean-straw ought to have been made in the preceding estimate; but this *apparent* waste is just another proof of the little market-value attached to bean-straw, so that many farmers really allow the horses to litter themselves with it in place of wheat straw, which sells so well for thatch or litter; and thus a seeming waste becomes, in the end, a source of gain. The truth, however, is, that, with such mashes, horses eat little straw at night, so that the greater part of it remains till next day.

This is demonstrated by the following facts, obtained by inspection of the premises of a most respectable proprietor of one of the largest posting establishments in Scotland, who, after sustaining great loss and much inconvenience from waste of hay, and continual recurrence of sick and unsound horses, has adopted the subjoined system of stable economy with the utmost success. In one corner of the yard, a boiler, containing about 120 gallons imperial measure, is erected under a small shed, containing the pump-well, with stone trough, and a square wooden cooler still more capacious than the boiler. Into this boiler are put 60 lbs. of bran, 320 lbs. of Swedish turnips, and 1½ bushels of barley, to which is added about 7 lbs. of salt, with water sufficient to boil the whole, and the mixture is then covered up and allowed to simmer till the turnips and barley are quite soft. The boiler is then emptied into the cooler, where the mash remains from four to six hours, according as it may be wanted, and is cooled to about blood heat. The mash is then distributed at seven or eight o'clock, P.M., when the horses are done up for the night, amongst fifty-four or sixty of them, at the rate of a half-pailful to each, or a heaped pailful among three horses, in lieu of a feed of oats, with about 7lbs. of hay put into each rack or crib. In the morning the horses get a feed of oats about six o'clock, and an hour or two afterwards, each has 10lbs. of raw turnips, washed and cut, put before him. He gets another feed of oats about mid-day, but nothing more till mash time, if not expected to go out soon. And those horses which are taken out or are on full work, have, in all, four feeds of oats each day, besides their portion of the evening mash and morning turnips. Such is the mode of keeping pursued during the whole winter season, or so soon and so long as turnips can be procured; and certainly nothing can exceed the appearance and condition of the horses, every one being as clean in the skin and lively as any private stud can be, however differently fed or maintained. This mash is given at least five times in the week, or oftener if possible. Nor are the horses doing the hardest, late and early, wet and dry work (stage coaching), found more easily heated or tender than before, but, on the contrary, are remarkably robust, active, and lively, far less liable to sickness or swelling of the legs than is so common with post-horses kept entirely on hay and oats. The actual difference, however, as to expense, between the two modes of keeping, though considerable, as will be seen below, is not so material as the fact of assured health, and consequently much greater length of active service, than on the old system.

The cost of this mash is—

60 lbs. of beans, at 70s. per ton -	£0	1	10½
1½ bushels, of inferior barley, 3s. 3d. per bushel - - - - -	0	4	10½
320 lbs. of Swedish turnips, at 14s. per ton- - - - - - -	0	2	0
7 lbs. of salt, or nearly 2 oz. to each horse, also fuel and attendance -	0	0	5
	£0	9	2

Being about 2d. per mash to each of fifty-four horses, whilst the feed of oats thus superseded would cost 3½d. But the saving chiefly lies in the small quantity of hay required by the horses thus maintained, which is only 7lbs. in twenty-four hours; whereas formerly each horse had his rack continually filled with hay (where it soon became tainted by his breath), and ate or wasted fully three times that quantity, or about 21lbs. per day, in addition to all the oats. Now, taking the hay at 19lbs. per day to each horse, at 3s. per cwt., and the oats at 2s. 5d. per bushel, the account will stand thus—

19 lbs. of hay, at 3s. per cwt. - -	£0	0	6
5 feeds of oats (8 to the bushel), at 2s. 5d. per bushel- - - - -	0	1	6
Twenty-four hours' keep of one horse on full work- - - - -	£0	2	0

Per Contra.

7 lbs. of hay per day, at 3s. per cwt.	£0	0	2¼
4 feeds of oats, at 2s. 5d. per bushel	0	1	2½
10 lbs. of raw turnips, at 14s. per ton	0	0	0¾
1 mash as above - - - -	0	0	2
Twenty-four hours' keep of one horse on the same work- - - -	£0	1	7½

Making a positive saving of 4½d. per day on the keeping of each horse, or £2 8s. 9d. on the six months of twenty-six weeks, at five mashes per week.

The *stewing* is thus most decidedly preferable to the *steaming* system of preparing horse food, obviously because the former preserves all the *juices* of every ingredient employed, whilst the latter allows those juices to escape from beneath; and which, in reference to *potatoes*, is proper enough, but with other roots or vegetable productions is absolute loss.* Besides, the universality of turnip and carrot culture, particularly turnips, which can now be produced on almost any soil and in every locality, renders the potato no longer an object of attention as horse food in any form; for it is not only inferior to these mashes in point of palatableness to the horse, but is also dangerous if given raw, often causing gripes, colic, and sudden death, as might easily be proved by facts of actual occurrence, were it here necessary. Potatoes may, therefore, be with great propriety excluded, and are already prohibited by many farmers from the dietary of the horse.†

Nor ought raw turnips or carrots to be given unwashed, or in larger quantities than 10 to 14lbs. at a time, or at other times than when horses are cool, and have some dry food on their stomachs; that is, in the morning before going to work. In this form turnips and carrots serve partly for water as well as food, just in the same way that the evening mash prevents horses from drinking so much cold water next morning as they would otherwise do if wholly restricted to dry food. This of itself is no trifling consideration, especially in the spring season, when the poor horse is so hard pushed from day to day, under a drying sun and wind, and when large or hasty supplies of cold water so frequently prove fatal to him.

Other instances might here be given, and additional facts adduced, illustrative of the same principle, and of the propriety of interchanging prepared food with dry provender to the horse in one form or another, as the circumstances of the case, the produce of the farm, or the prudence of parties, may render most expedient. But it is conceived to be unnecessary to enlarge upon a subject so plainly dependant in practice on so many minor considerations, all more or less likely to influence individuals as to its adoption or final rejection. Change of food, as all know, is not less grateful or essential to the horse than to other animals; and of all animals, the horse is most fastidious in the selection of suitable, and most readily affected by improper, food or water.

It is almost superfluous to attempt estimating with exact precision the summer keeping of farm-horses, seeing that locality alone must determine this point, every district having its own practice of retaining the horses in the stable at night or putting them into the fields for a month or two at midsummer. Both practices have their advantages and disadvantages. Where horses are pretty regularly employed on green crops, or fallow work, or carting lime, it is evidently much better for them to be kept in the stable over-night, and supplied with green food, than to be turned out to experience the vicissitudes of the weather, after being heated in the yoke, even though they do remain some time to cool in the stable; and, besides, they cannot refresh themselves so well and so fully as would be the case were they provided with their usual shelter along with their necessary forage. There is also a great loss of manure by the pasturing of horses, besides their requiring more ground for that than would suffice to raise a cultivated crop of forage. The pasture, too, must always be near the farmstead, well sheltered, dry-bottomed, and properly watered, to render it really available. These, and many similar considerations, combine to prevent farm-horses on heavy lands or exposed situations from ever being turned out at night, or even through the day, except occasionally on Sundays. On lighter and warmer soils, however, where there is less summer work, the horses will unquestionably be much healthier to remain out than be comparatively idle in the house day and night, unless they have a proper fold-yard to exercise and rest in.

The expense of summer keeping for farm-horses, as already remarked, must, therefore, be as various as that of winter, as the modes or means adopted are within the reach of the owner—the extent of forage, number of horses, and the nature of their employment. With his present resources, however, there seems to be no other course of summer management left to the heavy-land farmer than that now generally followed of cutting clover or tares for the horses, as early and as long as these can safely be used as green forage; for either plant cut too early would not be profitable nor suitable for hard-working horses. Hence, horses are frequently more than seven months on winter food, though, to preserve greater simplicity in the account, their cost of keeping has been taken in entire months.

On the farm to which the first-given estimate refers there are nine horses, including a brood-mare and two colts in winter, and only six horses, or three ploughs, in summer: their hours of yoke generally being from daylight to dusk in winter, at the plough, thrashing-machine, or carts, with one hour at mid-day to feed, and from seven A.M. to seven P.M. in spring and summer, with two hours at mid-day for feeding.

The cut grass is generally taken from one side or corner of a field of young clover and rye-grass (12lbs. red clover and $1\frac{1}{3}$ bushels annual rye-grass seed per acre), sown the previous season with the barley, and intended for hay for sale.

It is the first work of the three ploughmen in the morning to proceed to the clover-field about five o'clock, and cut a small cart-load of the grass, which occupies them about an hour, or a little more if two days' grass is required. The grass is taken home, and either remains in the cart, in a shady place close to the stable, or, if wet, is spread on the loft above to dry. When the space of ground thus reserved for the horses has been gone over, or the grass gets too ripe and hard to be used green, the remainder is made into hay, and the horses are kept upon cut tares for a time, till the second crop becomes ready for cutting, which is continued to the horses, in favourable seasons, to the end of October. The quantity of cut grass consumed by each horse necessarily varies with

* No kind of grain, or straw, or chaff, *can* be cooked by steaming, that process having the invariable effect of burning or charring those ingredients.—Ed.

† Even steamed potatoes, if constantly administered, have been found to act injuriously on the pulmonary system of the work-horse.—Ed.

the state of the grass at the time of cutting. When the grass is young and succulent, more of it is required; and when older and hard, the horses eat less and waste more, if allowed to do so by being too liberally supplied at a time.

Taking these things into account, and seeing that a certain degree of waste is unavoidable, be the care and economy what they may, it has been found, by repeated trials, that from 180 to 200lbs. of cut clover will serve each horse twenty-four hours, one day with another, throughout the grass season. Say 196lbs, or $1\frac{3}{4}$ cwts. at $6\frac{1}{2}$d. per cwt., for five calendar months, and five days to complete the year, or 155 days, with one feed of oats to each horse for four months, or 120 days, the amount will be this—

	£	s.	d.
155 days of cut grass, at $1\frac{1}{3}$ cwt. per day, at $6\frac{1}{2}$d. per cwt.	7	6	11
120 feeds of oats, eight to the bushel, at 2s. 2d.	1	12	6
Keeping of each horse, £1 14s. 6d. per month, or during $5\frac{1}{6}$ summer months	£8	19	5

No allowance is here made separately for the tares; because, however nutritious in themselves, or valuable as change of forage, they are so powerfully diuretic, particularly on weakly-constitutioned horses, that no more are sown than will serve to make up the usual blank of two or three weeks, between the close of the first and commencement of cutting the second crop of clover. Nor is there any account here taken of the time required to cut the clover, because it occurs in the least busy time of the season, and it is trivial in itself, not exceeding 20s. to 30s. upon the whole period. Nor does it properly belong to such an estimate; because, if the horses do not get cut grass, some other food must be provided for them, or the same time will be wasted in bringing them to and from pasture. A similar remark is applicable to the time of the boy who prepares the mashes for the horses; because, in reality, it forms but a very small part of his daily work. On very large farms, however, it is customary to have the grass cut and carried by an extra man and horse at still less expense.

Thus, then, it is seen that the cost of keeping each horse upon a farm of 120 imperial acres of heavy land, all under crop, is about £8 9s. 5d. during the five summer months, and £12 12s. $2\frac{1}{4}$d. for the seven winter months, or in all £21 11s. $7\frac{1}{4}$d., being a saving of £2 2s. $2\frac{1}{4}$d. in favour of bean-straw and boiled mashes as compared to hay and hard corn, for the winter; and a saving of £2 8s. 9d. in the case of posting horses for a period of six months; or a clear gain of £18 9s. $8\frac{1}{4}$d. to the farmer on the winter keeping of nine horses, and of £131 12s. 6d. to the postmaster on fifty-four horses during the winter—no small matter in these times, taken in connexion with the positively improved condition of both classes of horses, and the regular performance of ordinary work in both cases. Otherwise the comparative saving would be of little avail, were the horses not at the same time found equal, and more than equal, to their ordinary work; for no greater error can be committed by any farmer than to allow his horses to fall off for want of nutritious provender, especially in winter, with the prospect of long days of severe spring-labour before them. It is impossible to quit this very important subject without briefly adverting to the very injudicious practice prevalent in some quarters, of continuing to cut grass after boisterous weather has caused the clover to fall down and wither, or while it is covered with hoar-frost. Nothing can be more improper than this, or fraught with greater danger to the health of horses. How easily and advantageously might every risk be avoided in this by merely watching a dry day, at an earlier period of fine weather, whilst the clover is in full vigour, and cutting and carting it off after exposure to a day's sun, and placing it in a stack, intermixed, stratum upon stratum, with dry straw of oat, barley, or even wheat, to which a sprinkling of salt should be added, and thus converting the whole into excellent fodder for horses or any other stock, far more profitable than in its original state.

In connexion with farm-horse feeding, for which turnips are so admirably adapted, it may not be out of place here briefly to advert to the most approved mode of storing this invaluable root for winter and spring use, and regarding which much diversity of opinion obtains amongst farmers; for, however convenient it may be in dry upland districts to allow the turnips to remain in the ground till March or April, such a practice is inadmissible in low-lying clay soils, where, besides the inevitable poaching of the land, in carting off the turnips in wet weather, there is the risk of losing great part of the crop by continued rains or severe frost, it being well known that hoar-frost invariably proves the heaviest in such localities; and should it prove frosty when the spring seed-time arrives, the frozen turnips are necessarily thrown together in large heaps, the probable result of which is, the total loss of the whole so soon as the weather becomes mild, not to mention the danger of giving frozen turnips to cattle. To obviate these evils, and get the land sown with wheat before winter sets in, it is customary in the Vale of Forth to pull as many as possible of the turnips in October and November, and convey them to a convenient corner of a field near the homestead, where they are laid in long heaps on the ground, neatly *trimmed* up by hand, and carefully covered with straw, but not with earth, it being found that the admission of air and moisture is rather advantageous than otherwise to the keeping of turnips, all that is necessary being simply to add more straw in the event of severe frost, and to place a few straw ropes, or pieces of light wood, along the heap, to prevent the wind from removing the straw. Turnips, especially the yellow and Swedish, may thus be preserved quite fresh and firm till June or July. The heaps are turned over, and hand-picked whenever the buds begin to assume any size, and re-covered with straw as before. But great care is necessary in *topping* and *tailing*, as well as in handing the turnips into the carts; because too close cutting off of the top or tail, and bruising whilst throwing them into the carts, induce the speedy decay of the turnip in the heap. Every injured turnip, whether *cut*, *burst*, *bruised*, or slightly decayed, should therefore be laid aside at the time of storing or turning over the heap, for the purpose of being first used. The heaps may be arranged in the order in which they are to be used, placing the Swedes farthest off, and shaded from the influence of strong sunshine, but not in contact with wall or hedge without the intervention of straw, lest the frost should penetrate to the turnips.

Let it be remarked, however, that for the more perfect preparation of horse or cattle food, as exemplified in this essay, much necessarily depends on the construction and position of the boiler-house appropriated to such a purpose. Instead, therefore, of having such boilers pushed into a corner of some little hovel, with scarcely room sufficient to contain the proper apparatus, together with a cart-load or two of coals, or, as is too frequently the case, having the whole exposed in the open air, without any covering or house whatever, to the manifest waste of fuel and danger of igniting the stack-yard or other out-buildings—instead of incurring all this waste, risk, and inconvenience, apart from its unsightly appearance, it is easy to select a spare corner at one or other of the angles or openings of any ordinary farm-steading already formed, where the boiler-house, with the necessary appendages, can be safely and conveniently placed.

And where the vacant space is large enough for such purpose, or an entirely new homestead is being erected, a poultry-house, potato-house, and piggery might all be included in the range, or placed contiguous to each other. This arrangement would be found much more economical and convenient to the farmer than the usual one of having the houses in separate positions, and perhaps at a distance from the pump-well or water-course, so indispensable an adjunct to such houses. But the truth of these averments will, perhaps, be rendered still more apparent by a reference to the sketch (which accompanies the present number of the Farmer's Magazine) of the boiler-houses and others on the farm whence the preceding essay and estimates originated--a farm where all the main buildings were erected upwards of fifty years ago, and forming a square, with the dwelling-house on the south, the barn on the west, the granary over the cart-shed on the north, and the stable and byre on the east side, each side detached or separated from the other by an opening or thoroughfare at the four angles. The boiler-house was originally a mere hovel—the poultry had no other roost than the usual "cock-loft" over the cows—the ducks lodged as they best might in the cart-shed, or other less secure places, and the potatoes were kept in a corner of the cow-house, as also the pigs. Finding the great inconvenience and positive loss attending this want of proper accommodation, an effort was made several years since to have it remedied, and, partly at the expense of the landlord and that of the tenant, entirely new places were provided for all these purposes, agreeably to the plan. First the boiler-house, Fig. 1, embracing the whole space parallel to the byre gable, with which it nearly forms a square, being about 19 feet by 18½ feet within walls; the walls are 11 feet high, with a storeroom or loft overhead, for the purpose of holding small corn, bruised grain, and the like, for the boiler. The centre or south door of the boiler-house is placed over a tank or well, about 15 feet deep by about 6 feet diameter, dug out of the clay subsoil, bottomed and built round with stones, to serve as a reservoir, which is supplied with water by means of a small tile tube-drain, communicating with a horse-pond some 30 yards distant. The well is covered with a thick stone slab, into the one side of which a pump, *a*, is placed, with a folding door shutting in the whole, but so wide as to admit of the pump and slab being removed at any required time. This pump, thus secured from frost or injury, serves the boilers, the washing of turnips, potatoes, or other roots, watering of live stock by hand pails, besides supplying the water-trough in the straw yard? and, in short, every other domestic purpose, except for human food.

The boilers are placed on each side of the chimney, *c*, at *b b*, the one for horses, the other for cows, from which the flues convey the smoke, and the furnaces are in front, at *b b*.

Each boiler has a wooden cover as in Fig. 2, made double, with transverse inch boards, to prevent them casting or twisting, the upper part resting on the edge of the boiler, whilst the under side falls within the margin. The back segment of these covers is fastened to the rim of the boiler by means of three small-pointed iron brackets, equidistantly nailed on the under side of the segment, and passing into corresponding holes near the lip of the boiler. Two hinges, *k*, are placed on the upper sides of the covers, by which they are moved up and down at pleasure. The superfluous steam is conducted from the fixed part of the covers into the chimney, by a three-inch sheet-iron tube, as shown by *l l*. The figure represents one boiler with the cover *up* or open, and the other *down* or shut. This is an essential point, as tending to save fuel as well as to preserve the interior of the boiler-house and connected apartments from the injurious effects of a constant cloud of dense steam issuing from each boiler when in use.

Opposite to the boilers is the coal-place. Fig. 1, with a parapet wall; and in front of the pump is the *sink* or gutter, *e*, for the waste and dirty water passing into the *cess*-pool, *f*, and thence into the main drain, which has an opening or latch, at *g*,

The back-door on the right leads to the piggeries and straw-yard, in which a water-trough, *i*, stands, and is supplied with water, as required, from the boiler-house pump, by means of a moveable *run*, crossing the front door, and thence conducted, by a fixed three-inch iron pipe, round the angle of the coal-place, passing through the east wall and also the piggeries, and falling into the trough through the south wall of the straw-yard.

The corner door on the left leads to the court-yard of the farm, as well as into the poultry and potato houses.

The poultry-house is placed next the boiler-house, because of the constant warmth required by its feathered tenants, and the greater coolness necessary for the potato-house, three sides of the poultry-house being six-inch brick walls, with a south window, whilst the potato-house has three sides of stone walls and requires no window.

There is a loft on each side of the poultry-house, as shewn by Fig. 3, placed about six feet above the ground-floor; and over the centre space is placed a light stage let into the front wall about 3½ feet above the side lofts at one end, and resting on two upright posts placed in the partition at the door at the other end, with four straps of wood nailed to the sides, and fastened to the roof above. The object of this stage, which is considerably broader than the space between the two lower lofts, is to intercept the droppings from the hen-roost still higher up, and which, with the two side lofts, thus preserve the floor always clean, excepting what arises from a few ducks sitting below. Along the face of the brick walls, both above and below the side-lofts, are several tiers of *square holes*, at *m m*, formed of thin boards for the hens' nests, and the window is furnished with a wire screen to preserve the glass from accidents. The position of these nests are also seen at *m m* in the poultry-house, Fig. 1; *n* is the stair to the loft above the boiler-house. The potato-house has no extra fitting, and the piggery is only about 7 or 8 feet in height, covered with stone pavement. The poultry-house and potato-house would have been made larger had the space admitted of it, without curtailing the dimensions of the boiler house. And although these several apartments are thus placed at a corner of the original homestead, and actually connect the dwelling-house with the byre and stable range of buildings, yet, *internally*, each of the houses is still as disconnected by thick stone walls as formerly. Nor are the roofs at any point united; for, besides being in the pavilion form, the roof of the new houses is several feet lower than that of the byre or dwelling house. The roof is slated, and the whole buildings cost about £75, exclusive of the piggery.

THE LATE JOHN PRICE, ESQ.

TO THE EDITOR OF THE FARMER'S MAGAZINE.

SIR,—I have been perusing with deep interest a memoir, very faithful as far as it extends, of the late Mr. Price, in your number of the present month; and, as his only surviving child, I trust to your indulgent pardon in being thus tempted to address you thereon; a liberty which, as a stranger and a woman, I otherwise should not presume to.

Gratefully as I feel, and sensibly as I appreciate this honourable testimony, evidently intended by the writer to do ample justice to the memory of a man whose like will not soon again be seen, I yet can but regret that no laudatory mention is included—doubtless from the author's little personal knowledge--of the many social virtues which, *equally* with the public ones you name, adorned and enriched in private life the character of Mr. Price. Apart from the pride and pleasure of calling such a man Father, I can conscientiously declare, as though by no such tie connected, that in no other being have I yet found such unbounded benevolence, so many gentle charities, in fine, so large a share of the milk of human kindness! Generous and hospitable even to a failing, his table during the hey-day of his life was often surrounded by gentlemen and noblemen of the first distinction; few perhaps among whom, though educated in far higher school, could surpass their host in argumentative force and bright conversational power.

All is true that you state of his humble birth, not that his parents were of mean grade or fortuneless, but farmers then lived and brought up their sons so differently to those of modern times. My father's transcendant natural abilities and genius, however, surmounted every obstacle to improvement; by nature and by habit he became a perfect gentleman, an ornament to any society, and this without any assumed polish; humble and courteous even in his most palmy days, he was a favourite with all, the kind and assisting friend of many, his very faults leaning so much to the side of virtue as to disarm one of blame. Not only as you say was he an "admitted," but an honoured guest at Croome, for even during the visit of royal personages has the late Countess of Coventry insisted on my father's being of their circle. This circumstance, however, it should be said reflected as much lustre on the character of that excellent woman and her family, as on Mr. Price; each member being distinguished for affability, kindness, and an absence of that vulgar pride which often attaches to high rank, defacing the christian beauty and loveliness of the otherwise noblest escutcheon. I have known the late Earl of Coventry, with his brothers' dine at my father's house five days of the week; the late Earl Plymouth, and many others too numerous to name individually; none of whom had need to blush in association with a man mentally superior to most.

Mr. Tatham's portrait scarcely deserves the high eulogium with which you honour it. True he laboured under heavy disadvantage, his subject being a sufferer at the time from severe mental and bodily affliction; the recent loss of three favourite children (distinguished alike, though in other order, for genius and talent) weighing down with sorrow the heart of so fond, so good a parent. Thus I imagined is Mr. Tatham's representation tinctured with so strong an expression of age and melancholy, one so widely at variance with the naturally quick, energetic, and vivacious eye and manner of Mr. Price, when he was the charm, the life and soul of his home circle. Merely as a picture,however,there are other faults and discrepancies.

My good uncle, though a sensible man, indeed a philosophic reasoner,is yet a heavy,prosaic, and prolix writer of the old school, ill calculated, beyond the authenticity required in *business* points, to rightly convey and define the intellectual spirit of a creature of so different a mould; so that I quite regret my dear father's name should not have met a more enlightened biographer. His fame however, as a breeder and judge of stock, will not die for many an age; in which respect, I have often been told since and before his death, he had *no* equal.

It has been a solace to my feelings to pen this added memoir for your own private perusal; since, issuing from a daughter's pen, little weight with the world at large would attach to its yet honest truths, or little increase of lustre arise to the memory of that dear parent, to whose worth and kindness I feel my best praises are due.

In conclusion, his bereaved child can but breathe a wish that she were a worthier representative of his merits, thus better suited to the honour of subscribing herself, Yours, Sir,

With obligation and extreme respect,

HENRIETTA C. PUMFREY.

THE PROBABLE YIELD OF WHEAT.

TO THE EDITOR OF THE MARK-LANE EXPRESS.

Sir,—As a North Wilts farmer has favoured the public with some very fearful forebodings as to our future prospect for food, will you favour me with space to state a few facts as to the probable yield of wheat, &c. I am a constant attendant at some of the Wiltshire and Somersetshire markets, and have heard and seen much, especially in North Wilts. I am quite convinced that the yield of wheat in Wiltshire, though greatly less than last year, is a great deal more than the year before (viz., 1843). The lowest yield I have heard of is 20 bushels per acre, and the highest 46 bushels. I could give you the names of a dozen different individuals who have grown from 28 to 40 bushels per acre, and many more who have from 20 to 28 bushels per acre this year, on farms where they only had from 12 to 20 bushels in 1843. I am quite sure wheat is *a full average* as to quantity, but think it inferior in quality. Nevertheless, it grinds well; and the bran is lighter than from wheat of last year. I do not mean that there is less bran per bushel of wheat, for the reverse is the fact; but a bushel of bran weighs less from wheat of this year's growth than from that of last year, in consequence of its being thinner, and the flour cleaning more readily from it. On many farms in Somersetshire the farmers assure me they have more wheat per acre than they had last year; and all farmers, everywhere, acknowledge that every other crop of corn is a good one. The only fear is as to potatoes. That many are lost is certain; but the mischief does not seem to extend very rapidly. I have inquired of more than fifty of the Wilts and Somerset growers and dealers, and the almost universal reply is, "I expect there will be plenty left, sir, after all; for there was such a quantity planted, seed being cheap, and the weather fine at planting time."

There is still a great quantity of old wheat in the hands of the Wiltshire farmers. Again, it should be considered that we have begun feeding on the new crop from four to six weeks later than we did last year, which makes a difference of as much or more than the total quantity wanted for seed.

On the whole, therefore, we have no fear of a famine; and if we frighten ourselves into high prices, we shall only hasten the calamity of a "panic," which, in this manufacturing country, as surely follows a high price for food as ever prodigality produces poverty.

I am, sir, yours very respectfully,

A Wiltshire Farmer, and
A Somerset Miller.

North Wilts, Sept. 25, 1845.

TO THE EDITOR OF THE MARK-LANE EXPRESS.

Sir,—There are several articles and letters in your useful paper of last week, all bearing upon the subject, "whether there is sufficient food in the United Kingdom for the inhabitants up to the time of the next harvest."

Now, although the deficiency of last year's crops, both of wheat and potatoes, has been greatly exaggerated, yet I believe that all will agree that there is not sufficient food in the country without putting a large number of its inhabitants upon short commons by a material rise in the value of wheat; and it therefore becomes a question whether the British Government is determined to try the hazardous experiment of either half-starving a large proportion of its people, and filling the union-houses to overflowing, or by a timely concession obviate so dire a calamity, by adopting the plan pursued by the Belgian Government.

I consider the case cannot be too forcibly agitated; and that it becomes the duty of every loyal subject to prevent the consequences which might ensue from the want of means to procure a sufficiency of wholesome food; and it becomes the duty of every corn-seller and corn-buyer to urge upon her Majesty's Government to explain the course they intend to pursue, and not wait for the assembling of Parliament. Much evil may be prevented by a public declaration as to whether the corn laws are to remain in force, or not. Yours,

A Miller, risking his Capital in the Dark.

AN EXPERIMENTAL INQUIRY INTO THE THEORY OF THE ACTION, AND THE PRACTICAL APPLICATION, OF BONES AS A MANURE FOR THE TURNIP CROP.

BY JOHN HANNAM, HON. MEM. OF THE NEW YORK STATE AGRICUL. SOC., AUTHOR OF THE "ECONOMY OF WASTE MANURES," &c., &c.

(From the Journal of the Royal Agricultural Society.)

"Nothing is more wanted in agriculture than experiments in which all the circumstances are minutely and scientifically detailed. Information collected after views of *distinct inquiry* is necessarily fitted for *inductive reasoning*."—*Sir Humphrey Davy*, lec. i. p. 24.

The above remarks are as applicable at the present time to the circumstances of agriculture as they were when they were first uttered. It is true that the field of experiment is no longer a *terra incognita*, but that its explorers are now numerous. Its attractions, indeed, have made it fashionable. It is, however, equally true that its extent is so unlimited, that it is quite possible to wander in it without discovering any of those hidden mines of instruction which it is known to possess. It is not, therefore, to the casual tourist, who wanders without aim and without object, but to the plodder who, with a *fixed purpose in view*, travels with his chart in his hand, that we are to look for such observations as we can depend upon for our future guidance.

For these reasons it is necessary that every experiment should have, as Sir H. Davy has stated, distinct inquiries in view, or, to use the still more pertinent language of Professor Johnston, "should be designed to ask a question of nature."

Acting upon this impression, the writer, in the present experimental investigations, has not only had an important object in view, but has also endeavoured to ask such questions in such a manner that their answers might be both applicable and trustworthy.

The special object of this inquiry is the *theory of the action* and the *practical application* of bones as a manure for the turnip-crop.

The *importance* of this inquiry needs little illustration. One-third of the whole turnip-crop of England depends upon the action of bones as a manure: and upon the turnip-crop, unquestionably, depends that system of husbandry which has already doubled the amount of beef and mutton, without diminishing the supply of bread and beer, produced in England—the system of alternate cropping. It requires, therefore, but little logic to show that the interest of the farmer individually, and the country at large, is greatly concerned in this subject, and consequently in the matter of our inquiry—the *action* and application of the manure; upon a knowledge of which the proper economy of bones as a fertilizing agent depends.

The *necessity* for the inquiry is not the less evident. Thus, as regards the theory of the action of the manure, our highest authorities only agree on one point, to differ on another; and the part each constituent of the bone plays in the soil is yet a *quæstio vexata*.

On the first use of bone-manure it was imagined that its animal oil and gelatine* were the sole fertilizing ingredients it contained. And this was held on the well-grounded fact that such animal matters, if applied alone, have a powerful effect upon vegetation. However true this might be, it did not authorize such a conclusion; and the accidental use of bones which had been so long exposed to the action of the atmosphere that they had lost their animal oil, threw grave doubts upon the theory. At this stage opinion halted. Bones, however, which had lost a portion of their organic matter by combustion, whether arising from natural decomposition or from the application of artificial heat in the various process of certain manufactures, came gradually into use and favour. In a few years, indeed, the boiled bones of commerce (from which the fat and a large portion of the gelatine had been extracted) were bought in preference to those which still contained the whole of their animal matter. This preference still continues, and has tended to countenance the opposite theory to the one originally held. This theory is that the *inorganic constituents* of bones are the sole manuring substances that have effect upon the crop. As the champion of this theory, Sprengel has instanced the results of his experiments with bones from which the whole of the organic part had been burnt away. These experiments show that the bones had lost in no degree their power of fertilizing. As confirmatory of these trials, experiments made by the writer during the last few years have been instanced,* and so far as regards the fact asserted by Sprengel, that bones burnt so as to lose their animal matter, act equally well with those which still contain it, these experiments certainly do not contradict, but in a degree confirm it—the burnt bones in one instance acting better than the fresh ones, and in another worse. At the same time, however we may grant the facts, we may still doubt the inductive reasoning on which this theory of Sprengel's is founded; and, consequently, on more occasions than one I have endeavoured to show that the conclusion thus come to cannot legitimately be drawn from such premises.† To the details of the objections which have been taken to the theory in question, it is not necessary now to revert. With the same data in view, Professor Johnston has come to a very different conclusion. His theory is that "the whole effect of bones cannot in any case be ascribed exclusively either to one or the other of their principal constituents; and that the organic part performs the most *prominently* and most immediately useful office; but that the earthy part nevertheless affords a ready supply of certain inorganic kinds of food which in many soils the plants would not otherwise easily obtain." This conclusion the Professor places in opposition to Sprengel's, on the ground that the organic part of bone is analogous to horn, hair, wool, &c., valuable fertilizers; that if applied alone, it is known to be a potent fertilizer; that, in fact, the liquid in which bones are boiled in Cheshire and Lancashire, even after the fat has been skimmed off, and when the size (or dissolved gelatine) has become so weak that it will not answer for stiffening, is readily bought up as a manure; and that large bones put about the roots of vines and trees will promote their growth, and yet after the lapse of years these same bones may be dug up nearly unaltered in form or in size—the most striking change being a large loss of organic matter, while the relative proportions of the phosphate and carbonate of lime remain comparatively unaltered.

These facts, it is true, are quite sufficient to disprove the truth of the theory that the organic part is the sole fertilizer in bones, or even that the animal matter is insignificant; at the same time, however, I cannot see that it establishes Professor Johnston's own position—that the animal matter is the main and most immediately beneficial agent. Though we demolish Sprengel's edifice, we cannot destroy the materials of which it is built. Thus we have still before us the fact that 60 per cent. of inorganic matter equals in some cases, and sur-

* It may be well to observe here that bones may be divided into two parts—an organic part which will burn away, and an inorganic part which will not burn away. The organic part consists of *fat, gelatine, and water*, and the inorganic principally of *phosphate of lime*.

The following may be stated as an average of the proportions of each of these constituents in 100 parts of

Animal matter and Water	Oil .. .. .. Gelatine	20 to 45 parts.
Earthy matter	Phosphate of lime	70 to 40 parts.
	Other salts of lime, magnesia, &c.	10 to 15 parts.

* By Mr. Pusey. Royal Agr. Journal, vol. iv. p. 408.

† Vide Royal Agr. Journal, vol. v.

passes in others, 60 parts of the same inorganic matter when combined with 40 of animal matter: and this, it may as justly be asserted, proves that the animal matter is little worth, as the cases cited by Professor Johnston prove that it is most "prominently" valuable. This, it may be said, is an anomalous position. We have facts which prove the very opposite conclusions. The anomaly is, however, more apparent than real. It is not the facts to which we should object, but to the use which has been made of them. Thus, the evidence given by Professor Johnston only shows that the animal matter of bone is a fertilizer, and not that it has the chief and first effect; for it is very well known in practice that 20 stones of horse-hair or other animal matter (which at 40 per cent. is about the weight of the organic part of 16 bushels of bones) applied to the soil under the most favourable circumstances will not have anything like the effect that an ordinary dressing of burnt bones has. The principal effect must, therefore, arise from the action of the earthy part. On the other hand, the evidence which we have of the nearly equal effect arising from burnt and unburnt bones does not prove, as Sprengel holds, that the 40 per cent. animal matter which bones contain is of little or no value (a conclusion which the practical use of the oil, &c., alone would falsify), but that the earthy part acts *more readily* and efficiently when separated from the animal matter. In the case alluded to, therefore, we may conclude that all the 60 parts of phosphates, &c., come into full action when burnt bones are used, and that when fresh bones are employed the 40 parts of animal matter first exercise their influence, and then *a portion* of the phosphates; in which case it is easy to account for the equal results arising from the two applications, without asserting, what every day facts disprove, that the organic part is worthless; the *fact* being that the union of the animal oil with the earthy elements prevents the operation of the latter in as great a degree, in cases where *those earthy matters are required*, as the oil itself does good. This theory, then, which the writer has already advocated, is in consonance with all the facts which have been elicited by his own investigations, or by the advocates of other theories, and reconciles what has too often been set forth as the groundworks of opposite conclusions.

Thus, on the data produced by the supporters of the theories already discussed, it is clearly shown, on the one side, that the animal part, and on the other that the earthy portion of the manure is of value; both, therefore, may undoubtedly be considered fertilizers.

Again, it is also shown that in ordinary cases the animal part disappears before the earthy can act, and hence, in such cases, it must be considered to have the *first* effect upon the crop; it has, however, also been proved that in cases where this matter was removed, as in burnt bones, or even boiled ones, when water was absorbed, the effects of the earthy portion were equally immediate and potent throughout. It may, therefore, be as safely concluded that the earthy part is only secondary in its immediate action when prevented by the manner in which it is applied from being accessible to the young plant. The facts that bones which have been buried are found to lose their animal oil first (*vide* Analysis, Johnson's Lectures, p. 657)—that boiled and burnt bones are found to *begin* their action more immediately than the unburnt—that oil prevents the access of the water and organic acids in the soil from acting upon the earthy portion of the bone—and that finely pulverized bones are more immediate in their influence than bones imperfectly ground, are incontrovertible proofs that it is owing to their union with the animal oil that the phosphates and other earthy constituents of bone can ever be said to be secondary in their influence upon the crop. It is true, indeed, as Professor Johnston states, that there may be soils that do *not require* this earthy part of the bone; so far, however, turnips have very generally exhibited a decided liking for such food upon moist soils. It is, however (allowing the position assumed to be correct), equally probable that other soils may require no further supply of the organic food which is given in the animal matter of the bones.

In the next place, as to the relative value of the organic and inorganic matters, it is shown by the foregoing arguments that the animal part can only be the most valuable when the other cannot act, but that the latter is really and intrinsically the main fertilizer. No other proofs need be recapitulated, but the one well known, that the earthy constituents of 16 bushels of bones have a much greater effect than the same weight of *any animal oil* and gelatine. The general preference awarded by turnip-growers to dry bones, and the trials alluded to, in which burnt bones containing 60 parts of inorganic matter have shown themselves equal to fresh bones containing the same 60 parts of inorganic matter (in an unfavourable state for action), with 40 parts of organic food also, are further illustrations that the earthy part of the bone, if properly applied, is equal in amount of effect to *all* the animal matter and *some* of the earthy (for when fresh bones are applied, plants obtain some portion of the earthy matter), consequently it must be the *more valuable* constituent.

This, then, is the theory of the action of the manure which the facts already brought to bear on the subject, in the writer's opinion, sanction. In a case, however, where so much difference of opinion exists, and especially upon a question of such importance to practical agriculture, fresh facts cannot, as we asserted, but be valuable in order to enable us to agree in those first principles which, it is evident, are yet matters of doubt and dispute.

The necessity for experimental inquiry on this subject is, however, as obvious on the part of *practice* as of theory; for, as it has been well observed, "skilful practice is applied science:" if, therefore, the principles which explain the why and the wherefore of the action of the manure, and which, consequently ought to direct its application, be not laid down and clearly defined, how is it possible that its proper economy can be understood or observed? On the contrary, Practice, under such circumstances, must stumble on in the dark; its course, therefore, cannot be uniform; but even should it be correct in any one particular—should Chance cause any one to

"stumble on the plan
Eyes philosophic failed to scan."—

with no other reason to urge in its favour but our own absolute dictum, or individual practice, it cannot be considered worthy of acceptation or become generally adopted. The *experience* of past years illustrates this. Thus, although bones have now been used generally for many years, we can scarcely meet with two farmers who are agreed on each particular connected with their use, or who adopt a similar practice, as regards either the sort, quantity, or condition of the bones. Still more seldom do we find any who can give a reason for the preference which they may have. In fact, common practice varies essentially in different localities on these and other points connected with their use as manure. Another reason for further experimental inquiry on the subject has lately arisen. Thus, acting on the knowledge that the earthy constituents of bones are found in the structure of the turnip, and on the theory already adverted to—that they are highly essential to its vigorous growth—it has been suggested, that if they were dissolved in weak acid, the particles of the bone would be in a state more accessible to the roots of the plant; and that, as the whole quantity of these substances required during an ordinary course of cropping are contained in less than two bushels of bones, the vegetable would be able to obtain all the food of this description that it required from a much less quantity of bones than is now used. The facts which we have already urged in support of the opinion that fresh bones yield their phosphates more slowly than those which contain no animal matter, owing to the preservative effect which the latter has upon the structure of the bone, render this suggestion still more worthy of attention, as, setting aside the saving in quantity already noticed, it promises us a means of counteracting this tendency without destroying the animal manure in the bone by the action of fire. The action, too, of an acid is a much more effective means of causing a disintegration of the bone than either fire or any mechanical agency—both of which have been proved to promote the action of the manure upon the first crop: and this, be it observed, is all that we need look for from a hand-tillage which produces a green crop, as that crop itself makes manure for the ensuing grain-crop; and if this be not sufficient, we had better have the money in the pocket to buy more hand-tillage with at the time when it is wanted, than put more with the former green crop than that crop actually required.

To enter fully into the claims to our attention which this suggested practice offers, is, however, unnecessary. These have already been fully discussed in the pages of the Royal Agricultural Journal. Experiment, too, has in an extraordinary manner confirmed them. The results of my own former trials, communicated to the Highland Agricultural Society, of those made by the Duke of Richmond, the Morayshire Farmers' Club, and others, have already been made known through the same medium ("Royal Agricultural Journal," vol. v.); and they are such as, while they give great promise that the claims which theory has in this case put forth will be made good, demand further inquiry. And this not merely that the general truth of a theory which promises so much, and has already *performed something*, may be set beyond dispute—as we take it that the facts already proved are pretty conclusive as to the general truth of the advantages claimed for the system—but that all the peculiarities in effect and particulars of the preparation and application of so novel and economical a fertilising agent may be made known, and any difficulties or inconvenience which might retard its general adoption be the more speedily removed.

Such, then, is the necessity which both theory and practice have for further inquiry into the action of bone manure; and to this necessity is to be ascribed these and other investigations on the same subject which the writer has, within the last few years, undertaken. In the present case, however, he has made repeated trials, the results of which he has previously ascertained and published. As truth, however, cannot be too frequently confirmed, or error too speedily exposed, and as, in fact, comparative results can only be obtained under perfectly similar circumstances, he has done so in order to make the objects and results of his present inquiry the more comprehensive and valuable. And it has been a matter of hope with him that the experience of past labours might enable him to collect information fitted for inductive reasoning, and for building our precept and practice upon.

With what success he has laboured will be seen from the following particulars of the *objects*, *method*, and *results* of his inquiry.

I.—The Objects of Inquiry.

On the theory of the action of bones, our object is to ascertain—

1. What is the action of the earthy or inorganic part of bones as a manure?
2. What that of the organic part?
3. Is the united action of the organic and inorganic constituents of bone equal to the total action of both when applied separately?
4. If not, is the circumstance owing to the non-fertilising influence of one, or to the diminished action of the other?
5. Can their united action be promoted?
6. By what means?
7. Will sulphuric or muriatic acid answer the purpose?
8. If so, what part of the action of the mixture is to be attributed to the direct influence of the acid as a manure, and what to the increased action of the bone?

On the practical application of bones as a manure for the turnip-crop, it is intended to ask—

1. What are the peculiarities of the action of fresh bones? what of boiled bones? what of burnt bones?
2. What sort of bones should the turnip-grower use?
3. Is it economical to boil or burn bones before using them?
4. In what state of division should bones in their natural state be used?
5. What is the comparative effect of bones in their natural state, and bones dissolved in acid?

6. What are the peculiarities in effect arising from the use of dissolved bones?

7. What sort of bones are best adapted for use in a dissolved state?

8. What quantity of such bones is it best to apply?

9. What sort of acid should be used?

10. What proportion should the weight of the acid bear to that of the bones used?

11. What proportion of water should be added to the mixture before application?

12. What effect has the acid itself as a manure?

13. What are the general advantages of the solution of bones as a manure?

14. Is there any other feature connected with the preparation or application of the solution which the present trials suggest as worthy of our notice?

II.—Method of Inquiry.

The soil selected for the experiment was a deep sandy loam upon a gravelly subsoil, perfectly dry, free from wood, level, and exposed on all sides. Having had a crop of wheat during the previous year upon clover stubble, depastured in the autumn, the field was properly fallowed and cleaned.

In the middle of the field a patch of two acres was next staked out, and subdivided into 20 plots, each containing one-tenth of an acre. These were set out in ridges, at 24 inches' distance from each other, and drilled upon the ridge with Matson's white globe turnip-seed on the 1st of July, 1844.

The various manures fixed upon for trial were applied in the *quantities* and *order* shown in the subjoined chart of the particulars of the experiment.

CHART of the Particulars of an Experiment with Bones as a Manure upon the Turnip Crop, 1844.
Size of the Plots, 1-10th of an Acre.

No. 1. Fresh bones crushed (mixed dust and rough). Weight, 4st. $11\frac{1}{5}$lbs.	No. 2. Fresh bones (same as No. 1). Weight, 4st. $11\frac{1}{5}$lbs. Boiled 3 hours, so as to extract the oil without dissolving the gelatine, and then dried so as to drive out the water absorbed by the bones during the process. Weight after boiling, 4st.	No. 3. Fresh bones (same as No. 1). Weight, 4st. $11\frac{1}{5}$lbs. Burnt to whiteness, so as to completely destroy the animal matter of the bone (both oil and gelatine). Weight after burning, 2st. 9lbs.	No. 4. Bones (No. 1). fine dust; 4st. $11\frac{1}{5}$lbs.	No. 5. Bones(No. 1)rough half-inch, the fine dust having been sieved out. 4st. $11\frac{1}{5}$lbs.
No. 6. Bones (No. 1) crushed. 2st. $5\frac{3}{5}$lbs. Dissolved in half their weight of sulphuric acid. $16\frac{4}{5}$lbs. Applied with water, 168 gallons, or 100 times the weight of the acid.	No. 7. Bones(No.1)crushed, 2st. $5\frac{3}{5}$lbs. Boiled to 2st. Dissolved in sulphuric acid, $16\frac{4}{5}$lbs. Applied with 168 gallons of water, or 100 fold the weight of the acid.	No. 8. Bones(No.1)crushed, 2st. $5\frac{3}{5}$lbs. Burnt to 1st. $4\frac{1}{2}$lbs. Dissolved in sulphuric acid. $16\frac{4}{5}$lbs. Applied with 168 gallons of water, or 100 fold the weight of the acid.	No. 9. Bones(No. 1)crushed, 1st. $2\frac{4}{5}$lbs. Dissolved in half their weight of sulphuric acid. $8\frac{2}{5}$lbs. Applied with 84 gallons of water, or 100 fold the weight of acid, same as No. 6.	No. 10. Bones (No. 1) crushed. $8\frac{2}{5}$lbs. Dissolved in half their weight of sulphuric acid. $4\frac{1}{5}$lbs. Applied with 42 gallons of water, or 100 fold the weight of acid.
No. 11. Bones (No. 1). 2st. $5\frac{3}{5}$lbs. Dissolved in one-third their weight of sulphuric acid, viz., $11\frac{1}{5}$lbs. Applied with water, 112 gallons, or 100 times the weight of the acid.	No. 12. Bones (No. 1). 2st. $5\frac{3}{5}$lbs. Dissolved in one-fourth their weight of sulphuric acid, viz., $8\frac{2}{5}$lbs. Applied with water, 84 gallons, or 100 times the weight of the acid.	No. 13. Bones (No. 1). 2st. $5\frac{3}{5}$lbs. Dissolved in half their weight of sulphuric acid, viz., $16\frac{4}{5}$lbs. Applied with water, 84 gallons, or 50 times the weight of the acid.	No. 14. Bones (No. 1). 2st. 5_{3}lbs. Dissolved in half their weight of sulphuric acid, viz., $16\frac{4}{5}$lbs. Applied with water, 42 gallons, or 25 times the weight of the acid.	No. 15. Bones (No. 1). 2st. $5\frac{3}{5}$lbs. Dissolved in half their weight of muriatic acid, viz., $16\frac{4}{5}$lbs. Applied with water, 168 gallons, or 100 times the weight of acid.

No. 16. Bones (No. 1). 1st. $2\frac{4}{5}$lbs.	No. 17. Bones (No. 1). $8\frac{2}{5}$lbs.	No. 18. Sulphuric acid, $16\frac{4}{5}$lbs.	No. 19. Muriatic acid, $16\frac{4}{5}$lbs.	No. 20. No manure applied.
Dissolved in half their weight of muriatic acid, $8\frac{2}{5}$lbs. Applied with water, 84 gallons, or 100 times the weight of the acid.	Dissolved in half their weight of muriatic acid, $4\frac{1}{5}$lbs. Applied with water, 42 gallons, or 100 times the weight of acid.	Applied with water, 168 gallons, or 100 times the weight of acid.	Applied with water, 168 gallons, or 100 times the weight of the acid.	

N.B.—The whole of the bones used in this experiment were originally from the same stock. Thus

No. 1, fresh bones, crushed, are the bones in the state they left the mill.

No. 2 are the same boiled, so as to lose their oil; which amounted, as will be seen by reference to the loss of weight by the operation, to about $16\frac{2}{3}$ per cent.

No. 3 are the same bones as No. 1, *burnt*, so as to waste all the organic parts, both oil and gelatine. The loss by burning was about 45 per cent.

No. 4 are the same bones more highly pulverized, so much so indeed as to pass a sieve.

No. 5 are the same bones merely broken into pieces from one-tenth to a quarter of an inch in length. They were obtained by separating the fine dust of No. 1 from the larger particles.

Nos. 6, 9, 10, 11, 12, 13, 14, 15, and 16, are the same bones as No. 1, in the crushed state, but applied along with various other substances.

No. 7, these bones are from the same as No. 1, but boiled, &c., like No. 2.

No. 8, same bones as are used on No. 3.

From the above it will be seen that the bones employed contain about—

55 parts inorganic or earthy matter

45 parts organic { viz. $29\frac{1}{3}$ gelatine / $16\frac{2}{3}$ oil } or animal matter.

The sulphuric acid was diluted with twice its weight of water before it was mixed with bones; and similarly the muriatic.

The dissolved bones were prepared as follows:—After being very well pulverized, they were put into separate wooden vessels (*i. e.*, the quantity for each plot), containing diluted acid. After standing ten days, the proper quantity of water for diffusion was added, and they were immediately applied.

The liquid applications were made by spreading the fluid in the bottom of the ridges, and afterwards ploughing the ridges up; so that the seed was drilled upon the top and immediately over the manure, as is usually practised when farm dung is used.

The bones, in their ordinary states, were drilled along with the seed on the top of the ridges.

The following prices were paid for the various manures:—

Crushed fresh bones, 20s. per qr., or 10d. per stone.

Sulphuric acid $1\frac{1}{4}$d. per lb.

Muriatic acid, $1\frac{1}{2}$d. per lb.

From the foregoing, the following particulars of the applications, *per imperial acre*, are derived:—

No.	Sort of Manure.	Quantity of Bones per acre.				Quantity of Acid.	Quantity of Water
		bush.		st.	lbs.	st.	gallons.
1.	Fresh bones, crushed	16	or	48	0		
2.	Ditto, *boiled*	16	..	40	0		
3.	Ditto, *burnt*	16	..	26	6		
4.	Ditto, finely pulverized	16	..	48	0		
5.	Ditto, rough	16	..	48	0		
6.	Ditto (No. 1.), crushed and dissolved in sulphuric acid	8	..	24	0	12	1680
7.	Ditto, boiled and ditto	8	..	20	0	12	1680
8.	Ditto, burnt and ditto	8	..	13	3	12	1680
9.	Ditto (No. 1.), dissolved in sulphuric acid.	4	..	12	0	6	840
10.	Ditto ditto	2	..	6	0	3	420
11.	Ditto ditto	8	..	24	0	8	1120
12.	Ditto ditto	8	..	24	0	6	840
13.	Ditto ditto	8	..	24	0	12	840
14.	Ditto ditto	8	..	24	0	12	420
15.	Ditto muriatic acid	8	..	24	0	12	1680
16.	Ditto ditto	4	..	12	0	6	840
17.	Ditto ditto	2	..	6	0	3	420
18.	Sulphuric acid.		..			12	1680
19.	Muriatic acid		..			12	1680
20.			......			..	..

III.—Results of the Inquiry.

1. The first result evinced was the decided start which the whole of the dissolved bones took from the very first appearance of the plants.

2. The various plots with dissolved bones came into rough leaf sooner by eight days than the other plots.

3. No. 10 (two bushels per acre dissolved bones) did not move quite so quickly into rough leaf as Nos. 6 and 9 (eight bushels and four bushels, respectively.)

4. No. 12 (eight bushels, with only one-fourth part acid) also did not start so well as Nos. 6 and 11 (respectively half and one third part acid sulphuric).

5. Nos. 13 and 14 were also a shade behind the best in their first start; these (Nos. 13 and 14) having only half and one fourth the usual quantity of water applied.

6. Nos. 17, 18, and 19 (bones in various proportions, with muriatic acid) did not start quite so quickly as the same quantities of bones in the sulphuric acid (Nos. 6, 9, and 10); there was, however, but a shade of difference.

7. *Of bones in their ordinary conditions.* No. 3 (burnt) took the start; No. 2 (boiled) and No. 4 (fine dust) being next; No. 1, third; and No. 5 decidedly behind the whole.

8. The plots upon which acids *only* were used were much behind; both Nos. 18 and 19 being no better than 20, which was left unmanured.

9. On the 1st of August the positions of the various plots, so far as regards quick growth, were as mentioned in the foregoing notes—the only other peculiarities observable being that all the plots where the liquid bone mixtures had been used were quite fit for hoeing, and had suffered scarcely anything from the fly; while the other portions, with ordinary bones, were still 10 days behind, and had been more seriously attacked. The unmanured plot (20), and also Nos. 18 and 19 (sulphuric acid and muriatic acid), were at this time scarcely to be called plants; indeed, they were not one-fourth the size of the plants on No. 6, &c.

10. On the 1st of October the whole of the lots were again examined, and their peculiarities noted. The changes were as follows:

Of the *bones in their ordinary* states, No. 4 (fine dust) was now about the best, and No. 5 (rough bones) the worst; No. 3 (burnt), which took the lead at first, having lost ground slightly. At this time, however, the plots might be said to be very even, with the exception of No. 5 (rough bones).

Dissolved bones.—Under this head all looked extremely flourishing, showing a very early tendency to form bulbs.

In the first section (with eight bushels of *different sorts* of bones dissolved), No. 6 (fresh bones) seemed the best; Nos. 7 and 8 not having quite such large leaves, though all were marked in first class, and still continued in advance of the other plots—Nos. 1, 2, 3, 4, and 5.

In the section with *various quantities* of bones dissolved, No. 10 was still backward; No. 9 (four bushels per acre) being very nearly up with the best.

Nos. 11 and 12 (having respectively one-third and one-fourth weight of acid to that of the bone) have improved; they were now equal to the lots where the acid was in larger proportion. They are put in first rank.

Nos. 13 and 14 (with half and one-fourth the usual weight of water, *i. e.* with fifty and twenty-five fold the weight of the acid) had also made equal progress, and were marked "first rank."

The muriatic acid, Nos. 15, 16, and 17, had also come up fully to the very front rank, having quite as fine bulbs as No. 6, &c., and, if anything, a darker leaf. They were now marked with the first rank, and were twice as heavy as Nos. 1, 2, &c., with ordinary bone.

Nos. 18, 19, and 20 were all miserably bad.

Beyond these peculiarities, which were noted at the time, no particular variation was observed; the dissolved bones manifesting their superiority to the end of the season, and being ready for use a month before the rest.

The whole of the experimental plot was hoed by one person, and the land between the ridges regularly cleaned with the scuffler.

On the 30th of January, 1845, the turnips were topped and tailed, and the gross weight of the produce of each plot ascertained; the following being the results:—

No.	st.	lbs.	
1.	162	12	Per One-tenth of an Acre.
2.	152	2	....
3.	150	0	....
3.	150	0	....
4.	171	6	....
5.	124	4	....
6.	257	2	....
7.	229	4	....
8.	227	2	....
9.	201	6	....
10.	154	4	....
11.	242	2	....
12.	220	10	....
13.	257	2	....
14.	231	6	....
15.	248	8	....
16.	233	8	....
17.	188	8	....
18.	93	3	....
19.	92	2	....
20.	90	0	....

Annexed is a tabular statement of the particulars of the various applications, and of their peculiar and final results upon the crop, calculated on the scale of an imperial acre.

TABULAR SUMMARY of the Details and Results, per Imperial Acre,

Section of the Experiment.	PARTICULARS OF THE MANURES			
	—	Weight of Bones.	—	Weight of Acids.
		st. lbs.		st.
Nos. 1, 2, and 3. With various sorts of bone............	1. Fresh bones, crushed, dust and rough mixed, 16 bush.	48 0	......	..
	2. Ditto, ditto, boiled and dried..	40 0	......	..
	3. Ditto, ditto, burnt to whiteness	26 6	......	..
Nos. 1, 4, and 5. With bones in different states of division	4. Ditto, ditto, fine dust	48 0	......	..
	5. Ditto, ditto, rough	48 0	......	..
Nos. 6, 7, and 8. With various sorts of bones dissolved ..	6. Ditto, ditto, dust and rough mixed, 8 bush.	24 0	Dissolved in half their weight of sulphuric acid.	12
	7. Ditto, ditto, boiled, &c., to....	20 0	ditto	12
	8. Ditto, ditto, burnt, &c., to....	13 3	ditto	12
Nos. 6, 9, and 10. With different quantities of bones dissolved	9. Ditto, ditto, 4 bushels	12 0	ditto	6
	10. Ditto, ditto, 2 ditto	6 0	ditto..........	3
Nos. 6, 11, and 12. With bones dissolved in different proportions of acid	11. Ditto, ditto, 8 ditto	24 0	Dissolved in one-third their weight of sulphuric acid.	8
	12. Ditto, ditto, ditto	24 0	Ditto in one-fourth ditto...........	6
Nos. 6, 13, and 14. With bones dissolved and applied with different proportions of water	13. Ditto, ditto, ditto	24 0	Ditto in half ditto ..	12
	14. Ditto, ditto, ditto..........	24 0	ditto	12
Nos. 6 and 15. Bones with different acids	15. Ditto, ditto, ditto..........	24 0	Ditto in half their weight of muriatic acid.	12
Nos. 15, 16, and 17. With bones in various quantities, in muriatic acid	16. Ditto, ditto, 4 bushels	12 0	ditto.........	6
	17. Ditto, ditto, 2 ditto	0	ditto..........	3
Nos. 18, 19, and 20. With different acids alone, and no manure...........	18. ..	..	Sulphuric acid	12
	19. ..	..	Muriatic ditto......	12
	20. No manure	..	......	..

of an Experiment on the Action and Application of Bones as a Manure.

EMPLOYED.		RESULTS.										
—	Quantity of Water.	Cost of the Manure applied.			Appearance on the 1st of August. — 1° represents the highest merit; 4°, the lowest do.	Appearance on the 1st of October. — 1° represents the highest merit; 4° the lowest do.	Weight on the 30th Jan., 1845.				No. of Plot.
	Galls.	£	s.	d.			T.	cwt.	st.	lbs.	
....	..	2	0	0	$2\frac{1}{2}$°. Ten days behind 1°, and look only moderately; fly has plagued them.	2°. Medium crop; has improved.	10	3	4	8	1
....	..	2	0	0	$2\frac{1}{4}$°. Shade better than the above.	2°. Ditto; has lost ground.	9	10	1	6	2
....	..	2	0	0	2°. These have made best start of any of the undissolved lots.	2°. Made a good start, but has not continued quite as it promised.	9	7	4	0	3
....	..	2	0	0	$2\frac{1}{4}$°. Nearly equal to 2°..	2°. Has grown pretty evenly from the first.	10	14	2	4	4
....	..	2	0	0	3°. Decidedly worst of the undissolved lots.	3°. Still behind the above.	7	15	2	12	5
and water equal to 100 fold the weight of the acid	1680	1	19	6	1°. These look extremely well; seem to have grown twice as fast as the section above; are quite ready for hoeing. They are more than twice the size of plants marked 2°, &c. They have outgrown the attacks of fly.	Will be a good fair crop; they still keep in advance of 2° and 3° greatly. Leaf is much broader, and they now are forming bulbs better than the other.	16	1	3	6	6
ditto	1680	1	19	6	1°.	1°.	14	6	4	12	7
ditto	1680	1	19	6	1°.	1°.	14	3	7	6	8
ditto	840	0	19	9	1°.	$1\frac{1}{4}$°. Has not quite maintained its place.	12	11	6	4	9
ditto	420	0	9	$10\frac{1}{2}$	$1\frac{1}{2}$°. A shade less in size of leaf than 1°.	2°. These have not kept their lead.	9	12	6	12	10
ditto	1120	1	13	0	1°. Same as rest marked 1°.	1°. Same as rest of lots 1°. Have improved their position lately.	15	2	5	6	11
ditto	840	1	9	9	$1\frac{1}{4}$°. Shade inferior to 1°.	1°.	13	15	7	2	12
in 50 fold water	840	1	19	6	$1\frac{1}{4}$°. Ditto	1°.	16	1	3	6	13
in 25 ditto..	420	1	19	6	$1\frac{1}{2}$°. Ditto	1°.	14	9	2	4	14
in 100 ditto..	1680	2	1	0	$1\frac{1}{2}$°. These not quite so large in the leaf as 1, but are equally blooming; are full 10 days in advance of 2, &c.	1°. Very blooming; leaves now equally large with other plots, 1°. Colour slightly darker. Bulbs forming well; nearly twice as heavy as 2° in bulb.	15	10	5	10	15
ditto	840	1	0	6	$1\frac{1}{2}$°.	1°.	14	11	7	10	16
ditto	420	0	10	3	$1\frac{1}{2}$°.	1°.	11	15	5	10	17
ditto	1680	0	19	6	4°. Very bad. Some plants can scarcely be seen; the fly has severely punctured them.	4°. Very bad. Have scarcely made anything like a broad leaf or bulb.	5	16	4	2	18
ditto	1680	1	1	0	4°.	4°.	5	15	1	6	19
....	..		..		4°.	4°.	5	12	4	0	20

By comparing the results in this summary, and the peculiar circumstances connected therewith, with each other, we obtain the following answers to the questions which it was our "object" to elucidate :—

On the Theory of the Action of Bone Manure we learn—

1. That the inorganic part of bones is the most valuable fertilizing constituent.

In proof of this, we find that No. 3 (48 st. of bones reduced by burning to 26st. 6lbs.) gives a produce of 9 tons 7 cwt. 4st.; while No. 1 (fresh bones, 48st.) only gives 10 tons 3 cwt. and 4st. per acre. Now, as it is well known that the animal oil must first leave the bone, must first be extracted by the plant, before the earthy part can decompose and be taken up by the roots, it is evident that in No. 1 the turnip has the use of *all the animal*, and *some* of the *earthy*, part. In No. 3 the plant has the benefit of the earthy part only; and yet the difference in result is trifling. It is, therefore, evident that the earthy part alone is superior to the animal part alone.

Again, compare the results of Nos. 6 and 8, where the bones are dissolved, and both portions can have free action (for it will be evident that in No. 1 the earthy part has not been as ready for use as in No. 3, or it would, assisted by the animal matter, have greatly excelled No. 3 in effect). In this comparison we find that

No. 6. (8 bushels of *fresh* bones dissolved in sulphuric acid) gives 16 tons 1 cwt. 3st. per acre.

No. 8. (8 bushels of fresh bones *burnt* and *dissolved in sulphuric acid*) gives 14 tons 3 cwt. 7st. per acre.

Showing a difference in favour of the fresh bones of less than 2 tons.

This, therefore, is the *extra produce* arising from the animal matter of the bone, and 14 tons 3 cwt., &c., is the effect of the earthy portion; for the only difference in the two applications is that No. 6 contains 45 per cent. of oil and gelatine, while No. 8 contains none. This conclusion is in accordance with the facts already stated, that the amount of animal oil contained in bone could not possibly produce an effect equal to that which has been shown to arise from the earthy part alone in several cases (*vide* my "Prize Essay on the Use of Hand-tillages," Longman and Co.; and "Prize Report on the Effects of *Special Manures*," Transactions of the Royal Highland and Agricultural Society of Scotland, March, 1844). In this case, then, the increase arising from the 45 per cent. of organic matter (water, oil, and gelatine) is about 1 ton 17 cwt. per acre, while that arising from the earthy part is about 8 tons 11 cwt. per acre. This last result is obtained by subtracting the produce of the soil *without manure* (No. 20)—viz., 5 tons 12 cwt. per acre, from that of No. 7 (burnt bones dissolved). It will also be observed that none of this effect arises from the action of the acid as a manure of itself; for though it promotes the action of the bone, it has no effect of consequence if applied alone (*vide* Nos. 18 and 19).

2. That the organic part of bones has also a very beneficial effect upon the crop.

The remarks under the foregoing conclusions will illustrate this. In all cases where it is applied in addition to the earthy part, it will be seen that it has encouraged vegetation. Thus compare No. 1 with No. 3, and No. 6 with No. 8. It should also be observed, that its total action is greater than the difference between No. 1 and No. 3 shows; because, as will be shown, the phosphates, &c., in No. 1 do not act so fully as in No. 3. The effect, therefore, of the animal matter is not clearly shown by a comparison of No. 6 and No. 8. It will be observed, too, that one part of the animal matter, the gelatine, has also a visible effect in the cases where boiled bones are used.

3. That the action of the organic and inorganic parts of bone applied in natural union, is not equivalent to the total of their separate fertilizing capabilities.

In proof of this, it will be seen, by reference to the "Summary of Results," that any means of separating or reducing the particles of the bone, so as to make their separation more easy in the soil, greatly increases the effect arising from the manure. This increase of effect arises, therefore, from the increased action of their materials. In ordinary cases, therefore, we may conclude that they do not act up to their real capability. For example of this, note the greater efficacy attained by pulverizing or by dissolving the bones before using, compared with the inferior action of bones in a rough state. The increased effect of the bones dissolved *is threefold*, as one-fourth the quantity used generally here answers as well as the larger quantity. And as the *acid* has *no effect* as a manure, the effect from the bones is trebled: in their ordinary condition they therefore *only act partially*, or that action could not be increased.

5. That this circumstance is not owing to one of the matters having a non-fertilizing influence, but to the action of the earthy part being *retarded*, and consequently for that crop *lessened*, by its union with the animal oil, &c., of the bone.

The first part of this position has already been proved—both the animal and earthy matter having been shown to be manures. That the animal oil retards the action of the other portion is shown by the circumstances that the dissolution of the union of the two parts by an acid promotes both the *immediate* and total *action* of the manure; that the pulverization of the bone, and the consequent more free admission of water and the acids of the soil, produce improved results (compare Nos. 4 and 5); and that by taking away the animal matter totally (as in No. 3), or partially (as in No. 2), the immediate action of the earthy part is encouraged (See appearance of crop, 1st August). In every case it will be seen, by reference to the "Summary of Results," &c., that where the union of the two is least meddled with, the action of the bone is slowest; for instance, No, 5 (bones in the rough state) (½ inch) give throughout worse results than bones in any other form. That this is owing to the slow yield of phosphate, &c., the other cases show. This result is in perfect conformity to the well ascertained facts alluded to in the introductory part of this paper—that oil has a preservative effect upon the bone, and that (*vide* Analysis, Johnston's Lectures, p. 657) it must escape before the earthy part can be separated and made use of.

6 and 7. That this injurious influence may be counteracted, and the united action of the two main constituents promoted for the present crop by reducing the bones to as fine a state of division as possible.

The *fact* here stated is proved by a glance at the comparative results of the bones in different states of division, No. 1 (crushed), No. 4 (pulverized), and No. 5 (½ inch rough), the results from which are respectively 10 tons 3 cwt., 10 tons 14 cwt., and 7 tons 15 cwt. The *rationale* of this effect has already been explained.

8. That either sulphuric or muriatic acid may be employed with extraordinary success as a means of facilitating the action of the constituents of the bone.

A reference to the results will best explain this extraordinary success of the application—success so great, that one-fourth the quantity of bones usually employed have an effect, if applied in the manner proposed, equal to that of the most liberal application.

On the Practical Application of Bones as a manure for the turnip crop, we learn—

1. That the total benefit to the crop arising from fresh bones, in a *favourable state for application*, is greater than from the same quantity of bones from which the animal matter has been extracted: that boiled bones (that is, the same quantity of the fresh bones reduced to a less weight by boiling) are a little quicker in their influence; and that the same weight of fresh bones, reduced by burning to a still less weight, are more immediate in their operation, but fail slightly in their later effects.

A glance at the particulars in the summary will show this. The cause has been shown in the theoretical results deduced. The fresh bones must, however, be in a fine state of division, to be in the "*favourable state*" alluded to (*Vide* No. 4).

2. That the turnip grower should use dry bones, *i.e.* boiled or burnt bones, or any other from which the animal matter has partly escaped, when he purchases *by weight*, as he will in that case get more of the earthy matter of bone (which has been already proved to be the most valuable portion) than he will in the same weight of fresh ones; but when he purchases by *measure*, it will be to his advantage to buy fresh ones, as he will get a large per centage of animal matter in addition to their earthy constituents, without and equivalent or proportionate increase of bulk.

Forty-eight stones of fresh bones are reduced by burning to 26st. 6lbs., and yet they nearly equal 48st. of fresh bones in total effect: 48st. of *burnt* or dry bones would therefore undoubtedly greatly surpass the same weight of fresh ones. That it would be more advantageous to have any *given weight* of the earthy part of bones in preference to the same weight of the animal and the earthy parts combined is clear for two reasons; because the action of the inorganic is superior to that of the organic alone, and because the united action of both is not equal to their total separate effects: both of which positions have been proved. As to the next point, if we buy *by measure*, we may as well have the animal matter in the bone (it being a fertilizer), because if it be taken out, the bulk of the bones is not diminished in proportion to the weight taken out. Thus 40 per cent. organic matter taken from a quarter of bones will not cause them to measure 40 per cent. less.

3. That it is not judicious economy to boil or burn bones before using them, in order to improve their effects, because by so doing we *totally destroy* the organic part of the manure: and though we may, perhaps, promote their immediate action, we do not gain anything in the total effects arising from the application.

What has already been stated, in conjunction with the results also quoted, fully illustrates this conclusion.

4. That instead of burning bones to accelerate their action, we should (if we have fresh bones to use) pulverize them as finely as possible, in order to counteract the tendency which it has already been proved that the animal part has to prevent the earthy part from coming into action: as by such operation we reduce the particles of the bone, fermentation and decomposition speedily ensue, the oil is more easily washed out of the small particles, water and the acids of the soil take its place, and the inorganic constituents are, therefore, soon made fit for assimilation by the plant.

For facts in support of our position compare Nos. 4 and 5. The theory of the cause of the improved action of No. 4. has been sufficiently discussed. I beg to note, however, the perfect coincidence in result of this trial between No. 4 and No. 5, with those obtained from similar applications last year, the particulars of which trial may be found in my Report on Special Manures (Prize Essays of the Highland Agricultural Society, March, 1844).

5. That bones dissolved in acid have a much greater and readier fertilizing influence than any sort of bones not so prepared.

The first and final effects of both sorts may be seen by comparing the results of the applications Nos. 1, 6, 9, and 14. Thus—

No. 1.—16 bush. bones give 10 tons 3 cwt. 4st. 8lb. per acre.
6.— 8 ,, dissolved give 16 tons 1 cwt. 3st. 6 lb. per acre.
9.— 4 ,, dissolved give 12 tons 11 cwt. 6st. 4 lb. per acre.
16.— 4 ,, dissolved give 14 tons 11 cwt. 7 st. per acre.

Nos. 6, 9, and 14, too, it will be observed, also took the lead from the commencement.

6. That the peculiar effects arising from the application of dissolved bones are not merely an augmented crop at a decreased cost in manure, but a crop showing an abundant, healthy, and extraordinarily quick-growing young plant, a decided tendency to form bulbs at a much earlier period than common, and less liability to damage from the enemies which usually attack the turnip in the early period of its growth.

It will be observed that there was a gain, in the growth of the dissolved plots, of ten days in the first month. It may be added, that there was a gain of a month at the end—the dissolved portions being ready for use several weeks before any other.

7. That all sorts of bones are well adapted for use in this manner; but that it is a bad economy to burn or boil the bones in order to prepare them, as we waste a valuable manure in the organic matter, and the total effect arising from such will not be the same that it would had they not been subject to a process which materially reduces the weight of manure applied. If, however, bones are to be bought for this purpose, the same rule will hold that we have laid down before, as regards bones in their ordinary state. Thus, if we buy *by measure*, it will be advisable to have the animal matter *in the* bone, as it does not materially augment the bulk of the bone; but if we buy *by weight*, we cannot have over little of the animal part, as the earthy is comparatively the more valuable; and when we pay by weight, we cannot have too great a proportion of the best material.

All the sorts of bone are augmented in their action by being dissolved (*vide* Nos. 6, 7, and 8). The animal part in No. 6, it will be seen, has some effect, and therefore it should never be *wasted*, as the action of the acid removes the influence it possesses in ordinary cases over the action of the earthy part. In No. 6 it will be seen that there is 10st. 8lbs. more matter of the bone applied than in No 8; this 10st. 8lbs. being the amount of the animal substance in the 24st. of bones applied. If now No. 8, instead of 13st. 6lbs., had had 24st. of the earthy part of bone (*i.e.* 10st. 8lbs. extra), it would, no doubt, have equalled and perhaps surpassed in results No. 6. which had 13st. 6lbs. of the earthy and 10st. 8lbs. of the animal parts of bones applied; as, under present circumstances, there is not a great difference in the weight of the crop produced. If, therefore, we can buy by weight the dry earthy parts of bone for this purpose, we had better have it than the same price for the animal matter which is in fresh ones, when it has been proved that that part is not equal to the other in relative value.

8. That 2 bushels of bones per acre will actually produce as good results as 16 bushels of bones in their ordinary state in some cases; that 8 bushels of bones dissolved will greatly surpass 16 bushels of bones in any other manner; and that 4 or 6 bushels per acre is a fair quantity to apply in the state of solution—the results being greatly superior to those from fourfold the same quantity of bones applied in the usual manner, and the cost of the application less in proportion to the amount of effect produced (evidenced by the weight of the crop) than that of any other quantity.

For results from 2 bushels of bones dissolved compare No. 10 (9 tons 12 cwt.) and No. 17 (11 tons 15 cwt.) with the results of 16 bushels of crushed bones, No. 1 (10 tons 3 cwt.)

For results from 8 bushels of bones dissolved compare No. 6 and 15 with No. 1.

Nos. 7 and 16 (each 4 bushels of dissolved bones per acre) give respectively—

14 tons 6 cwt. 4st. at a cost of 19s. 6d. per acre.
14 tons 11 cwt. 7st. „ 20s. 6d. „
And No. 1 (crushed bones, 16 bushels per acre)—
10 tons 3 cwt. 4st. at a cost of 40s. 0d. per acre.

9. That either sulphuric or muriatic acid may be used with success in disolving bones.

Although a slight difference may be traced between the visible effects of the solutions made with different acids, the final results show no decided difference in favour of either. The cost and convenience is the criterion.

10. That though one-half the weight of the bone is the proportion of acid that has been generally used hitherto, one-third of the weight of the bones to be applied per acre will answer extremely well; and that even one-fourth the weight of the bone may, if occasion demands it, be used with success.

This is an important point in the economy of the manure, as it affects the cost materially. That our conclusion is warranted, see the following results:—

No. 6.—8 bush. bones (24 st.) and 12st. of acid cost £1 19s. 6d., and gave 16 tons 1 cwt. 3st. per acre.
11.—Ditto (24st.) and 8st. of acid cost £1 13s., and gave 15 tons 2 cwt. 5st. per acre.
12.—Ditto (24st.) and 6st. of acid cost £1 9s. 9d., and gave 13 tons 15 cwt. 7st. per acre.
While No. 1., 16 bushels of bones in an ordinary state cost £2., and gave 10 tons 3 cwt. 4st. per acre.

11. That though the bones have usually been mixed in water to the amount of 100 times the weight of the acid, one-half that quantity will answer equally well; and that even one-fourth the ordinary quantity, or 25 times the weight of the acid, will serve the purpose required very efficiently.

This fact is one which will be of great use. One of the main practical difficulties to contend with in the application of dissolved bones was the large quantity of water which was considered necessary.

These results, however, show that 4 bushels of bones (or 12st.), 6st. of acid, and 300st. of water (at 50 fold) = 420 gallons per acre, will suffice, or at 25 fold, 210 gallons will serve.

While upon this question, it will not be improper to state, that the objection to the liquid form of application may be done away with by using the manure in the compost form, as practised by Mr. Tennant Ayr, and detailed in the *addition* to my paper on *Sulphuric acid*, in the " Journal of the Royal Agricultural Society of England," vol. v., p. 596.

As, however, it is proved in this case that so small a quantity of water will serve us, and as it is not requisite to place the manure in immediate contact with the seed (all the dissolved bones in these trials being spread in the ridge, and then covered up with the plough, before the seed was drilled), a simple barrel for the distribution of the liquid may be easily constructed.—(*Vide* my paper on action of Dissolved Bones, " Journal of the Royal Agricultural Society," vol. v., p. 467).

12. That the sulphuric and muriatic acids have no fertilizing influence of themselves; and that the whole of the beneficial results from dissolved bones is owing to the increased efficiency of the bones.

Compare 18 and 19 with 20 for proof of this. It has been thought that some of the acid might form salts with the alkalies in the soil, and thus have some effect upon vegetation; but such is not the result in this case.

13. That the general advantages arising from the use of dissolved bones, instead of the ordinary bone-dust, are—1st, a great saving in the cost of application; 2nd, a gain in the greatly augmented produce; 3rd, a crop which grows so quickly that the fly, and other enemies of the turnip's infancy, cannot afflict it so seriously as in ordinary cases; 4th, a crop which shows so early a tendency to form bulbs that it affords us the means, by *sowing early*, of getting an early crop for autumn feeding, or, by sowing late, of securing a crop when no other known means could effect it, and when our land, owing to peculiar circumstances, has not been fit for the seed at an earlier period.

The three first advantages have already been explained, and the fourth is of equal consequence. In the present case the crop was sown at a later period than usual, as a test of the forcing quality of the manure; and it is fully proved, not only by final results, but by the fact of the turnips under its influence arriving so soon at maturity.

The advantages of an *early crop* are well known when we want food for sheep in the autumn. An early crop of turnips, too, will give more food than a crop of rape, and let us get a crop of wheat after it quite as well. By *sowing late* occasionally, we are able to get a *weedy* fallow *clean*; and this is of importance to a *whole* rotation. Weather also, and other circumstances, may make us in some cases later with sowing than usual. The means of hastening and securing a crop are therefore of some value.

But again, we may want to get two green crops after wheat, that is, by sowing a crop of autumn turnips as soon as wheat is cut, and another, or a crop of rape, next spring; or by sowing rye and tares, &c., in the autumn for spring feed, and turnips in the ensuing summer. There are other crops which, sown in autumn or early spring, afford a chance for a late crop of turnips after the first is gathered. In all these cases, then, the dissolved bones come to our use, and enable us to do effectually that which we have hitherto only attempted to do; for, owing to its *forcing* effect, it may be said to give us an extra month of growing weather.

14. That it is worthy of notice, as regards the *preparation of the mixture*, that, in order to render the solution more complete, the bones should be pulverized as much as possible before they are mixed with the acid; but that should this, through any means, not be the case, and a few of the larger portions of bone be left undissolved, this will have no injurious effect, as there will be sufficient dissolved for the plant in its early stages, and the larger particles will operate towards the end of the season.

And that it is not necessary to apply the seed and the liquid in contact, or at the same time. Instead, therefore, of an expensive and complicated drill-machine, any simple vessel that will deposit a muddy liquid in the bottom of a furrow will serve the purpose.

These are two important considerations, as the *preparation* and *application* of the mixture are the only points on which a *shadow* of objection can be urged against the manure; and these difficulties will be found to be rather the effect of our own inexperience than the unavoidable results of the system. Thus, as to preparation, the foregoing trials with weak acid (Nos. 11 and 12) prove that one-third and one-fourth the weight of the bone will serve; and that, though the solution be *not* perfect, the final results are not affected. Thus No. 11 (with 6st. instead of 12st. of acid) began a little behind the other plots with a larger share of acid, but stood, on second inspection, in the first rank (October 1, 1844).

As to the second point, I trust that another year will not pass without a simple and cheap drill-cart, for the purpose of distributing this peculiar mixture, being exhibited to the members of the Royal Agricultural Society. The object to accomplish being simple, I hope that economy in construction will not be lost sight of, as the farmer cannot afford expensive drills for each description of manure. In such case the public will soon both appreciate its use and the value of the application.

I dwell on this point because I am aware that a little practical difficulty of this sort often retards the spread of a beneficial practice, and that the only way to promote it is to give the farmer an economical means—*a cheap and easy way of trying it.*

Supplementary Note.

To the traveller who has journeyed long and sedulously, the attainment of his object, and the discovery at the same time, in the realization of his expectations, that his labour has not been fruitless, are matters of high gratification. In a similar manner the results of the present inquiry afford peculiar satisfaction to the writer, as they not only confirm his previous investigations, but convert the anticipations of science, on a most important question connected with the economy of the manure, into the certainty of fact.

For instance, the theory which the facts now developed sustain is the same which the facts previously elicited suggested, viz., that both the organic and inorganic parts of bones are fertilizers; that the total action of the inorganic is greater than that of the organic; that when applied in conjunction, the latter has a tendency to retard the action of the former; that this tendency may be counteracted by pulverizing the bones; that it may be most effectually accomplished by dissolving the bones in a diluted acid; and that the fertilizing influence of the bones thus treated will be quadrupled.

This latter conclusion is, moreover, a *practical truth* of the greatest value, as it offers a saving of one-half the usual cost of the manure; and the various circumstances under which the several applications which support this conclusion were tried, *without one contradictory result*, place that conclusion beyond the possibility of error, and justify us in asserting that practice has already realized what theory previously promised—" the most important saving which was ever held out in the use of manure."*

February 27, 1845.

---

* Mr. Pusey, Royal Agricultural Journal, vol. iv., p. 408.

HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND'S MEETING AT DUMFRIES.

The proceedings connected with the Annual Meeting of this truly national and patriotic Society commenced at Dumfries on Monday, Oct. 8. The extent and excellence of the Show, the numerous attendance, the success of the Public Breakfasts, and the attractions of the two dinners, have made the meeting altogether a very distinguished one.

The state of the weather is an important point at such meetings. It rained all Friday, and the Nith rose rapidly. In the afternoon the area of the Show-yard was completely flooded, and fears began to be entertained for the wooden wall. About half-past nine o'clock in the evening the river was over the whole of the White Sands, inundating the lower parts of the Vennel and Kirkgate, and other streets, and reaching the very bottom of Assembly Street. About ten, the outer wooden wall of the Show-yard, which ran along the margin of the river, gave way, and was floated off instantly. A number of sheep-bars were also swept away. Saturday morning showed the Nith subsiding. The Show-yard scene, however, was a dreary one; and, to make matters still gloomier, it rained more or less all Saturday. Sunday dawned beautifully, and continued fine throughout.

The arrival of various portions of stock and other articles for exhibition, and the visible influx of strangers, all going about in the cheerful sunshine, and evidently delighted with the preparations on the dock, and with the sweet scenery all around, enlivened Monday. In the afternoon, coaches, and extra coaches, brought in their contingents of people, and the inns overflowed with bustle.

In the evening, the local committee sat for several hours, and completed all their preliminary arrangements.

Tuesday, Oct. 7.—Monday night had lowered, and the dawning of Tuesday showed that a considerable shower had fallen. Carts were coming in from all quarters, bringing implements, dairy produce, &c. (the white-snooded "gash gudewife" sitting by her butter); and the show-yard was early astir, in preparation for the first day's show.

THE SHOW YARD.

We found the ground in fine order; and though the attendance was not numerous at any given time, still there was a steady stream of visitors going out and in. We observed his grace the Duke of Buccleuch on the ground; the Duke of Montrose; the Marquis of Queensberry; the Earl of Selkirk; Mr. Hope Johnston, M.P. for the county of Dumfries; Mr. Maitland, M.P. for the stewartry of Kirkcudbright, and many other distinguished individuals.

So far as we can judge from information and our own observation, we would say that the exhibition of the day was a very fair one. Those who are accustomed to see such shows as that of Shrewsbury would think the exhibition of implements by no means an extensive one; still it was varied and interesting. Mr. Crosskill's pretty marquee of models attracted much attention; Mr. M'Neil's exhibition of felt roofing; and the several machines for making tiles. Mr. Lawson's exhibition of seeds was very fine; our excellent townsman, Mr. Kennedy, shone in the same department; and Mr. Skirving, of Liverpool, was quite up to the mark. Mr. Lawson's specimen of tussac grass attracted great attention, and we witnessed our gallant townsman, Lieut. M'Murdo, bearing testimony to it as the veritable tussac grass of the Falkland Islands. Mr. Kennedy's white globe turnips were specially admired, and Mr. Skirving's Swedes. The specimens of mangel wurzel from the innerly and cozy holms of Cannobie were much looked at. The rye-grass exhibited was very fine; and the samples of grain, considering the season, were good. There was a most extensive exhibition of butter and cheese. The potatoes really looked as if there were no taint in the world. Among other agricultural implements exhibited, we observed a variety of ploughs of improved construction—one by our townsman, Mr. Campbell; two by Mr. Shankland, Thornhill, the one having an instrument attached for marking out and equalizing the breadth of the furrow. A double paring-plough, with harrow attached, and a double-moulded plough, with sliders and screws for shifting the moulds, by Mr. Thomas Inglis, West Linton; a drill machine, for sowing grain in twenty-eight different degrees of thickness, and thirteen rows at one time, and having an index showing the quantity sown, by John Geddes, Cargen Bridge; Crosskill's clodcrusher, a useful instrument for clay land, and which has been awarded many premiums; a two-wheeled rake, for hay or corn, by Smith and Co., Stamford, Lincolnshire; a churning machine, one horse power, by Mr. David Craig, Stewarton, Ayrshire; a hand churning machine, and a machine for steaming grain, both from Ireland; a curd cutter and turnip cutter, by Mr. John Harris, Dalskairth; two improved specimens of fanners (Coleman's of Colchester), expanding lever harrow, which elicited the warmest approbation of the judges at the Liverpool Agricultural Meeting; flowerpots in great variety, by Mr. John Thompson, of Glasgow; specimens of iron and wire-gates, rails, flower-stands, &c., &c.

TRIAL OF IMPLEMENTS.

The trial of Agricultural Implements took place on the forenoon, in presence of the judges, Messrs. Schooler, Turnbull, Dalziel, Alexander, Slight, Smith, and Professor Low, and a considerable number of influential gentlemen and agriculturists interested in this department of the exhibition. The utmost anxiety was manifested by the judges to deal ample justice to all. When any doubt seemed to exist of the comparative value of the implements, repeated trials were made of their respective efficiency. The implements in general seemed to give much satisfaction, and we suspect the judges would have no little difficulty in making their decision.

WEDNESDAY, THE 8TH.

THE SHOW OF STOCK.

This morning had a very doubtful appearance, and a slight shower fell between seven and eight o'clock. However, it cleared off, and the day became beautiful.

The exhibition of stock was now added to the exhibition of the preceding day; and, taken together, they constituted, in the opinion of good judges, one of the best shows that our Highland Society has yet had. The Show at Glasgow last season was certainly more extensive; but as there was an extraordinary number of Ayrshire beasts at it, from the facilities of travelling from a contiguous county, this gave it a peculiar means of appearing extensive. Whether absolutely, or relatively, our exhibition to-day was a very fine one. The show of Cheviot sheep was probably the finest that ever was seen before in Scotland. The exhibition of horses was also a superior one. In the class of Galloway stock, the prize ox from Logan—a prize given to all breeds, and thus carried off by a Galloway—attracted a vast deal of attention. In swine the show was remarkably rich; and few, we suppose, ever witnessed better specimens of grunters, from the Siamese kind, with little ones running around, up to our largest and fattest native breeds.

The display of poultry exceeded anything we ever witnessed at the Highland and Agricultural Society of Scotland. Nearly the whole netted pens were filled with first-class birds, if we ever saw such—cocks and hens, turkeys, geese, ducks, lovely in feather, sleek in condition, and what, perhaps, for a show-yard is better still, of such goodly dimensions, that they should all and each become breeders forthwith for the general good of the country.

In the dairy department, which was really an excellent one, we counted 154 specimens of cheese, very generally of first-rate quality, and mostly from Ayrshire.

On the ground, we saw various of the noblemen, and a great proportion of the county gentlemen of the district, and our leading farmers. Altogether, the turn-out was a splendid one.

It is expected that £1,300 was collected in half-crowns and shillings.

PREMIUMS.

The following is a list of the premiums awarded:—

I. CATTLE.

GALLOWAY BREED.

Class 1. For the best bull, calved between 1st January, 1839, and 1st January, 1843, thirty sovereigns; to the Duke of Buccleuch. For the second best ditto, fifteen sovereigns; to John Rain, Callymains, Kirkcudbright. The honorary silver medal to Mr. Marshall, Kirkcudbright, as the breeder of the best bull.

Class 2. For the best bull, not exceeding thirty-three months old, ten sovereigns; to Stair H. Stewart, of Glasserton, Wigtownshire.

Class 3. For the best two breeding cows, belonging to the same stock, calved prior to 1st January, 1843, fifteen sovereigns; to James Gillespie, Annanbank, Dumfriesshire.

Class 4. For the best single breeding cow, calved prior to 1st January, 1843, ten sovereigns; to the Duke of Buccleuch. For the second best ditto, five sovereigns; to John M'Fiee, Borland.

Class 5. For the best two spayed heifers, calved after 1st January, 1842; ten sovereigns; no competition.

Class 6. For the best two spayed heifers, calved after 1st Jan., 1843, ten sovs.; to the Duke of Buccleuch.

Class 7. For the best ox, or spayed heifer, of any age, ten sovereigns; to Hugh Corrie, Newtonaird, Dumfriesshire.

Class 8. For the best two oxen, calved after 1st January, 1842, ten sovereigns; to Stair H. Stewart, of Glasserton, Wigtownshire. For the second best two ditto, five sovereigns; to Colonel James M'Douall, of Logan, Wigtownshire.

Class 9. For the best two oxen, calved after 1st January, 1843, ten sovereigns; to the Duke of Buccleuch. For the second best two ditto, five sovereigns; to Colonel James M'Douall.

Class 10. For the best two heifers, calved after 1st January, 1843, ten sovereigns; to John Halliday, Moloch, in Rerwick, Kirkcudbright. For the second best two ditto, seven sovereigns; to William Sproat, Borness, Kirkcudbright.

Class 11. For the best single heifer, in calf, five sovereigns; to the Duke of Buccleuch.

Class 12. For the best lot of stirks, calved after 1st January, 1844, being not under one-half of those bred on the farm, and not fewer than four in number, ten sovereigns; to William Sproat, Borness. For the second best ditto, five sovereigns; to Alexander Halliday, Culcaigrie, Kirkcudbright.

SHORT-HORN BREED.

Class 13. For the best bull, calved between 1st January, 1841, and 1st January, 1843, thirty sovereigns; to C. W. Harvey, Walton, Lancashire. For the second best ditto, fifteen sovereigns; to No. 5, belonging to William Jobson, Chillingham, Newton, Northumberland. The honorary silver medal, to C. W. Harvey, as the breeder of the best bull.

Class 14. For the best bull stirk, calved after 1st January, 1844, fifteen sovereigns; to David Hill, of Edenhall, Cumberland. For the second best ditto, seven sovereigns; William Tod, Elphinstone Tower, East Lothian.

Class 15. For the best breeding cow, calved prior to 1st January, 1843, ten sovereigns; to W. T. Carruthers, of Dormont, Dumfries-shire.

Class 16. For the best heifer, calved after 1st January, 1843, ten sovereigns; to W. T. Carruthers.

Class 17. For the best two heifers, calved after 1st January, 1844, ten sovereigns; to W. T. Carruthers.

AYRSHIRE BREED.

Class 18. For the best bull, calved between 1st January, 1840, and 1st January, 1843, fifteen sovereigns; to George Lorimer, Kirkland, Dumfriesshire. For the second best ditto, seven sovereigns; to Lawrence Drew, Carmyle, Lanarkshire. The honorary silver medal, to Lawrence Drew, as the breeder of the best bull.

Class 19. For the best bull, calved after 1st January, 1843, five sovereigns; to James Grierson, Morton Mains, Dumfriesshire.

Class 20. For the best milch cow, calved prior to 1st January, 1842, ten sovereigns; to William Young Herries, of Spottes, Kirkcudbright. For the second best ditto, five sovereigns; to James Wilson, Old Mill, Ayrshire.

Class 21. For the best two heifers, calved after the 1st January, 1843, seven sovereigns; to William Muir, Hardington Mains, Lanarkshire. For the second best two ditto, five sovereigns, to James Muir, Castledykes, Lanarkshire.

WEST HIGHLAND BREED.

Class 22. For the best two oxen, calved after 1st January, 1841, ten sovereigns; to Archibald Stirling, of Keir, Perthshire.

Class 23. For the best two heifers, five sovereigns; no competition.

Class 24. For the best ox of the Galloway, Aberdeen, or Angus polled breeds, calved after 1st January, 1841, ten sovereigns; to Stair H. Stewart, of Glasserton, Wigtownshire.

ANY BREED.

Class 25. For the best ox of any breed, pure or cross, of any age, the particulars of the breed being specified, ten sovereigns; to Colonel James M'Douall, of Logan, Wigtownshire.

II. HORSES.

Class 1. For the best stallion, from three to ten years old, for breeding draught horses, forty sovereigns; to Thomas Richardson, Solemain, Cumberland. For the second best ditto, twenty sovereigns; to John Paterson, Killeonan, Argyllshire.

Class 2. For the best stallion, from three to ten years old, for breeding horses for coach or chariot, twenty sovereigns; to Robert Moffat, Newtown of Rockliffe, Cumberland.

Class 3. For the best mare for breeding draught horses, and which shall have been at least one year in the possession of the competitor, fifteen sovereigns; to John Bartholomew, Broomhill, Dumbartonshire. For the second best ditto, ten sovereigns; to John Birrel, Guards Farm, Cumberland.

Class 4. For the best three year-old draught gelding, five sovereigns; to Robert Hiddleston, Riddingwood, Dumfries-shire.

Class 5. For the best two-year-old draught gelding, five sovereigns; to Thomas Struthers, Gilfoot, Kirkcudbright.

CLASS 6. For the best three-year-old draught filly, five sovereigns; to Thos. Smith, Daltibble, Dumfries-shire.

CLASS 7. For the best two-year-old draught filly, five sovereigns; to Reginald Tinning, Chapeltown, Cumberland.

III. SHEEP.

LEICESTER BREED.

CLASS 1. For the best tup, not exceeding five years old, ten sovereigns; to Alexander Scott, Craiglockhart, Mid-Lothian. For the second best ditto, five sovereigns; to Thomas Howey, Lilburngrange, Northumberland.

CLASS 2. For the best shearling tup, five sovereigns; to Wm. Smith, Burton, Northumberland.

CLASS 3. For the best pen of three ewes, not less than two years old, five sovereigns; to William Parker, Yanwath Hall, Cumberland.

CLASS 4. For the best pen of three gimmers, five sovereigns; to Randle W. Saunders, of Nunwick Hall, Cumberland.

CLASS 5. For the best pen of three fat wethers, not exceeding twenty months old, three sovereigns; to Wm. Marshall, Kirkland, Kirkcudbright.

CHEVIOT BREED.

CLASS 6. For the best two tups, not exceeding 45 months old, ten sovereigns; to James Brydon, Moodlaw, Dumfries-shire. For the second best two ditto, five sovs.; to Wm. Aitchison, Menzion, Peeblesshire.

CLASS 7. For the best three shearling tups, bred by the exhibitor, seven sovereigns; to John Murray, Dean's Houses, Peebles-shire. For the second best three ditto, five sovereigns; to William Aitchison, Menzion.

CLASS 8. For the best three shearling tups, the property of the exhibitor, without reference to the breeder, five sovereigns; to Robert Elliot, Hardgrave, Dumfries-shire.

CLASS 9. For the best pen of ten ewes, not exceeding six years old, selected from a regular breeding stock of not fewer than 200, ten sovereigns; to James Brydon, Moodlaw. For the second best pen of ten ditto, five sovereigns; to Thomas Little, Pennyland, Dumfries-shire.

CLASS 10. For the best pen of ten gimmers, selected from a regular breeding stock of not less than 200 ewes, and kept with the breeding stock until the period of the show, five sovereigns; to Thomas Little, Pennyland.

CLASS 11. For the best pen of five fat wethers, not exceeding 32 months old, five sovereigns; to Charles Stewart, of Hill-side, Dumfries-shire.

CLASS 12. For the best pen of five ditto, not exceeding 20 months old, five sovereigns; to Charles Stewart, of Hillside.

BLACK-FACED BREED.

CLASS 13. For the best two tups, not exceeding 45 months old, ten sovereigns; to Mr. Adam Blacklock, Minnygate, Dumfries-shire. For the second best two ditto, five sovereigns; to Mr. Adam Blacklock.

CLASS 14. For the best pen of ten ewes, not exceeding six years old, selected from a regular breeding stock of not fewer than 200, ten sovereigns; to James Milligan, of Hayfield, Dumfries-shire. For the second best pen of ten ditto, five sovereigns; to Thomas Reid, Trollos.

CLASS 15. For the best pen of ten gimmers, selected from a regular breeding stock of not fewer than 200 ewes, and kept with the breeding stock until the period of the show, five sovereigns; to James Milligan.

CLASS 16. For the best pen of five fat wethers, not exceeding 56 months old, five sovereigns; to David Scott, Northfield, East Lothian.

SOUTHDOWN BREED.

CLASS 17. For the best tup, ten sovereigns; to Walter M'Culloch, of Kirkclaugh, Kirkcudbright.

CLASS 18. For the best pen of three ewes, five sovereigns; not awarded.

CLASS 19. For the best three wethers, showing most symmetry, fat, and weight, five sovs.; no competition.

CROSSES.

CLASS 20. For the best pen of five fat wethers, a cross between Leicester tups and Cheviot ewes, not exceeding twenty months old, five sovereigns; to Robert Smith, Ladyland, Kirkcudbright. For the second best pen of five ditto, three sovereigns; to James Mitchell, Bankhead, Dumfries-shire.

CLASS 21. For the best pen of five fat Wethers, a cross between Leicester tups and black-faced ewes, not exceeding twenty months old, five sovereigns; to J. J. Hope Johnstone, of Annandale, M.P., Dumfries-shire.

CLASS 22. For the best pen of five fat wethers, of any cross, under thirty-two months old, five sovereigns; to William Wright, Bengal, Dumfries-shire.

CLASS 23. For the best pen of ten lambs, from Cheviot ewes by Leicester rams, or any long-woolled ram, dropped subsequently to the 1st of March, 1845, shown by the breeder, five sovereigns; to Archibald Rodan, Duncow, Dunfries-shire.

IV. SWINE.

CLASS 1. For the best boar, large breed, not under twelve months, and not exceeding four years old, five sovereigns; to Robert Graham, Hetherside, Cumberland. For the second best ditto, two sovereigns; to Robert James, Chalkside, Cumberland.

CLASS 2. For the best boar, small breed, five sovereigns; to M. C. Maxwell, of Terregles, Kirkcudbright. For the second best ditto, two sovereigns; to James Wilkin, Tinwald Downs, Dumfries-shire.

CLASS 3. For the best breeding sow, large breed, not under twelve months and not exceeding four years old, five sovereigns; to Robert Hewetson, Auchenbenzie, Dumfries-shire. For the second-best ditto, two sovereigns; to Walter Hewetson, Kirkbean, Dumfries-shire.

CLASS 4. For the best breeding sow, small breed, four sovereigns; to Robert Gibson, Braehead, Dumfries-shire. For the second best ditto, two sovereigns; to Robert James, Chalkside, Cumberland.

CLASS 5. For the best two pigs, not exceeding forty weeks old, three sovereigns; to John Mackenzie, Barnhill, Dumfries-shire.

V. POULTRY.

CLASS 1. For the best couple of turkeys, of any breed, two sovereigns; to J. J. Hope Johnstone, of Annandale, M.P., Dumfrieshire. For the second best ditto, one sovereign; to William Scott, Esq., of Craigmuie, Kirkcudbright.

CLASS 2. For the best couple of fowls, of the Dorking breed, one sovereign; to J. J. Hope Johnstone, Esq. For the second best ditto, half a sovereign; to the Countess of Selkirk, St. Mary's Isle, Kirkcudbright.

CLASS 3. For the best couple of any other fowls, of pure breed, one sovereign; to Mrs. Stewart, Southwick, Kirkcudbright. For the second best ditto, half a sovereign; to Mr. Robert Thomson, Annfield Pottery, Glasgow.

CLASS 4. For the best couple of ducks, of any breed, one sovereign; to J. J. Hope Johnstone, Esq. For the second best ditto, half a sovereign; to the Countess of Selkirk.

CLASS 5. For the best couple of geese, of any breed, one sovereign; to Miss Mary Mackenzie, Barnhill, Dumfriesshire. For the second best ditto, half a sovereign; to Andrew Thomson, Limekilns, Annan.

Class 6. For the best specimen of poultry of any other description, one sovereign; to Mr. Robert Osborne, Dalscone, Dumfriesshire.

VI. DAIRY PRODUCE.

1. CURING BUTTER.

Class 1. To the owner of any dairy who made and cured the best quality of butter for the market, not being less than two cwt., during the season 1843, five sovereigns; to James Rome, Allerbeck, Dumfriesshire. For the second best quality of ditto, three sovereigns; to Alexander Aitkenhead, Barskevin, Renfrewshire.

2. MAKING CHEESE.

Class 2. For the best specimen of sweet or full milk cheese, made of any variety that he finds most profitable for the market, five sovereigns; to John Young, Nether Kirkcudbright, Dumfriesshire. For the second best ditto, three sovereigns; to Thomas Kennedy, Chaplehill, Dumfriesshire.

Class 3. For the best quality of cheese from skimmed milk, made for sale, during the season 1845, not being less than one cwt., five sovereigns; to Mrs. Janet M'Kay, Chapel Dairy, Dumfriesshire. For the second best quality of ditto, three sovereigns; to William Muir, Hardington Mains, Dumfriesshire.

VII. SEEDS, ROOTS, AND PLANTS.

Class 1. For the best and approved sample of white wheat, of any variety, the silver medal; to Thomas Laurie, Terreglestown, near Dumfries.

Class 2. For the best and approved sample of red wheat, of any variety, the silver medal; to William Watts, Craigs, Dumfriesshire.

Class 3. For the best and approved sample of spring wheat, the silver medal; to John Mackenzie, Barnhill, near Dumfries.

Class 4. For the best and approved sample of barley, of any variety, the silver medal; to John Mackenzie, Barnhill.

Class 5. For the best and approved sample of potato oats, the silver medal; to George Riddick, Greenhillhead, Dumfriesshire.

Class 6. For the best and approved sample of Hopetoun oats, the silver medal; not awarded.

Class 7. For the best and approved sample of sandy oats, the silver medal; to Robert Osborne, Dalscone, Dumfriesshire.

Class 8. For the best and approved sample of beans, of any variety, the silver medal; not awarded.

Class 9. For the best and approved sample of perennial rye-grass seed, of any variety, the silver medal; to Thomas Biggar, King's Grange, Kirkcudbright.

Class 10. For the best and approved sample of any new variety of grass seed, introduced into the culture of the farm, the silver medal; to Thomas Biggar, King's Grange.

Class 11. For the best and approved sample of Swedish turnip seed, the silver medal; to William Skirving, Walton, Lancashire.

Class 12. For the best and approved sample of greentop globe turnip seed, the silver medal; to Thomas Kennedy, Dumfries.

Class 13. For the best and approved sample of yellow bullock turnip seed, the silver medal; to John Corrie, Gallowberry, Dumfriesshire.

Class 14. For the best and approved sample of 20 roots of Swedish turnips, of any variety, the silver medal; to John Mackenzie, Barnhill.

Class 15. For the best and approved sample of 20 roots of yellow turnips of any variety, the silver medal; to James Connell, Conheath, Dumfriesshire.

Class 16. For the best and approved sample of 20 roots of white turnips of any variety, the silver medal; to Thomas Laurie, Terreglestown, near Dumfries.

Class 17. For the best and approved sample of 20 roots of any other plant suited to field culture, the silver medal; no competitor.

Class 18. For each of the two best and approved varieties of potato suited for the table, the silver medal; to Robert Osborne, Dalscone, Dumfriesshire, for a variety named "Buffs," and to No. 5, for potatoes named "New York Whites," belonging to William Gordon, Castlehill, Dumfriesshire. And for the best and approved potato for feeding cattle, the silver medal; to Francis Wood, Jardington, Dumfriesshire.

Class 19. To each of the four best and approved samples of seeds and roots, not falling within any of the classes above enumerated, the silver medal; no competitor.

Class 20. For the best and approved collection of seeds, roots, and plants exhibited by any one competitor; the premium was awarded equally between Peter Lawson and Son, the Society's seedsmen, and Thomas Kennedy, seedsman, Dumfries.

VIII. IMPLEMENTS AND MACHINES.

Class 1. For the best collection of agricultural implements and machines of any description, manufactured by or under the superintendence of the exhibitor, just proportion of parts, workmanship, utility, and price being considered, five sovereigns, or the medium gold medal; to R. Gray and Sons, implement makers, Uddingston, Lanarkshire; and two sovereigns to Wm. Smith, Lochthorn, Dumfriesshire.

Class 2. For any new and useful agricultural implement or machine that has been satisfactorily tested in actual work, not previously exhibited in competition, five sovereigns, or the medium gold medal; to J. Geddes, Cargen Bridge, Kirkcudbright, for a drill sowing machine; and to Robert M'Turk, Hastingshall, Minnyhive, for a simple stack ventilator, the silver medal.

Class 3. For any design, model, or drawing of any new machine or implement applicable to any useful purpose connected with agriculture, which may, in the opinion of the judges, promise to be successful in accomplishing the object intended; the silver medal, to Mr. Crosskill, Beverley Ironworks, Yorkshire.

Class 4. For such useful improvement in the construction of the subsoil plough as may be best suited to accomplish the main object of subsoil ploughing, viz., moving, breaking, stirring, and effectually detaching the subsoil from its own substratum without bringing it to the surface, seven sovereigns; to James Anderson, Howwood, Renfrewshire; for a subsoil plough, or grubber, three sovereigns.

Class 5. For any useful improvement in the construction of the common two-horse plough, which has for its object the lifting and turning over the greatest quantity of the soil in a given time, with the least resistance to the draught, and which produces, at the same time, a fair and efficient surface for exposure, or for seed. In this class the judges were of opinion that the several articles deserved notice for the endeavours to improve the common plough, and for the goodness of the workmanship; but as the ploughs did not exhibit such improvements as to bring them within the terms of the premium, they awarded eleven sovereigns for expenses among the competitors—eleven in number.

Class 6. For any useful improvement in the construction of barn fanners, five sovereigns. No premium awarded.

Class 7. For any useful improvement in farm carts and wheels, five sovereigns; to Robert Crawford, Uddingston, Lanarkshire, for a cart with an improved double lock.

Class 8. For any useful improvement on the thrashing-machine, particularly on the drum, having for its object the saving of horse-power, and producing clean work, six sovereigns. No competition.

Class 9. For the most useful improvement in the construction of any of the implements used in the cultivation of the turnip and potato crops, one and-a-half sovereign; to John Affleck and Co., Palmerston, for a turnip drill exhibited by them; and also one and a-half sovereign to John Wightman, the inventor; to John Birkett Stainton, Milton, for a double plough, the silver medal.

Class 10. For the most useful improvement in any of the utensils or machines used in dairy husbandry, the silver medal: to Robert Miller, Balgray, Dumfries-shire. To Richard Robinson, Lisburn, Ireland, for churns exhibited by him, five sovereigns; to be divided equally between him and the inventors, John Rowan and Sons, Ballyclare, Ireland.

Class 11. To the implement maker, who shall have successfully introduced into Scotland, of his own manufacture, any machine or implement that is generally approved in the practice of agriculture in England or elsewhere, or a modification of the same, and which has hitherto been but little known or employed in Scotland, the premium of five sovereigns. (A premium would have been awarded to Mr. Crosskill, had he not received one previously for his clod-crusher.) To Richard Robinson, Lisburn, five sovereigns, for the steaming apparatus exhibited by him; and the silver medal to Josiah Jennings, New York, as being partly the inventor.

Class 12. For a weighing machine, adapted to general farm purposes, capable of weighing stock or produce, dead or alive, from the weight of a sheep to that of a loaded cart, and which will indicate the addition of 1-500th part of the mass to be weighed, the premium of five sovereigns. No competition.

Class 13. For any improved tile pipe, or other invention for securing the run of water in drains, possessing the advantages of cheapness and durability, combined with efficiency, ten sovereigns. No premium awarded.

Class 14. For approved patented articles, and articles not coming within the range of any of the foregoing articles:—To No. 1, John Ainslie, Alperton, Middlesex, for his patent hand drain-tile machine, the medium gold medal or five sovereigns. To No. 4, to Robert Boyle, Ayr, for his patent tile machine, the medium gold medal or five sovereigns. To No. 5, to John Henry Charnock, Wakefield, Yorkshire, for his drain tile and pipe machine, three sovereigns. To No. 19, to John Weir, Dumfries, for the good workmanship and cheapness of the saddlery exhibited by him, the silver medal. To No. 20, to John West, Lundie, Forfarshire, for his mole plough, which may be used as a subsoil plough, two sovereigns. To No. 21, to Messrs. Young, Edinburgh, for their portable sheep rack, the silver medal. The Committee expressed their favourable opinion of the quality and cheapness of Messrs. Young's wire and iron work. To Richard Colman, Colchester, for his expanding lever harrow, three sovereigns. To James Kirkwood, Tranent, East Lothian, for his harrow for breaking and pulverising land, three sovereigns. To Norman Lockhart, of Tarbrax, Lanarkshire, for introduction of Norwegian harrows, two sovereigns.

EXTRA STOCK.

Various recommendations were made by the Judges in this department. These will, as is usual, be considered and determined upon by the Directors.

LIVERPOOL AGRICULTURAL SOCIETY.

REPORT OF THE INSPECTORS OF FARMS AND CROPS.

"Having laid before the committee and other members a particular account of the farms and crops, as well as an account of the draining and other improvements inspected by us during the past year, it now becomes our duty to make a few general remarks.

"In the first place we would notice the best cultivated farms. Richard Willis, Esq., of Halsnead, to whom has been awarded the medal, is the owner and occupier of a farm and park of 500 acres. The soil is chiefly a brown sandy loam, which is cultivated as follows—viz., 220 acres pasture, 146 mown, 47 wheat after potatoes and turnips, 25 oats, 6 vetches for stall feeding, 41 potatoes, and 15 turnips. The farm is in a very high state of cultivation, and the crops abundant. The green crops were perfectly free from weeds, and were looking better, at the time of our inspection in August, than any we have seen this year. The whole reflects great credit upon Mr. Grey, the manager. We must not omit to notice the beautiful whitethorn hedges upon this estate, which are kept in the greatest order.

"Mr. Henry Clayton, of Speke, who has obtained the society's prize of 10*l.*, occupies a farm of 163 acres, under Richard Watt, Esq. The soil is chiefly a light, sandy loam. About $11\frac{3}{4}$ acres of this farm are in pasture, $84\frac{1}{2}$ mown, $18\frac{1}{2}$ wheat, 6 oats, $18\frac{1}{2}$ barley, 4 rye and vetches for stall feeding last spring, (afterwards planted with potatoes and turnips), $13\frac{1}{2}$ potatoes, $2\frac{1}{2}$ turnips, and $3\frac{3}{4}$ orchards, gardens, and occupation roads. The crops on this farm were all good and clean; the hedges, gates, and homestead were in the best possible order, and the general state of management of a superior kind. The tenant has made great improvements upon the farm by draining, by filling up of unnecessary pits, and by soughing of deep ditches. The present stock consists of eight horses, sixteen milch cows, one bull, four heifers, eleven pigs (but usually feeds twenty annually), and three rearing calves. The manure made from these is estimated at 250 tons; in addition to which, 600 tons of night-soil, and about 200 tons of horse and cow dung, are purchased by the tenant, annually, from Liverpool.

"Mr. G. Halsall, of Halewood, to whom has been awarded the prize of 5*l.*, occupies a farm of 106 acres under the Earl of Derby. The soil is all a stiff clayey loam, on clay. The farm is not at present under a regular rotation of cropping, as the improvements which are going on prevent it. These improvements consist of draining on the parallel system, with tiles and slate soles, the drains being five yards apart; eradication of old hedges, by which a number of fields are thrown together, and new fields afterwards formed of more convenient shapes and sizes; new whitethorn hedges planted, waste from the road sides enclosed, and useless ponds and pits filled up, and made into good land. The tenant is assisted in these improvements by his landlord, and we need scarcely say the work is all well done. The length of fences and ditches which have been done away with since the improvements first commenced, is 3,474 yards and the land gained by these and the filling up of pits &c., is upwards of $4\frac{1}{2}$ acres. This is only one of many instances of his lordship's farms which are thus being remodelled and improved. We think it a worthy pattern, and if followed by others, as it has already been to some extent on the estates of the Earl of Sefton and Mr Blackburn, a mighty change will be effected in the appearance of a district which has hitherto partaken far too much of the character of a wooded wilderness.

"Draining and sub-soil ploughing continue on the increase. The beneficial effects of the latter have been very perceptible in the crops of the successful competitor, Mr. Robert Birch, of Netherton, a tenant to the Earl of Sefton. His lordship, in order to promote the improvement, has provided three subsoil ploughs for the use of his tenants.

"Marling of land is still extensively practised, and with great advantage, especially on poor or exhausted sandy soils. It is now more frequently applied upon land in a state of fallow than formerly; but some of the old Cheshire farmers object to this practice, and contend that it ought to be applied on grass, half a year or a year before breaking up. The marl of the successful competitor, Mr. Wilson, of Norton, was chiefly applied to arable land, in last winter and spring, and was well fallen and harrowed, before being ploughed under. There can be no doubt that the marling, in this instance, will have a very beneficial effect.

"It is gratifying to remark, that for the new prize offered for the eradication of hedges there have been four claimants. The committee awarded the prize to Mr. John Birch, of Orrell (tenant to the Earl of Sefton), and recommended that an extra prize of the same amount should be given to Mr. Rose, of Halegate (tenant to Mr. Blackburne), as he had, during the last year, eradicated 1670 yards of old hedges (half filled with stunted oaks and other timber), upon a farm of 232 acres; and, in order to make the improvement more complete, he had filled up 21 pits. Fifteen fields were by this improvement made into six. The ditches were all drained with stone and tile, and filled up, and the land gained by hedges and ditches (which averaged six yards in width), and by filled-up pits, would not be less than three acres.

"We will now give our opinion as correctly as we can from the means we have had of judging of the state of the crops in the district. Hay grass has been unusually abundant, but the second crop of clover has been very light. As to the wheat, we believe it will be under what is usually considered an average crop. The straw has certainly been abundant, but the yield is perhaps worse than we ever knew it. This is attributed by us to the very wet and windy weather which prevailed just at the time it was in blossom.

"Barley and oats have generally been good, and although they were much laid we anticipate a full average yield.

"The growth of beans appears much on the increase, which may be accounted for by their being substituted by many farmers for potatoes, on account of the failure of late years in the latter crop. The crop is unusually good, but, owing to the lateness of the harvest, has not yet been gathered. We would recommend that they should always be sown in drills, as it appears almost impossible to keep the land clean when sown broad-cast.

"Potatoes showed well for a good crop; but it is doubtful at present what will be the result, as the rot is again prevailing.

"The application of guano has been very general this year, and has been successfully applied for nearly all descriptions of crops.

"Whilst on this subject, we would call the attention of the members to another light manure, invented by Professor Liebig, and prepared by Messrs. Muspratt and Co., of this town, which, if it realizes the expectations of the inventor, will be a valuable acquisition to our other stock of fertilizers.

"WILLIAM LONGTON,
"*October* 1, 1845. HENRY WHITE."

LOUGHBOROUGH AGRICULTURAL ASSOCIATION.

The quarterly meeting of this Association was held in the Wellington room, at the Plough Inn, on Thursday, the 25th September. S. B. Wilde, Esq., presided; and Mr. J. N. H. Burrows occupied the vice-chair. After the cloth had been drawn, and the usual loyal toasts were given, as also the health of the President, Chas. Wm. Packe, Esq., M.P.:—

The CHAIRMAN read the circular calling the meeting, in which it was announced that the subject for discussion was, "the fattening of cattle."

Mr. RAWSON, surgeon, of Kegworth, introduced the subject. He said, there were known to chemists about fifty-six elements, of which there were only eight or nine in animals; the principal of those were oxygen, hydrogen, nitrogen, and carbon. Oxygen enters into all animal and vegetable substances, and is an essential ingredient in atmospheric air. Nitrogen has no positive properties, its object is to dilute oxygen. No animal could live in nitrogen alone. Hydrogen is sixteen times lighter than common air, and is an essential ingredient in water, and very inflammable. After an elaborate description of the various elements which enter into the animal frame, the speaker proceeded to inform the meeting what were the various uses of each. Nitrogen, he said, was the principal ingredient in flesh and muscle. Fat is composed of carbon and hydrogen. If they wished to make an animal fat for sale, or for show, they must feed it on carbonaceous food. Unripe straw is very carbonaceous. As the seed ripens it becomes less so, and not so suitable for fattening. Cows generally feed well on aftermath. Half-a-pound of Swede turnips contains 110 grains of nutriment, while the same weight of white turnips only contains 85 grains. The outer temperature is very important; it should be brought as nearly as possible to the temperature of the blood. The same regard to temperature is necessary with respect to a milking cow. Fat is a mere deposit, a secretion; it does not impart strength, rather the contrary. Hence we do not make a horse fat for racing, but make him display muscular power. In fattening horses for sale, carbonaceous food, young grass, oil-cake, swede turnips, &c., should be given. In feeding for use, the carbonaceous should be mixed with an equal quantity of other kind of food.

The CHAIRMAN, after eulogizing the able exposition of the subject they had just heard proposed, with thanks for it, proposed Mr. Rawson's health, which was drunk with applause, and Mr. R. acknowledged the compliment, and had great pleasure in proposing "the best interests of the Agriculturists of the Midland Counties."

The CHAIRMAN next proposed "The health of Mr. Bernays," which was received with applause.

Mr. A. J. BERNAYS (analytical chemist, from Derby), then rose and said: Agriculture is a subject of such vital importance to the community at large, that I consider myself bound to attend all such meetings, where I may increase my knowledge of it; and I shall always be glad to be present at your quarterly meetings as long as I am in the neighbourhood of Loughborough. We have just now heard that although 56 elements are at present known, yet only a small portion of them enter into the composition of animal and vegetable life. Of this portion, consisting of from 10 to 12, only four enter extensively into the formation of the organized portion of the vegetable and the animal. These elements arrange themselves into two distinct classes: the one class, formed by the combination of carbon, hydrogen, and oxygen, in different proportions, includes what Liebig calls *the elements of respiration*. Hereto belong starch, fat, butter, sugar, gum, and alcoholic fluids. These may likewise be termed non-nitrogenised substances. The other class, formed by the combination of all the four elements, includes the *elements of nutrition*, or the *nitrogenised* constituents of food. Hereto belong vegetable and animal fibrine, caseine, albumen, and gluten. The non-nitrogenised constituents were provided for sustaining the animal heat of the body, and protecting its parts; and in so doing a provision is laid by, upon which nature draws when the body is diseased. From their very nature they are easily destroyed, by the influence of the oxygen of the air. You all know it to be a common practice to milk cows in the field, if they be at any distance from the homestead: the reason is obvious: when a cow walks a great distance without food, the oxygen of the air almost immediately begins to act upon those substances with which it can most easily combine. Such a substance is the butter in the milk: when a cow is driven home, the butter is found, in great part, to have disappeared. Again, after parturition, the milk of the cow contains only traces of butter; because, by the increased action of the muscles, a larger proportion of oxygen is taken into the system. This well known fact brings us to the subject of stall-feeding. When a cow is intended for milking, and with a view of yielding as much butter as possible, we naturally confine her. In this unnatural state, there being no call for exercise, the food taken by the animal is only in small part expended in maintaining its heat. However, we all know that confined milch cows never yielded so well-flavoured butter or cheese, as those which are unconfined. Cows living in a natural state eat what they *like*: stall-fed cows eat what they *get*. Owing to this cause, the Dutch cheeses have nearly been driven out of our market by the American. In Holland, stall-feeding is the common practice; hence is the produce less palatable than the American, in which country, land being cheaper, the practice is unnecessary. There can be no question about the utility of stall-feeding, but I very much question whether close confinement is equally beneficial with a confinement allowing of some gentle exercise. When the weather is warm, cattle may pasture in the meadows without loss to the agriculturist. The air is then nearer the temperature of their own bodies, besides being more expanded. The animals feel no call for exertion to keep themselves warm, and the gentle motion necessary in the seeking of food, by increasing the healthy state of the body, enables them not only to eat more, but to assimilate better what they do eat. In winter the case is materially altered. The temperature is far lower than that of their own bodies; the air, too, being more condensed, contains a proportionally larger quantity of oxygen. Therefore, more non-nitrogenized food will be required to combine with the excess of oxygen; indeed, as we all well know, more food will be required than in warm weather. Here, the peculiar advantages of stall-feeding come to our aid. You will perceive that warmth produces a saving in food; it is indeed an equivalent for food. Everything that cools the body of an animal, causes a proportionate expenditure of food. In stall-feeding, the temperature of the air of the stalls should be equally maintained, and they should be kept clean. The animals should be regularly fed, have plentiful litter, and be kept clean. If, as we have already said, warmth is an equivalent for food, it is obvious that the form in which the food is given cannot be immaterial. The more we facilitate the adaptation of the food for the organs of digestion, the greater will be the saving to us. The farmer cuts up his hay, straw, and turnips to save some expenditure of force, hence of food, by the feeding animal. If the food contain much water of a temperature far lower than that of the animal, it must be raised to that temperature at the expense of a part of the food. This is obviated by the process of steaming. An ox, fed by Earl Spencer, consumed in a winter month (the temperature of the air 32°), 60lbs. of mangold wurzel a day. Now, in order to raise the temperature of the water of the mangold wurzel to the temperature of the body of the ox, no less than one-twentieth of the food was expended. All feeders of pigs know that they thrive better on dry than on wet fodder (Mr. B. sat down amidst great applause).

The CHAIRMAN then proposed "The healths of Mr. Stokes and of Mr. Allen," who made a few observations on the advantages of giving artificial food to animals in the straw yard. He had himself given oil cake to cattle, and found it to remunerate him.

C. STOKES, Esq., rose to give his testimony to the principles laid down by Mr. Rawson and Mr. Bernays. He could fully bear out Mr. B.'s remarks on stall-feeding.

Mr. SMITH wanted to see science brought forward in connexion with agriculture. "We want," he said, "something definite and distinct on the formation of fat and muscle." He wanted defined what would produce most fat, milk, and cheese; and he hoped to provoke one of the gentlemen present, to rise and define it. He hoped they would give them the kind and quantity of food to produce them.

Mr. C. W. WOOD, surgeon, of Woodhouse Eaves, said he would direct the few remarks he had to make exclusively to the expressed object of the meeting, namely, the feeding of cattle; and he viewed that as the most important matter with which the practical farmer had to do; in short, his whole life and exertions tended only to produce the greatest possible quantity of beef and mutton—if not in the shape of fat cattle, his supply of grain only produced the same effects in man. But before we talk of producing, it is necessary to ascertain correctly what it is we want to produce. All animals are composed of bone, muscle, fat, cellular tissue, wool, hair, horns, skin, and nails, and we find these very substances ready formed in vegetables, the power of nutrition in the animal having nothing to do but select them from its food, and by means of the circulation to place them where they are wanted. If your object be, as in the young growing animal, to increase as well as to sustain it, you choose those vegetables which contain a large proportion of muscular fibre, or nitrogen and phosphate of lime for the bones, such as peas, beans, oats, barley, &c. If with a full grown animal, your object be to sustain its condition with an increase of fat, you give those vegetables which contain fat ready formed, as lentils, Indian corn, oil cake, &c. But as you have generally a mixed object in view, namely, to produce bone, muscle, and fat also, you must necessarily give a mixed food—the operations of which I will now explain. The composition of the animal and the vegetable world is identically the same, and the latter, wherever we find it, contains in a greater or less degree all the elements of the former. The vegetable world is sustained entirely from inorganic nature, the earth on which we tread, and the atmosphere we breathe, occupying a middle sphere, its whole existence being to collect materials to build up the animal, consequently entirely subservient to it. The inorganic world, again, is composed of a few simple elements, of which hydrogen, oxygen, nitrogen, carbon, phosphorus sulphur, and some saline substances, as pottassium, sodium, and calcine form the chief, the very elements of vegetable and animal life. Geology, chemistry, physiology, are therefore essential to the right understanding of this subject, bearing ever in mind that the lower are always administering to the wants and necessities of the higher orders of creation. There is no motion in an animal body, or emotion of mind, but what causes a corresponding absorption of the tissues of the body, and in order to keep up this daily waste, a certain amount of food is necessary. This is called sustaining the body. Thus cattle working hard require a larger amount of food than when at rest. This necessity being duly attended to, constitutes health. But fattening, gentlemen, is an unnatural condition, and requires an increase of substance. Hence the necessity of unnatural means, as the absence of exercise, light, and the influences of the atmosphere, a mixed diet (to bring out all the materials of the animal body to the greatest perfection) in a dry warm state. Mr. Childer's beautiful experiments proved that warmth alone with an animal would produce one-third more flesh, and at the expense of one fourth less food. Mr. Norton also proved that the absence of light with warmth produced still greater results. The reason of this is obvious. Every animal possesses both a nutritive and respiratory apparatus; the one to sustain the body, the other to support its vitality, by producing heat or warmth. This first object is effected by the gluten in the food principally, the basis of which is nitrogen. The second by the starch, sugar, and gum, contained in the food, which forms bile, the basis of which is carbon. The bile passes into the intestines, where it meets with oxygen, and thus becomes carbonic acid. In this state it enters the circulation, where it meets with peroxide of iron (which the blood always contains), the carbon unites with the iron, and forms carbonate of iron. In this state it passes to the lungs, where it meets with fresh oxygen during inspiration, which reconverts the carbon in the carbonic acid, which passes off during expiration, while the peroxide of iron is reformed, and taken back by means of its carriers to be again transformed into carbonate. The result of this combustion of carbon is heat. The heat of the animal body is nearly 100 degrees: all food, therefore, before it can be assimilated must be raised to its own temperature, which can only be done by the consumption of carbon, or in other words, food. Potatoes, linseed-cake, and oleaginous seeds, on account of the starch, sugar, oil, and gum they contain, are well adapted to accomplish this end. If we reflect for one moment on the immense importance of the liver and lungs in the animal economy, is it not strange to see the scores of diseased ones which our shambles are constantly exhibiting? showing the great inattention the farmer pays to the comfort and well-being of his cattle. Fat is a reservoir of carbon for the system to draw upon for the purposes of combustion, in the event of the food not containing a sufficient quantity of the proper elements to keep up animal heat. As manure is an important result attending the feeding of animals, it may be well to remark that its quantity depends upon the refuse of food, and the amount of absorption going on in an animal's body, or in other words, upon its own destruction, thus returning to inorganic nature, as food for vegetable life, the elements of its own nature. But the quality depends upon the quantity of nutritious food given to the animal. The young growing animal requiring increase as well as sustenance, consumes all the nitrogen and fatty matter in its food. The milking cow the same. But in the full-grown feeding animal a large quantity of these ingredients are not consumed: a rich and valuable manure is the result. In choosing animals for feeding purposes, the farmer often exhibits a remarkable knowledge of physiognomy. He likes a kindly-disposed, quiet looking animal, with symmetry of carcass; one built for strength, broad across the back and loins, and long quarters, where large masses of muscles are placed, a narrow and deep chest, and "a good handler," or where there is a large quantity of fine soft hair, with plenty of fatty matter underneath to nourish it. Thus furnished, he has only to put into operation the suggestions of science, and the result must necessarily be both profitable and useful. When we see the extensive application of capital, industry, and science to the manufactures of this country, and the comfort and wealth they produce to thousands of our fellow creatures, also the dominant influence of its interests, threatening the downfall of the British farmer, surely it is time, and our bounden duty, to unite these same principles, that the abundance of the soil may satisfy both landlord and tenant, and be the means, under the blessing of Divine Providence, of producing plenty of cheap food to the many thousands of our wanting fellow-creatures.

The CHAIRMAN proposed the health of Messrs. Smith and Wood.

Mr. SMITH replied, and expressed his gratitude to Mr. Wood, for his elaborate exposition of the subject, and still hoped to see science and practice combined much more than he had done.

Mr. WOOD proposed the health of the Chairman, which was received with loud cheers.

THE CHAIRMAN rose and expressed his gratitude for the kindly manner in which they had drunk his health. He would have gone further into the subject before them had it not been so ably treated by gentlemen of practical science. It was from practical men they must expect useful information; and when they had practical men for their leaders, it was their own fault if they did not benefit by them. He bore testimony to some of the priciples laid down by the previous speakers, and said he should feel pleasure in presiding at their meetings. Again thanking them for the honour done him, he resumed his seat amidst applause.

Mr. BERNAYS again rose, and said—In order to obtain a fair proportion of fat and lean, it is of the utmost importance that you should be acquainted with the composition of food. We should be very much mistaken were we judge of the value of food by its *bulk*. Green-top turnips, mangold wurtzel, and red beet, contain 89 per cent of water; Swedes, 85 per cent.; potatoes, 72 per cent.; oats and wheat straw, 18 per cent.; hay, peas, and lentils, 16 per cent.; and beans, only 14 per cent. Hence the latter food is infinitely superior as to its feeding properties than the former. But we have only spoken of the food in relation to water: it is necessary that we should understand each other when we make use of certain terms. It is but too indefinite if we include fleshening and fattening in the term *fattening*; the term rearing would then be more appropriate. But it would be still better if we distinguish between *fleshening*, or the formation of muscle, and *fattening*, or the formation of fat. According to the quantity of non-nitrogenized constituents of food capable of forming fat, in other words, according to the supposed fattening properties of food, they rank thus:—1, Oats, barley meal, and hay; 2, beans and peas; 3, lentils; 4, potatoes; 5, turnips and red beet. According to their fleshening properties, they stand thus:—1, lentils; 2, beans; 3, peas; 4, flesh; 5, barley meal; 6, oats; 7, hay; 8, carrots and potatoes; 9, red beet; 10, turnips: 100lbs. of lentils are supposed to be capable of yielding 33 times as much muscle as 100lbs. of turnips. Great advantage therefore results from the admixture of food. An animal which has been fed chiefly on oil cake, would, on being turned out, increase in size much more slowly than the animal which has been fed on hay, or on turnips and hay. The oil cake produces chiefly fat, and little flesh; hence the movement of the animal will consume much of the ready formed fat, or tallow. It is only when the oil cake is given with fleshening food—such as beans, oats, and hay—that lean is proportionally formed. Warmth, confinement, and fattening food are most favourable for the formation of butter, fat, and tallow. Herbage—which is generally denominated *poor*, but which, in reality, is *rich* in nitrogenized constituents, and which cows have to crop themselves—is favourable to the formation of cheese, but not of butter.

Mr. Stokes.—Would you recommend the food to be given in a warm state?

Mr. Bernays.—Decidedly; a little lower than the temperature of their own bodies.

Mr. Stokes proposed "The health of Mr. Burrows, and the Stewards."

Mr. B. returned thanks, and said he had been much pleased with the discussion that afternoon. He was sorry that more practical men had not risen to take part in it. He had found by experience, that cattle kept dry and warm, consumed less, and fattened better.

Mr. Henson rose, and asked what mixture of food Mr. Bernays would recommend. He was at a loss to know how to put these different elements together. He hoped to hear at some future discussion how to produce the largest amount of fat, without losing sight of the manure heap. He proposed "The health of the Rev. E. Wilson;" who rose and returned thanks, and expressed his gratification with the discussion. He always found instruction at their meetings.

Mr. Stokes suggested that tables of the quantity and quality of food recommended, should be drawn out, and some of the members requested to keep an ox or two, and give the result of their experiments for the benefit of others.

Mr. Hensom made another observation or two relative to the quantities of food and the manure heap, and

Mr. Bernays rose and said—I can only say, in answer to Mr. Hensom, that I shall be happy to answer his questions as to the necessary quantities of food for producing flesh and fat, on some future occasion.

Mr. Eaton said they had had much science and a little practice. He would propose "The health of Mr. Walker," who would be able to give them a good deal of practical information (*cheers*).

Mr. Walker said he had hoped to have taken his own pleasure on that occasion. He was almost afraid to venture an observation where there had been so much science. He felt inclined to walk away and largely benefit. As a practical man, he intended to make use of what part would suit him. The manure heap had been referred to, and he would observe, it was very well to have the whistle if they did not pay too dear for it. He would not recommend giving oil-cake to store cattle. They ought to be exceedingly careful how they gave oil-cake in the straw yard. Vegetables were the proper food for animals. He gave two pounds of oil-cake a day, and hay, to some cattle, and they did not do well; they were feverish; there was no swelling of the muscle, no lifting of the lean meat. He gave them turnips, and there was immediately an improvement.

Mr. Smith made a few observations on the importance of attention to the temperature of the atmosphere to which cattle were exposed; and,

On the motion of Mr. Henson, seconded by Mr. Stokes, it was resolved—"That this meeting entirely agrees with the science of nutrition now propounded, and recommends the practical farmer to test the theory by his experience."

Thanks were voted to the Chairman, and appropriately acknowledged; and the meeting, which occupied upwards of four hours, separated.

STORING AND PRESERVING POTATOES.

TO THE EDITOR OF THE EXETER FLYING-POST.

Sir,—As the hope of saving the important potato crop precludes waiting the result of our experiments, I have again to offer suggestions for others also to consider, correct, or improve.

The failure of the last, where the added moisture counteracted the benefit of the salts, has been a guide to my present experiments, which have not yet time to test their efficacy. It must, however, have fallen under the observation of others, that, of two parcels of the same potatoes, whilst one, heaped together, will putrefy, the other, spread out on a dry floor, will make no progress in decay, but rather lose their offensive smell. Hence, without staying at present to discuss the CAUSE of the rot, drying appears to be one of the readiest means of checking it; and accordingly kiln and oven-drying have been recommended, both of which appear to me quite inadequate to the great quantity of the subject, with its large proportion of juice.

Before suggesting another method, let me ask whether others have also observed three varieties of the rot, either different degrees or belonging to different kinds of potato?

1—The tuber not much discoloured inside or out, but having a pungent odour when cut, like putrid horseradish, and decaying quickly—this chiefly in white potatoes.

2—Brown spots or patches more or less throughout the tuber, with little offensive smell, and much slower in progress than the first—this chiefly in red potatoes.

3—Coating, limited to the compact outside layer, the inner side of which is often marked by a distinct brown outline, the heart remaining sound and sweet—this only in reds.

This division is not taken as the basis of the classification below, being drawn from local and limited observation; but, if found coincident with the appearances in other places, may assist in the selection.

Dr. Lindley (*Gard. Chron.* Aug. 30) whilst recommending kiln drying, to such as have opportunity, seems to feel its inadequacy generally, and suggests pitting in dry earth; so as to prevent contact and communication by perspiration. But can we not, by using FIRE dried earth, which will absorb much moisture from the potato, effect the double purpose of drying and separation? With this view, the potatoes may be divided into three classes or conditions.

1—Apparently sound: to be pitted in fire dried earth, entire.

2—Infected, but not HOPELESSLY decaying: to be cut and pitted as the first; with or without SALT.

3—Putrescent, unfit for use or keeping: to be ground into starch, without delay.

A brief explanation of each of these three methods may be sufficient for our present purpose.

1—Apparently sound. However impracticable it may be to find oven or kiln room for our potato crop, there is no great difficulty in fire drying any requisite quantity of earth; which may be done in heaps, in the field, in some of the methods practised for clay or marl burning, only using small coke, "brise," or cinders; as the ashes of wood, or soot from coal, might excite vegetative action, and thus prevent the good keeping of the potatoes.

Air dried earth contains much moisture, which may be driven off by a heat a little above boiling water; leaving the earth very greedy for damp, which it will suck from the air, or from any juicy substance in contact with it; but if made red hot, it loses much of this attraction for moisture, and should therefore be rather dried than burned. The sooner it is pitted with the potatoes, after cooling, the better, that it may have the less time to draw moisture from the air. It should, however, be quite COLD; because potatoes spread out in the sun are said to rot quickly. There should be earth enough to fill in between the potatoes, and keep them in separate layers; and it is almost superfluous to add that they should be pitted in very dry ground, and covered from the rain.

The poorer the earth in humus the less smell it will acquire in fire dying; but sandy soil is very little absorbent.

2—Slightly infected. These may be cut in halves from stem to nose; when such as appear past hope may be turned over to the third class, for starch.

The less damaged may be pitted, with the dried earth, in separate pits from the sound ones; when the earth, in contact with the cut sides, will rapidly suck out the diseased sap.

It is a question whether the earth for these might not be mixed with some salt (say one-sixth or one-eighth), which would not only help to suck out the sap, but would more or less enter the substance of the potato, and probably contribute to its preservation. The salt might be tried in a pit or two only, at first; and extended in its use, afterward, if found to answer best, as the potatoes come to be taken out for sale or consumption.

These two methods can be regarded only as experimental, with a view to preserve the potatoes at the least loss and expense: the following is more costly and wasteful, but certain.

3—Those which are far gone, even half rotten and stinking, will still make good sweet potato starch (see note); which will keep for years, and with one-third flour, make excellent bread, puddings, or pastry.

For this purpose nothing more is required (as already stated in the papers) than a grater, a fine hair sieve, two or three pans, trays or tubs, and plenty of clean water. The potatoes must be thoroughly washed, the very rotten parts cut out, and the clean part grated into the sieve. Here it must be continually stirred about, and watered with a watering pot, to wash the starch through the sieve, into a pan or tray, to settle.

While the starch is settling, the pulp remaining in the sieve may be pressed in a cider press or otherwise, and if well squeezed will keep a few weeks, sprinkled with salt and vinegar. It may be boiled for pig feeding, and as vinegar is the best preservative of vegetable substances, palliates the action of vegetable poisons, and has a particular tendency to fatten pigs, it is a very desirable addition. Where, however, vinegar is wanting, other acids may answer, as the muriatic or sulphuric, in very small quantities; perhaps even the apple pomice. Or the potato pulp itself will often turn sour, by standing open in cold water 24 to 36 hours.

When the starch is settled, the best and whitest will be at the bottom, covered with particles of peel and discoloured fibre; and a little management is necessary in washing off the upper part, from vessel to vessel, and letting it settle repeatedly, to get as much of the clean white as possible from the coloured. The last coloured residue may be thrown back with the pulp. After several washings, the water may be poured away, and the white starch laid out on a cloth, upon some bricks or dry earth, to absorb the moisture, and then very gradually dried.

This is, however, a tiresome process, ill suited to the economy of a farm; the grating is slow, the repeated washings tedious, and the drying much in the way. It would be better done at the Union Workhouses, where the cleaned potatoes could be ground in a mill, figured and described in Parnell's Applied Chemistry, v. ii. 133; and Ure's Dictionary of Arts, &c., p. 1,166. This mill is not costly, and will grate two or three tons in 12 hours. There must be, of course, several sieves and watering pots, and a drying room is easily contrived in such an establishment.

Yours, &c., J. PRIDEAUX.

NOTE.—In the microscopic examination of a great number of potatoes I have never found the starch damaged; it was either perfect and colourless, even when the cells and fibrous matter were quite brown, or if affected at all, it was completely dissolved, leaving the cells empty.

THE POTATO DISEASE.

TO THE EDITOR OF THE TIMES.

SIR,—Having had my attention called, during a short visit in Kent, to the destructive changes at present taking place in the potato crop, I beg to offer a few observations on the actual state of the tuber, in the hope that they may be of service to some of your readers, as tending to the preservation of so important an article of food.

The real cause of the destructive changes at present taking place appears to be the unripeness of the tuber, and the consequent imperfection of elaboration of its juices. When examined with the microscope, the cells of the potato are found to be not more than half filled with starch-cells, many of which are incomplete, the remaining portion of the cell being occupied by water. Hence the actual condition of the potato may be stated as follows:—1st, deficiency of starch; 2nd, imperfection in the tissue of the cell walls; and 3rd, excess of water, to which may possibly be added, imperfectly elaborated starch. As a consequence of the imperfection of the tissue of the cell walls, and its state of maceration in a superabundance of water, it falls speedily into decay, the change beginning at the surface and proceeding inwards, and being indicated by a brown discolouration of the cells. The starch cells, which are at first unaffected, are soon enclosed in the decayed cellular tissue, and becoming involved in the decay, are thereby destroyed.

Taking this view of the state of the potato, two modes suggest themselves of preventing the loss which must necessarily result from the recurrence of the above described changes. The first is that recommended more than a week since in your journal by Mr. Herapath, viz., of separating the starch by reducing the potato to a state of pulp, and collecting the washed precipitate. When it is recollected that the starch embodies the whole of the nutritive part of the potato, the importance of this plan will at once be perceived. But, practically, there exists a great obstacle to the prosecution of the plan in the inconvenience of employing it on a small scale.

The second mode, that which I am now about to suggest, seems to me to be calculated to meet the exigencies of the case, at the same time that it is free from the objection stated above; it is, to dry the potatoes in an oven or kiln at a moderate temperature, and thus drive off the excess of water which they contain, the water being a chief agent in the decomposing process.

With regard to the statements of the potato being a cause of disease to man and animals, I beg to remark that, so far as my investigations have gone, these are unfounded. In preparing the potato for table the discoloured parts should, of course, be cut away; the potatoes should be boiled in two waters, and salt should be mingled with both. The instances which have been reported of pigs being destroyed by eating them are referrible to the quantity, and not to the quality of the potato, and would as certainly occur with the best potatoes, taken in excess, as with those of inferior quality.

I have the honour to be, sir,
Your obedient servant,
ERASMUS WILSON, F.R.S.
Upper Charlotte-street, Fitzroy-square,
Sept. 23.

(From the Bristol Mercury, Sept. 20.*)*

The following correspondence has just taken place between Lord Portman, President of the Royal Agricultural Society, and William Herapath, Esq., the eminent analytical chemist of this city, in reference to seed potatoes for 1846. His lordship in a subsequent letter requests that the correspondence may be made public, and it has been handed to us by Mr. Herapath for that purpose. The subject is of vital importance, and is worthy of the deepest attention :—

"*Bryanston, Sept.* 13, 1845.

"Sir,—I observe in the newspapers that you have directed your attention to the potato disease, and have advised as to the use of the starch, &c. As I am specially bound, during this year of my holding the office of President of the Royal Agricultural Society of England, to promote inquiry and to notify observations on subjects relative to the produce of the soil, I trouble you with this letter, and ask if any method has occurred to you by which the potato may be preserved for the planting of 1846 ? I have found that potatoes apparently sound and free from the disease, though in a field or garden which has been partially diseased, have, after being stored away, shown signs of the disease and have rotted off; and I fear that the greatest quantity of the potatoes will thus perish, and so continue the distress of the poor into another season. I have directed some potatoes to be stored in slaked lime, in the hope that it may preserve them, but have, of course, yet had no time to judge of the effect. I therefore ask for your opinion, as one of our most eminent chemists, upon this point, and would ask leave to make known your reply, if you are able to offer an opinion sufficiently explicit to be useful.

"I remain your obedient servant.
"Wm. Herapath, Esq." "PORTMAN.

"TO LORD PORTMAN, PRESIDENT OF THE AGRICULTURAL SOCIETY.

"*Bristol, Sept.* 17, 1845.

"My Lord,—In reply to your letter of the 13th inst., I must say that I do not think it would be either safe or prudent to depend upon the infected potatoes of the present season as seed for the next year ; as, in all instances, I have found the diseased parts to extend when the potatoes are kept in a damp situation ; I should therefore expect that if any diseased seed was kept so dry as not to rot before setting time, yet upon being planted and left in the damp soil, the rotting process would then begin, and the hopes of the husbandman be disappointed. I have no doubt that some potatoes, apparently sound, have (as stated by your lordship) been found to be affected after stowing away; but I do not consider this to have been an origination of it, but merely that which was unnoticed when dug has become apparent after storing. When a potato is first affected, the diseased parts are scarcely visible ; but upon keeping it in a dry place, the spots soon become dark, and consequently more apparent, but the spots do not extend : if, however, the tuber has been kept in a damp place, the spots not only extend rapidly over the surface, but penetrate into the interior, and in a short time it will be completely rotten. As far as the slaked lime, which you have used in your potato stores, has a tendency to prevent the tubers from touching each other, or, by its power of absorbing water, of keeping them dry, it will answer a good end : but it must not be expected to have any chemical effect upon the diseased parts or their juices. Anything which, like dry sawdust or sand, would prevent contact, would prevent the propagation from one tuber to another ; and any substance capable of absorbing the moisture of the air in which the potato is stored, would prevent the extension of the disease in each diseased root. Our best microscopists and cryptogamists are divided in opinion as to whether the cause of the calamity is a fungus or not. After all the examination I have given to the subject, and a careful review of all the evidence brought before me on the two sides, I believe that it is ; and I am daily confirmed in the opinion originally expressed, that the only advantageous way of treating the diseased potatoes is to obtain from them, by rasping and washing, the starch which they contain—by which process all their nutriment can be retained ; and if it is well dried it will keep for any length of time. The operations can be performed in the cottage or manufactory alike, as no apparatus beyond a tin rasp (a nutmeg grater), a tub, and clean water are required ; and I have ascertained that however far the disease might have extended, even if the root is rotten, yet the starch can be separated, and in a state fit to be eaten, if it shall be well washed, as all the bad parts come away with the water, while the great weight of the starch carries it to the bottom of the vessel. If it is required that the fecula should have all the qualities of the best foreign arrow-root, it is only necessary to wash it last in water containing a little chlorine, when it has unrivalled colour and quality, and this I can speak of practically, having made many tons of the article. I will only add, that an opinion has been circulated that the disease is owing to the introduction of guano as a manure ; this I feel no hesitation in contradicting, as I have seen it in situations where no guano has been used, and where every other variety of manure has been resorted to.

"I am your lordship's most obedient servant,
"WILLIAM HERAPATH."

RHINS FARMERS' CLUB.—STRANRAER MONTHLY MEETING.

SEPTEMBER 26, 1845.

The Right Honourable the Earl of Stair in the chair.

The Improvement of Waste Land.

MR. HARKNESS introduced the subject with some general remarks, of which we will give an outline. Waste lands were very extensive throughout England, Ireland, and Scotland, and if judiciously improved, would realize a handsome profit to the improvers, and prove the source of immense national wealth. Improvements of waste lands in Scotland was peculiarly called for, to render more mild its rigid climate, and raise its stocks of sheep and cattle to greater bone and weight, by richer grasses and green crops. In Wigtownshire there were great tracts of good deep mosses and of deep upland pastures capable of much improvement. These waste lands are naturally divided into three classes—mosses and waste land, lying within the range of rotation or cropping land ; a second class extended to great tracts of moss lands, and of soil in upland farms which could be reclaimed, and brought under regular green crop culture; and, thirdly, pasture lands, which would pay to improve for permanent pasture on which to graze young cattle and sheep. In the improvement of all these kinds of waste lands, proper drainage was the first step. The deep spongy mosses required drains, some five, six, and others seven feet deep. The improvement of such moss could be seen to the greatest advantage in Lord Stair's home farm of Culhorn, where moss lands, on which cattle or sheep could not be trusted to pasture, had been thoroughly tile-drained, levelled, and brought into admirable cultivation. One field of this kind, sixteen acres in extent, and about four years ago a perfect morass, was now worth upwards of 30s. per acre, and the crops of the first three years had amply refunded the whole expense of draining, levelling, liming, and working. Then as to the improvement of waste lands, of thinner substance, and hard subsoil, he (Mr. H.) would say that no better examples could be afforded than what appeared on other tracts of ground at Culhorn, where lands formerly of little value, probably not more than 5s. or 7s. 6d. per acre, had, by the Deanston draining system, been converted into most productive soil. At Logan, too, several hundreds of acres had been reclaimed on a hard retentive subsoil by such drains, the use of the subsoil plough, turnip husbandry, and feeding with sheep. He saw extraordinary crops of wheat and oats, as well as turnips and potatoes, growing there this year on such land; and Logan bullocks, so handsome, well haired, and fat, spoke emphatically for the improved quality of the grasses. Col. M'Douall's ground had an iron pan or moor pan below, which required to be all broken up with the subsoil plough. Such land is very expensive to improve; but, notwithstanding, we have no doubt such improvements will pay the landlord, while it will beautify the country. The most of farmers know well how such improvements ought to be executed; and he would, therefore, now refer to the improvement of upland waste lands. Draining was the grand cure. Sheep drains were usually made, but they ought to be cut deep into the tile; and where the soil was deep and of good quality, it ought to be fenced in at the expense of the landlord, and thorough drained with stones or tile. The highest ground in the Rhins might be thus reclaimed. Indeed, Mr. Guthrie had told him (Mr. H.) that Lord Stair had last year made the experiment on the highest of his farm in New Luce, by thorough draining, and the result was that this year they had as good oat and turnip crops as could grow. Mr. Harkness said that quantities of good peat could be cast, exposed to the atmosphere, and afterwards applied to the drained lands as a substitute for lime, or the moss might be charred. The consequence would be to greatly increase and improve the sheep pasture.

Lord Stair thought the highest grounds in the district much below the elevation of Oxenford and Fala, the latter being 1,100 feet above the level of the sea, and where the finest crops of turnip in the country were to be found. No part of Balcar farm was so high. No doubt the difference of soil makes a great difference in the climate and crops. The Rhins, however, was a good agricultural climate, and more forward than his Oxenford lands. Here a great portion of the crops were secured, while from a letter which his lordship had received from Mr. Dodds, his factor in East Lothian, he had not taken in there a single sheaf as yet. Lord Stair said that with enterprise and intelligence much was to be done. He would instance a small experiment made by Mr. John Crawford upon a piece of bog. He did not enter till Whitsunday last; after which he drained and cultivated the moss, on which he was now growing a good crop of turnip. There was another thing he had to say, and that with regret, as to the improving of stock. On several occasions he (Lord Stair) had invited his tenantry to bring their cows to his Teeswater bull, but none had done so except Mr. M'Bryde and Mr. M'Meekan.

Mr. M'Clean, senior, Auchneel, approved of the surface drains for sheep walks, and recommended the stuff taken out of them to be thrown abroad as a top-dressing.

Mr. John Gibson said that his views on sheep-drains for the improvement of hill pasture differed slightly from Mr. Harkness's. His opinion was, that sheep-drains being generally made about one foot deep, are only of use in so far as they assisted in carrying away the surface water, and in preventing it from forming stagnant pools in the hollow places. The improvement of pasturage could only be effected by draining to such a depth as to afford the roots of the pasture plants a sufficient body of dry soil. It was well known that the roots of clover, and of some species of grasses, penetrated the soil from 12 to 15 inches; and it was therefore essential to the health and development of such deep growing plants that the soil below their extreme roots should be dry. He would therefore recommend that in draining muir pasture the drains should be at least two feet deep, and that they ought to be covered over, as additional surface would be obtained. The expense of keeping them in order would be saved, and all risk of obstruction would be avoided. Where the land was of unequal altitude, it was a judicious plan to apply the drain water from the higher lands in irrigating the lower lands, which could be accomplished for a small additional expense if the direction of the drains and their outlets were properly chosen for that purpose. In reference to the subject more immediately under discussion — " improvement of waste land "—he remarked, that the waste land of this district might be included under two descriptions—deep moss, and hard till-land, with a shallow top furrow of inferior moss. The usual method of reclaiming and improving the latter description of land, was to pare off the thin covering of moss, to collect into heaps and burn the greater portion of it, so as to obtain as much ashes as would manure it, and also for the purpose of getting a smooth surface. The evils of such a system were evident. The best producing portion of the land having been consumed, the consequence was, that when the land was laid down to pasture, there was only a scanty covering of grass; and in subsequent years, when again brought under a course of cropping, the crops were of such a poor description as to forbid the sowing of grass seeds, as it was considered better to allow it to rest until in progress of time it would restore itself, than to risk the expense for an uncertain hay crop, and pasture of little value during the succeeding years. Another system was to apply heavy dressings of lime, which acted powerfully upon the most of inert vegetable matter, and produced large crops of oats for a few years; but as soon as the vegetable matter was exhausted, it became ungenerous, and was condemned as unprofitable land for cultivation. He disapproved of liming such soils until they had been drained and deeply ploughed, as it was only after these operations that lime could be judiciously and profitably applied. The subsoil and vegetable surface would then be mixed, which would be the salvation of both; the lime would pulverise the hard till-subsoil, and the vegetable surface by being mixed, would only be partially acted upon, and a portion would remain in store to be brought into use for future crops. He did not consider lime a manure, but merely a stimulant calculated to bring into action certain principles previously possessed by the soil, and in this position he was justified by the fact, that thin moorish soils never repaid a second application of lime. The plan pursued in improving deep moss was draining and burning, and which was generally followed with happy effects. The system of burning he deprecated as being of a very robbing character; a large mass of valuable vegetable substance was exchanged for a small residue of siliceous matter of lime, the beneficial action of which he believed was as much mechanical as chemical, and it was a question whether a compound of sand and lime would not yield as good results. He trusted that he would be able to show a preferable method of preparing moss for manure. He considered that the great hinderance to the improvement of waste lands was the expense of draining and manures. The ingenuity of several gentlemen of great mechanical talent had been at work in devising improvements in the form of tiles, and in tile machines, with a view to lower the price of tiles; and he was sure that it would be gratifying to the meeting that those attempts had been successful. He held in his hand a pipe tile of 2 inches diameter, which had waved or indented ends that locked into each other, and thus formed a continuous line of tube; it was the invention of Mr. Smith of Deanston. This tube, which he considered superior to any others which had yet been made, could be supplied at the works for 12s. per 1,000. He detailed the expense of manufacture per 1,000, from a copy of the agreement with the manufacturer, as follows:—

	s.	d.
Digging and turning clay	0	4½
Wheeling	0	9
Milling	1	3
Moulding	3	4
Filling and emptying kiln	0	11
Burner's wages	0	4½
Allowance for waste	0	6
	7	6
Coals	4	6
	12	0

The sum of 12s. included the manufacturer's profit. The price of coals in Dumbartonshire, where the works are situated, was 12s. per ton, and they are charged accordingly. The pipes are 12 inches long, and, draining at 18 feet apart, 2,420 are required for an English, and 3,052 for a Scotch acre. The expense of the pipes for a Scotch acre is a fraction above 36s. He understood that the cost of tiles and soles in this district was 36s. per 1,000, which was just treble the price of the pipes. This was a very serious obstacle to the progress of draining, and no doubt many tenants allowed portions of their farms to remain undrained and "*waste*," because of the excessive cost of tiles. He said that several attempts had been made to manufacture tiles from peat, but no suitable machine for that purpose had yet been invented; hitherto they had been made either by hand moulding, or by being cut out of benches of moss with a spade made for the purpose. In this country, where peat is in so great abundance, it would be of the greatest importance if a good and cheap method of making them was introduced. His own opinion was that they could be made by compression at a small cost, say 6s. per 1000; and if made in that way they would be easily dried, and of such a compact structure as to be irresistible to every influence, in fact they would be as lasting as brick tiles. In referring to the manuring of the land, he stated that the application of bones, guano, and artificial manure, entailed a large annual expenditure, and as on poor soils large quantities were necessary for the production of crops, that it would be of great importance if a cheap and accessible substitute could be found. His attention had been drawn to the surprising qualities of charcoal, which was capable of absorbing 90 times its volume of ammoniacal gas, and 35 times its volume of carbonic acid gas. Chemistry has revealed to us that a manure heap contains carbon and nitrogen, which are two opposite affinities, and strengthen mutually each other's action, thus—nitrogen struggles to combine with hydrogen, and forms *ammonia*; and carbon struggles to combine with oxygen, and forms *carbonic acid*. Ammonia and carbonic acid therefore being the gases which charcoal absorbs readily and in such large quantities, there could not be a doubt of its importance as a manure; and he recommended that instead of *dissipating* by burning what is useful in moss, it should undergo the *process of charring*. Every farmer in this part of the country could procure a plentiful supply of peat, either on his own farm or from his neighbour's, which could be converted by the cheap and simple process of charring into a very valuable manure, for any description of soil, and which could be made of the greatest value by soaking it full of the urine of horses and cattle, and the liquid refuse of the dunghill. He referred to the last meeting of the Yorkshire Agricultural Society, at which it was stated by a gentleman from London, who kept a large number of dray-horses, that he collected with great care the urine of the animals, and he had found the urine of one horse was sufficient to manure as much land as would grow grass for two horses. This was a startling statement, and ought to have the effect of making us place a proper value on the liquid manures, which, during several months in the year, forms stagnant masses of putridity in many court-yards. He trusted that many of the meeting would make a trial of the charred peat and liquid manure—he was sure they would not be disappointed; indeed he had the testimony of a gentleman, who wrote him from the north of Scotland, that, among a series of experiments, he had found nothing so good as charred peat, even when used alone. If the experiment should prove as successful as he anticipated, many bone and guano bills would be avoided, and more money might be expended in the improvement of waste land. He would just add that, as draining must take the precedence, he trusted that the cheap cost at which either clay or peat tiles might be furnished would induce proprietors to execute draining to a much greater extent that hitherto; and that before many years we might expect to see large portions of those waste lands, which are now yielding only a scanty herbage, bearing heavy crops of grain and luxuriant green crops.

Mr. Snodgrass, seedsman, &c., begged that he might be allowed to make a few observations on the subject. Mr. Gibson had said lime was not manure; but he thought it should be so classed, as by the proper application of it to the soil, the earth was made to yield more nourishment for plants. Manure acted in the same way. No doubt lime did no good when applied to a calcareous soil; but many soils were deficient in lime, and to these it would be of great service. As to the use and preparation of peat, he (Mr. S.) would recommend an efficient system of charring the peat, not a superficial plan. It was a different and a more easy thing to char wood, which had more fibre and is not so apt to go to ashes. To char moss properly, a temporary retort would be most suitable; and this could be done at little expense and with little difficulty.

Mr. M'Bryde then said, these good modes of draining being agreed upon, it was clear that in the greater portion of improveable lands cheaper tiles would be of the greatest service. But these could not be got here. If they could be got as cheap here as they are in Lanarkshire and Dumbartonshire, adding a little for the coal being higher there, he (Mr. M'Bryde) was sure this inducement would set all the tenantry in the country to drain.

Bailie M'Douall could see no reason for the exorbitant price of tiles here over the price of Lanarkshire and Ayrshire, and the matter should be inquired into and explained, for nothing in agriculture was of so much consequence as draining.

Mr. Taylor, Belmont, suggested that a competition work should be got up, by the farmers getting from Lord Stair a piece of ground, and erecting on it a tile work.

Lord Stair said the difference in the expense of tiles here and elsewhere was far too great, and his Lordship thought competition would reduce them in price; but he would be glad that the Club would take a memorandum of the matter, and suggest some plan to correct this evil, on which he would speak with Mr. Guthrie on the subject.

Bailie M'Douall then, in a very able speech, depicting in a manner not less graphic than correct, the great benefits conferred upon the country at large by his Lordship's agricultural enterprise and improvements, and upon Wigtownshire and the Rhins Farmers' Club by his Lordship's example and personal attention, proposed a vote of thanks to Lord Stair, with a resolution of regret that his Lordship was about to leave the district, and expressive of the fond hope that his Lordship would be soon back again among his tenantry in this district.

Lord Stair replied in most feeling terms, expressed his highest commendation of the Club, and trusted he would be spared to come back among them all.

The meeting, after some routine business, broke up.

TYNESIDE AGRICULTURAL SOCIETY.

IMPORTANCE OF SCIENCE AND MECHANICAL SKILL TO AGRICULTURE.

In replying to the health of the "Unsuccessful Candidates," Mr. Grey said—There was another set of canditates who were so far unsuccessful that no premiums had been offered them for competition. Their attention had no doubt been drawn to a tile machine, which he believed was likely to be of great benefit (*applause*). They were indebted to Mr. Charnock for having exhibited that machine without the slightest prospect of any return, because no premium had been offered for implements. Mr. Charnock had been lately engaged at Whittonstall. He (Mr. Grey) had placed him on the top of a hill there that wanted draining; and he believed Mr. Silvertop, and others of the class to which Mr. Kirsopp had referred, could not do better than become a customer of Mr. Charnock (*hear*). It happened that he (Mr. G.) was riding through a district in Hexhamshire, where the land was pretty high, and pretty cold, and pretty wet—(*a laugh*)—and he was surprised to see one of the best crops of wheat growing on one of the Greenwich Hospital farms where he never saw a crop of wheat growing before. He made inquiry on the subject, and the tenant said he had tile-drained that side of the field last year, and left the other side, which was considered the good side, without draining. The result was, that the crop on that side of the field which had never borne a crop before, was one half more than on the good side. Another good effect of extracting the poisonous water from the soil was, that the straw was much stronger, so that, although a heavier crop, it rose up and waved in the wind, whilst the other was still lying prostrate (*hear, hear, and cheers*). He hoped tile-draining was one thing which would make them independent of all the evils which were impending over the agricultural interest. The prospect was now frequently pointed to as not very far distant, when landlords must no longer look to legislative enactments for protection, and when tenants must learn to wade the waters of competition without the aid of those stilts on which they had frequently floundered. It therefore behoved them to use every exertion in their power, and to avail themselves of all the improvements which mechanical skill and science, combined with practical knowledge, put within their reach, to meet the crisis, and increase the produce of their native soil (*cheers*).

A SKETCH OF BELGIAN HUSBANDRY.

(From the Journal of Agriculture).

Having set sail from London, in the beginning of April, in most charming weather, and with every prospect of its continuance, we arrived safe at Ostend after a most delightful passage. On nearing the coast of Belgium we could observe nothing but one continuous bank of sand, from Dunkirk to some distance past Ostend—rather a curious introduction to a fine agricultural country. But being now in Belgium, it will not be out of place here to inquire into the history of the soil about which we are going to speak.

There is no subject connected with Belgium about which so much misapprehension prevails as its soil. We are accustomed to associate fine crops and superior farming with a fertile soil; and people generally, hearing of the great crops produced in Belgium, conclude, without farther inquiry, that it is blessed with a fine soil and a finer climate; and the yearly, but not exaggerated, accounts of the heavy crops, brought home by the railroad tourists, some of whom have compared the cutting down of a field of wheat to the slicing of a plum cake, tend, above all, to increase the mistake already abroad.

The general character of the soil in the western provinces of Belgium, where the most perfect system of agriculture is carried on, is lightness, which includes all stages of fertility, from the arid sand to the sandy loam. And though we find now much that really appears excellent soil, such, for instance, as that in the neighbourhood of Courtray, we have sufficient reason for supposing that it is not naturally a rich soil, but has been brought to its present state of fertility by the most laborious cultivation; and there is not the least doubt that, if the farmers were withdrawing their present careful attention from the soil, and the artificial treatment to which it is at present subjected were in the least relaxed, the broom and fir would soon assert their ancient dominion. The following extract fully bears me out in what I have just stated:—

"What land is cultivated in Brabant is owing to the religious houses founded in it. Their uninterrupted duration for five or six hundred years, and their indefatigable industry, have conquered the barren harsh sands, and rendered many parts of them highly productive.

"From the undoubted testimony of the historians of the low countries, it appears that the cultivation of the greater part of these rich provinces had its rise from the self-same means, eight hundred or a thousand years ago, when they were, in a manner, one continued forest."

The farmers of Flanders, therefore, are presented to us in a double character—*tillers* of the toil, and, in some places, at the present day, *makers* of a soil. Those who are anxious to study them in their second character are referred to Mr. Radcliff's work on Flemish husbandry. I do not refer to the Polders at present, where the stiffest clays exist, and a totally different system is pursued. The only true clay I met with was in the neighbourhood of Ostend, where it was very stiff, and of a grey colour. On the road from Ostend to Bruges the soil is of various qualities. It loses in a great measure its character as we approach Bruges, in the immediate vicinity of which it is in a high state of cultivation. From Bruges to Ghent the soil is very poor, and around the latter place it is little better than sand; yet the crops we passed on the road were most luxuriant. The general aspect of the country from Ostend to Ghent is that of a flat open country, not at all beautified by wood, and interesting to none but a farmer. There are no hedges, the fields being separated merely by ditches, on the banks of which are planted trees, which are cut at different intervals of time, from every fourth to every ninth year, according to the nature of the kind. They are planted merely to supply the people with firewood in those districts where other fuel is scarce. All kinds of trees are grown for this purpose. Between Ghent and Courtrai the scenery assumes more of an English character. The country is more wooded, which divests the landscape of that vapid tameness so peculiar to Belgium. Nor is the cultivation neglected. The luxuriant crops of rye, the healthy and equally dispersed brairds of wheat, and the neatness with which all the fields were finished, gave ample proofs of the skill as well as the industry of the farmers. The country about Courtrai has scenery peculiar to itself at this season, from the great quantities of rape cultivated here, and is also exceedingly beautiful compared with the usual Belgian landscapes. The vistas of trees have not yet expanded their leaves; while all around, the diffuse foliage of spring, insufficient yet to conceal the distant horizon, gives to the scenery an airy picturesqueness, and divests the country of that vapidness natural to it. Here, among the unfolded leaves, some stately poplars wave their plumes—there a village steeple overlooks the humble dwellings of its inhabitants—here some straggling villa, buried in a plantation, rejoices in its seclusion—and the landscape is improved by the innumerable and thickly-set farm-places, each surrounded by a few scattered trees, while on the surface rest the farmer's hopes. Grains in every stage of their growth, and of every tint of green, flutter in the breeze; and the solid masses of ripe blossom roll in the wind, and form a beautiful contrast, from their saffron yellow, with the surrounding crops. But there is still something awanting to animate this otherwise beautiful prospect. No herds enliven the landscape—no flocks send forth their bleating—and the milkmaid's happy voice is mute. Profit, not beauty, is studied in Flanders.

From Ghent to Antwerp we pass through a part of the celebrated Pays de Waes, the most thickly populated district in the world. Where the soil is little better than sand, the most laborious culture is practised, and the greatest comparative average crops are raised of any district in the world. In many places the soil presents a mottled appearance, from the imperfect amalgamation of the sand with the decayed vegetable matter. In no part of Belgium did I see such attention paid to the tillage of each field; the consequence of which is, that the crops produced on the barren sand are not far inferior to what you will find on ordinary soil. From the thickness of the population in this locality, they are enabled to turn over mostly all the soil with the spade, which would render the tillage, one would suppose, very tedious; but the tediousness is not felt, from the smallness of the farms and the excessive looseness of the soil. A man, with no pressure but that from his hands, sinks the spade more than a foot into the ground. Here, truly, it ought to be called gardening rather than farming, from the great neatness and excessive care bestowed on each field. From the sandy nature of the soil, they are enabled to finish off each field with all the beauty of a flower-bed, while a border of well shorn grass, about ten feet in width, surrounds the field, the edge of which is most carefully pared, so that on entering one of these fields, we are apt to suppose that we are trespassing on the carefully swept lawn of some noble residence.

It is the Flemish farmers' boast that the system of agriculture they practise has been handed down unchanged to them from their forefathers; and this is the more to be wondered at, when we consider that in no country have so many and such sanguinary battles and wars been fought and carried on as in Belgium. From the trials of strength that have taken place in it between the first powers of Europe, it has justly been denominated the cockpit of Europe; and yet the scene of these dreadful struggles, the tendency of which is to retard all improvement, and to throw back to a state of pristine civilization all the arts of peace, of which agriculture is among the first, is also the seat of an organized and exemplary system of husbandry. Even when the last convulsion rent the kingdom of the Netherlands, and Belgium was subjected to all the anarchical disorder attendant upon a change in the form of government, and was deprived of the principal market for the products of its soil, its agriculture remained unchanged, and continues at present as if no such disturbance had happened.

Without attempting at present to account for this anomaly in the history of the arts of peace in a nation, we shall proceed to inquire into some of the excellences of that system which has been preserved amid the havocs of foreign and civil wars.

The farms in Flanders are small, the average size being not more than fifty imperial acres. Some are held on lease, others are not. The terms vary from three to fifteen years, some multiple of three as far as fifteen being the duration of a lease. In some the tenants have it in their power to quit at the end of every third year, while the landlord cannot put him away till his lease is out. It is impossible to say what the average rent of the farms is; but so far as I could ascertain, it may be stated at 30s. the imperial acre, for the best soils, exclusive of burdens, which are generally one-fifth of the rent.

The farmers of Belgium are a hard-working class of men—in the habit of labouring their farms, and generally ignorant of every other subject but their profession. But in it truly they shew rare sagacity and experience; and though unaided by, and almost despising, the light of science, they discover in some parts of their system of agriculture a perfection to which science has never yet guided the farmers of this or any other country. When we look back to the ancient grandeur of Belgium, when its cities were the marts and factories of Europe, and consider the consequent increase of population in a country naturally unproductive, we will discover a sufficient stimulus to excite the energies of a people gifted by nature with an indomitable perseverance and unwearied industry. This disposition, as well as its effects—their agriculture—has been handed down to the present generation of farmers, and still manifests itself in many operations which the negligent farmer would consider unprofitable, or, at least, superfluous; and it is from this praiseworthy industry that Belgium, comparatively a poor country, is considered by strangers as unrivalled in the salubrity of its climate and the fertility of its soil, and that the great part of the kingdom is prevented from returning to its original barrenness.

The number of servants who live on the farm throughout the year may be stated at six to the fifty acres, and these are paid as follows:—The men who perform the work of ploughmen and labourers receive 10s. a-month with their meat, which the farmers value at 6d. or 7d. a-day, thus making the full wages of a man equal to 25s. a-month, or 15*l*. a-year. Their food consists of boiled milk and bread for breakfast, soup or butter-milk and bread and butter for dinner, with potatoes and pork five times a-week, and bread and milk for supper. The soup used is composed, according to Mr. Radcliff, of butter-milk boiled and thickened with flour or rye bread, potatoes, salt pork, salt fish, various vegetables, and eggs. They work from daylight till it is nearly dark at this season of the year, which, after deducting the hours of rest, will be about ten hours a-day. In summer it is longer. The women, who are hired to live on the farm, receive about 4s. 6d. of wages less in the year than the men. It may be observed that almost all the farmers take the same food as their servants. The day-labourers, who are only employed at certain seasons, such as for weeding the crops and engaging in the operations peculiar to flax culture, receive 7d. and 8d. a-day, with their meat; and boys and girls have 5d. with their meat. An ordinary working man will live very comfortably in a town in the south of Belgium, paying £15 for victuals and £2 for the rent of one room for the whole year.

The farm-buildings are generally built in the form of a square, and consist of dwelling-house, byre, barn, stable, servants' sleeping-room, and cart-shed. The middle of the area included in the square is several feet below the level of the houses, and is admirably adapted for saving manure. The greatest cleanness prevails in every department of the steading.

The strength of horses kept on a farm is at the rate of a pair of horses to the fifty acres. And the number of animals supported altogether on the farm far exceeds anything we are accustomed to in this country. This, indeed, is one of the secrets of their farming; and we have no hesitation in saying that, in this particular, they excel the farming of any country with which we are acquainted. The keep of a horse is estimated at 20d. a day. It is generally fed during the winter on oats, straw, beans, and hay; and in summer on cut grass. The horses are small, but compact, handsome, with beautiful action, and high-spirited. As no attention has been paid to the improving of their breed of cows, they are not distinguished for any excellences. They answer the purpose of the dairy, for which they are principally kept: they are generally black and white in the colour. After being for some years in the dairy, they are fattened or sold lean to the butcher, who is generally feeder as well as butcher. The most of the beef used in Belgium is that of these old cows. They have a practice by which they ensure the regular feeding of the calves, which they consider essential to quick fattening. Immediately after they have got their usual quantity of milk, baskets are put on their mouths, to prevent their eating anything in the interval between the feeding times. Few sheep are kept, and these are of the worst description.

The fields are small, and are divided merely by ditches. There is no such thing as a hedge or dyke inclosing a field. These, from the peculiar management of the stock on their farms, are quite unnecessary. But where thorns are used as fences, as around nurseries and gardens, the settings are put very closely together; and, after they have sprouted up a certain length, sticks are run along horizontally, and the young shoots are tied to these, so that in a short time, from the intertwining of the shoots, now grown into branches, the fence becomes quite impenetrable. Under-drainage is never practised. Much of the soil does not require it; but to facilitate the drying of the fields, and to draw off the surface-water from the plants, a spading of earth is taken out from every furrow, and scattered over the ridge, so that, in a heavy shower, the rain-water finds a ready course to the ditches which skirt the fields.

One of the points in which the Flemings show their skill of management is the attention they pay to the working of the soil. Unless the soil has been thoroughly pulverized by repeated ploughings and harrowings, they forbear from sowing any crop. To this, in particular, among other causes, we must attribute the practice prevalent there of using small quantities of seed, and the beautiful, healthy, and equal brairds which cover the surface in spring. In many places they are not content with the mere use of the plough for this purpose, but resort to the spade also, either in giving an additional depth to the furrow, or in turning the whole soil over with this implement. In the province of Antwerp, we mentioned before that the spade was far more used than the plough for agricultural purposes.

An operation seen daily at present is the picking of the weeds from the young crops. Often the land is raked well before the workers commence their operations, for the purpose, as the farmers allege, of separating the plants, that the weeds may be more easily distinguished. But there is evidently another and more beneficial effect the raking will have upon the crops. It will loosen any crust that may have been formed on the surface, and thus admit of a more ready access of the air to the roots of the plants and the quantities of manure which are covered by the soil, thus aiding their action by a supply of oxygen. Some may object to the raking, from its exposing the plants to the action of drought; but the good derived from it, for the reasons stated, is more than sufficient to counterbalance any risk from drought. After the raking, the workers go over the whole field on their knees, picking out every useless plant. This is perhaps repeated several times in the season, according to the state which the field is in. Flax costs far more labour in weeding than any other crop; and the Flemings spend double time on it from the importance of the crop. A Scotchman, ignorant of agriculture, in passing through Belgium at this season, and seeing an extended row of women creeping on their knees among the young crops, and looking with the greatest care for injurious weeds, would be apt to extol the industry of the people, while he would accuse his own countrymen of indolence and carelessness in the minute, but no less important, points of husbandry. But he would be doing his own countrymen an injustice, in as far as he would condemn them for their non-performance of what they do in a more economical and as effectual a manner as is to be met with in Belgium: we allude to the practice of drilling grain-crops, by which means the weeding of the crop is far more expeditiously accomplished than it is by the plan resorted to in Flanders. This careful attention to the weeding of the grain crops is the more necessary in Belgium, where they are all sown broadcast; the soil is of that class which encourages the growth of annuals, and summer fallow or green drilled crops form rarely a part of their rotations.

The implements used in Flanders are so simple and rude that they scarcely deserve mention. There are two kinds of ploughs employed: one which is held by one hand only, and is of the rudest construction; and the other, called the Walloon plough, in which the body is attached, by means of its beam, to a framework on wheels, which connects it with the horses, and regulates the different depths to be ploughed. In this the mouldboard is moveable, and is changed at the end of every furrow from one side to the other.

The next subject of which we shall speak is the manures of Flanders; and some conception of the importance of this subject may be formed, when we mention that it regulates, not only the whole, but every individual part of the management of a Flemish farm. The first object and great aim of a Flemish farmer is to make or get manure; and, to carry this into effect, nothing that can contribute in the least to increasing a dunghill is thrown away. He cultivates food for cattle, and ties them up all the year round, that he may not lose any of the manure. He sows rape, and allows it to blossom and ripen, that he may obtain the seed for manure. His ashes-cart and urine barrels traverse every street in a town, every bye-way in the country, to collect this important necessary for his farm. It is in their management here that the farmers of Belgium excel those of every other country, and are thus enabled to extract more from the land than any other body of farmers. They act up, in short, to the true old adage that "Muck is the mither o' the meal kist." The principal manures used are farm-yard dung, urine or liquid manure, rape-cake, and ashes. Minerals are seldom, if ever used, and bones are almost unknown. I alluded before to the comparatively great number of animals kept by the Flemish farmers on their few acres. This they do principally for making manure, to enable them to carry out their system of farming. On a farm of 63 acres, 3 horses and 15 milch cows, and several heifers for supplying the stock were kept throughout the year, besides 6 cows and a few calves that were fattened yearly. In another, of 77 acres' extent, 4 horses and 20 cows, with a requisite number of heifers, were kept, besides from 20 to 30 calves being fattened off yearly; and in a third, of 88 acres, 5 horses and 20 cows, besides heifers and calves, were kept. These farms were all arable, and were situated in one of the finest districts in Belgium. Mostly every crop receives some of this farm-yard dung, which is always well rotted before being applied. One of the peculiarities of the Flemish system is, the extensive and various uses they make of the urine from the animals kept on their farms. Every one has heard of the urine tanks of Flanders, which are to be found all over the country, at home, and in the fields. They are built in a most substantial manner, and so far under ground, that when they are covered in, the farmer is enabled to cultivate the soil over them. Contracts are generally entered into between the farmers and those in towns who have much of this at command, such as brewers, distillers, &c., who fatten animals from the refuse of their works. £2 is commonly given for the urine of one animal for a year. The farmer, at stated periods, conveys, by means of barrel-carts, what is collected in towns to his subterraneous receptacles at the corners of his fields, to be ready for the seed-time. The crop to which it is principally applied is flax; and then they dissolve in it rape-cake, which renders it a most powerful manure. After the flax-seed has been sown and covered in, and rolled, so that the surface is made quite smooth, they proceed to apply this mixture. It is applied in the following manner:—Five men are employed altogether, two to pump, two to scatter it, and one to drive it. A rectangular piece of ground, thirty yards in breadth, is measured off across the ridge; this is sub-divided into six portions of five yards each. The field was laid off in ridges of ten yards. Six wooden vessels are filled, and placed in the middle of a ridge, at the distance of five yards from one another; so that the contents of each vessel, which is about the size of a potato firlot, is the allowance for every fifty square yards. There is nothing in which they manifest such economy as in the saving of this material, which they prize as a most valuable assistant to their labours. Rape-cake, besides being applied, as mentioned above, with the liquid manure, is also used in a dry state. The rape is cultivated principally as a manure, and is used extensively where the cropping is very severe. Ashes are never used but as a top-dressing to clover; but the traffic which is carried on in them, between Holland and Belgium, is sufficient to form a distinct trade with a certain class of merchants in Belgium. The farmers in Belgium set a high value on them, and place so much dependance on them for the success of their clover-crop, that (I understand, from what I have read) there is a current saying among them, that "He who buys ashes for his clover-crop, pays nothing; but he that does it not, pays double." It is really surprising that this manure, which has been proved to be so efficacious by a class of experienced farmers like the Flemish, has never yet been tried, or at least sufficiently tested, in Scotland. I believe some were imported in the beginning of this year by Messrs John Mitchell & Co., in Leith; but I am not aware that they have met with the reception we would anticipate from the well-known successful results of their application in Belgium. There is nothing so much wanted at present, in the agriculture of Scotland, as a good lasting top-dressing for clover. The failures in this crop have been frequent of late, and the effects of nitrate of soda last only with the crop to which it is applied, while sad disappointments have been experienced in the use of gypsum. But before recommending an extensive use of this material, I would suggest a few comparative trials to be made with it, gypsum, soot, and other substances; for if the failure of gypsum arose from there being a supply of it already in the soil sufficient for the growth of the plant, an application of Dutch ashes might be attended with a similar result, as the great proportion of the ingredients of the ashes are salts of lime, with the useful addition, however, of some salts of soda. Some attribute their great effects in Belgium to the lime which they contain, as few of the soils there have any amount of lime in their composition. They are applied in different quantities to the soil, from ten to thirty bushels an imperial acre.

The crops raised in Belgium are wheat, oats, rye, flax, potatoes, rape, and clover, as principal; and, as secondary, turnips, carrots, buck-wheat, tobacco, and spurry. The farmers consider flax and rape the best paying crops they cultivate, and they are the most exhausting; hence the enormous quantities of manure given them. The rape is sown in July, transplanted in September, and cut in June of the next year. The clover, which is grown for seed as well as for food for cattle, is an important crop with the Flemish farmer. He is not particular among what he sows it. We find it growing amongst flax, wheat, oats, or rye. There are two varieties of rye used, winter and spring. The winter variety is almost always sown after potatoes in December, and some of it is cut green in spring, before the clover is ready for cutting. It thus answers the purpose of early tares in this country. Another crop is taken the same year, after it is cut. The ground is ploughed several times for potatoes. When the last ploughing is finished, the furrows of which are about seven inches wide, one man walks up one of the furrows, and, with an instrument similar to that used for picking turnips, makes a hole, into which a boy drops the cutting of a potato. Eight inches farther on, another potato-set is put, in making the hole for which he draws the soil over the previous setting. This he does every second furrow, so that the distance between each row of potatoes is not more than fourteen inches.

One man and a boy do about 450 yards in this manner in an hour. The turnips are almost always taken as a second crop in the year. Immediately after the rye is cut, they begin to prepare the land for turnips; and, by the powerful agency of the liquid manure, a beautiful braird is obtained in a few days. The turnips have attained a pretty good size when they are pulled, and, with the potatoes, form the winter food for the animals on the farm. Carrots are often sown with flax, so that they are enabled to have two crops the same year from the land; for by the time the flax is pulled, the carrots are considerably advanced. This method of double cropping is very frequent in Flanders, and is another instance of what, by economy of manure and a judicious application of it, they are enabled to produce from the soil.

The next subject which comes naturally after this is the rotation of crops practised in Flanders. I was prepared, before crossing the channel, to encounter some little difficulty in this subject, from having read of the great variety of rotations to be found there. Every field, Mr. Radcliff tells us, has its own rotation. But the four, five, or six years' courses to which we are accustomed in this country, made me form but a faint idea of the difficulties of comprehending the Flemish courses; and therefore, when I began to study them, these exceeded my greatest anticipations, and every day that I renewed my inquiries but plunged me into greater perplexities. I could perceive no fixed principle on which they founded their constantly varying rotations. The same farmer would give me one day one rotation, and the next another totally different from yesterday's, as the rotation he practised on his farm; and, were I to transcribe all the various systems I jotted down in my note-book, as those followed on farms within the narrow compass of a few miles, I would fill as many pages as this short sketch of Belgian farming would require. With such conflicting statements, and with no prospect of unravelling the mystery, I began to solace myself with the thought that the Flemings had no such thing as a rotation; that they knew the value of a change of crops each year, and therefore they practised a succession rather than a rotation, of crops. If they are rotations, it is difficult to tell where they commence and where they end; and they are besides extremely long. The principle they seem to go upon is, that the same crop shall not be taken two successive years from the same land. And on examining my heterogeneous mass of rotations, I have been enabled to trace out the few following facts:—That wheat and rye almost always succeed potatoes; and rye, potato wheat: the place of flax seems to be after oats, and before wheat or rye. Clover is sown with any of the principal crops. Rape seems to succeed oats or rye. I think I cannot do better than conclude this part of the subject in the words of Mr. Radcliff—

"In Flanders they would consider their industry and their manure inefficacious without the aid of a precise and well-regulated rotation; hence the variety of successions which we observe at every variation of the soil. They have been farmers time out of mind, rotation farmers for centuries; there is not a cultivated acre, the properties of which are not matter of notoriety; and, according to those properties, the most suitable succession and the most profitable application of manure have been long since resolved on, and are now invariably practised."

It may not be out of place here to introduce the management of a farm in the high country, or Walloon district. The farms there are much larger than in the low country: 150 acres are there considered a small farm, and many of them are 1,000 acres in extent. The size of the farm about which I obtained most information was 200 acres. The whole of it was under the plough but twelve acres of meadow. There were only three ploughs used; but twelve horses were kept, and used for farm work alone. The cause of this great number of horses is, that they never put fewer than four horses, and often six, into their waggons. They have, besides, twelve young horses of different ages, and fifteen cows, which is the whole of the stock kept on the farm. The rotation is generally potatoes, wheat, rye, oats, with clover sown with one or other of them. When we speak of this being the rotation, we do not mean that it is followed with unaltered regularity; for the most profitable crop here is wheat, which the farmer endeavours to grow on a third of his farm. They are near lime here, of which they avail themselves, by applying considerable quantities to the soil. I saw some applied as a top-dressing to young clover. Ashes are also used for the same purpose; but they are much redder in the colour than those I saw in the low country. The coal burnt here is always mixed with clay, to bind the pieces together, as it is all in small pieces, the largest not being larger than a hen's egg. This may cause the red colour in the ashes referred to. They are not so careful of their manure as in Flanders, nor does the same attention seem to be paid to the land. Wages are much the same as those mentioned before.

This is a rough outline of Belgian farming, from personal observations there. I must admit that there is much that might be very profitably introduced and mingled with Scottish husbandry. A little more latitude and variety in our rotations would, while it would increase our productions, benefit the soil. But such a change would have to be introduced with caution, as otherwise it would shake the whole fabric of our agriculture, which rests so firmly on its present foundation; and while we would cull out the excellences of Flemish farming, and engraft them on our own system, we would not commend it as a whole. And he who would attempt to introduce it into this country, either as a whole or in certain of its parts, would not only expose himself to ruin, but prove himself ignorant of the different states of the two countries, and of the first rudiments of good farming. P. M'L.

ON RENT.

By Cuthbert W. Johnson, Esq., F.R.S.

(Continued.)

THE LEASE.

That the Legislature should at length have deemed the granting of leases, a practice worthy of additional legislative encouragement is a fact worthy of the farmers' considerable congratulation. This feeling the present Parliament have indicated very clearly, by the Act of last Session, just printed (8 and 9 Vic. c. 124), for the preamble commences with the declaration that "it is expedient to facilitate the leasing of lands and tenements;" and then acting in the true common-sense spirit of a senate legislating for country gentlemen and non-legal farmers, they proceed in its opening sections thus to define what a lease shall be *held* and *construed* to *include:*

"Be it, &c., enacted, That whenever any party to any deed made according to the forms set forth in the first schedule to this Act or to any other deed which shall be expressed to be made in pursuance of this Act, shall employ in such deed respectively any of the forms of words contained in column one of the second schedule hereto annexed, and distinguished by any number therein, such deed shall be taken to have the same effect, and be constructed as if such party had inserted in such deed the form of words contained in column two of the same schedule, and distinguished by the same number as is annexed to the form of words employed by such party; but it shall not be necessary in any such deed to insert any such number.

"That every such deed, unless any exception be specially made therein, shall be held and construed to include all outhouses, buildings, barns, stables, yards, gardens, cellars, ancient and other lights, paths, passages, ways, waters, watercourses, liberties, privileges, easements, profits, commodities, emoluments, hereditaments, and appurtenances whatsoever, to the lands and tenements therein comprised belonging or in anywise appertaining."

"That this Act shall not extend to *Scotland.*"

Having thus cleared away a mass of doubts, and legal sources of uncertainty which have gradually, by the ingenuity of legal pleadings and the definitions of learned judges, accumulated around very apparently plain every-day modes of expression, the Act next gives the form of a sufficient lease, unexampled in legal history for its brevity. The following is a complete copy of it. It forms the first schedule to which the Act itself refers.

"*This indenture, made the day of one thousand eight hundred and forty-* [or other year], *in pursuance of an Act to facilitate the granting of certain leases between* [here insert the names of the parties and recitals, if any] *witnesseth, that the said* [Lessor] *or* [Lessors] *doth or do demise unto the said* [Lessee] *or* [Lessees], *his* [or their] *Executors, Administrators, and Assigns, all, &c.* [parcels], *from the day of for the term of thence ensuing, yielding therefore during the said term the rent of* [state the rent and mode of payment].

"*In witness whereof the said parties hereto have hereunto set their hands and seals.*"

Having thus given the form of the lease, the second schedule of the Act proceeds to give firstly, in a column marked number one, an abridged form of words, in which the usual covenants of leases may be expressed; and secondly, in another column marked number two, the Act furnishes at length an explanation (in case of disputes arising as to the intention of the parties), by which the farmer will see, by comparing the simple form of words which the Act declares by column No. 1 to be sufficient, with those, which in column marked No. 2 was, previous to the passing of this Act, deemed necessary to explain the meaning of the Landlord and Tenant, how great a mass of verbiage may now be avoided. I will now give the form of each common covenant from column one, and under it add its exposition or enlarged form from column two; and to assist the reader in the more readily comparing the form, now sufficient with its enlarged exposition, I will give the form prescribed by the Act in italics.

"1. *That the said* [Lessee] *covenants with the said* [Lessor] *to pay rent;*" (the legal meaning of which is thus defined by colume 2)—

"And the said Lessee doth hereby, for himself, his Heirs, Executors, Administrators, and Assigns, covenant with the said Lessor, that he the said Lessee, his Executors, Administrators, and Assigns, will during the said term pay unto the said Lessor the rent hereby reserved, in manner herein-before mentioned, without any deduction whatsoever."

"2. *And to pay taxes;*" (which is thus enlarged in column 2)—

"And also will pay all taxes, rates, duties, and assessments whatsoever, whether parochial, parliamentary, or otherwise, now charged or hereafter to be charged upon the said demised premises, or upon the said Lessor, on account thereof (excepting land-tax, and excepting, in Ireland, tithe rent-charge and such portion of the poor rate as the Lessor is or may be liable to pay, and excepting also all taxes, rates, duties, and assessments whatsoever, or any portion thereof, which the Lessee is or may be by law exempted from)."

"3. *And to repair;*" (thus given in column 2)—

"And also will during the said term well and sufficiently repair, maintain, pave, empty, cleanse, amend, and keep the said demised premises, with the appurtenances, in good and substantial repair, together with all chimney-pieces, windows, doors, fastenings, water-closets, cisterns, partitions, fixed presses, shelves, pipes, pumps, pales, rails, locks, and keys, and all other fixtures and things which at any time during the said term shall be erected and made, when, where, and so often as need shall be."

"4. *And to paint outside every year;*" (thus given in column 2)—

"And also that the said Lessee, his Executors, Administrators, and assigns, will in every year in the said term paint all the outside woodwork and iron-work belonging to the said premises, with two coats of proper oil colours, in a workmanlike manner."

"5. *And to paint and paper inside every year;* (thus given in column 2)—

"And also that the said [*Lessee*], his Executors, Administrators, and Assigns, will in every year paint the inside wood, iron, and other works now or usually painted, with two coats of proper oil-colours in a workmanlike manner; and also re-paper with paper of a quality as at present, such parts of the premises as are now papered; and also wash, stop, whiten, or colour such parts of the said premises as are now plastered."

"6. *And to insure from fire in the joint names of the said* [Lessor] *and the said* [Lessee]*; to show receipts; and to rebuild in case of fire;*" (thus given in column 2—

"And also that the said Lessee, his Executors, Administrators, and Assigns, will forthwith insure the said Premises hereby demised to the full value thereof, in some respectable Insurance Office, in the joint names of the said Lessor, his Executors, Administrators, or Assigns, and the said Lessee, his Executors, Administrators, or Assigns, and keep the same so insured during the said term; and will, upon the request of the said Lessor, or his Agent, show the receipt for the last premium paid for such insurance for every current year; and as often as the said premises hereby demised shall be burnt down or damaged by fire, all and every the sums or sum of money which shall be recovered or received by the said [*Lessee*], his Executors, Administrators, or Assigns, for or in respect of such insurance, shall be laid out and expended by him in building or repairing the said demised premises, or such parts thereof as shall be burnt down or damaged by fire as aforesaid."

"7. *And that the said* [Lessor] *may enter and view state of repair, and that the said* [Lessee] *will repair according to notice;*" (thus given in column 2)—

"And it is hereby agreed, that it shall be lawful for the said Lessor and his Agents, at all seasonable times during the said term, to enter the said demised premises to take a schedule of the fixtures and things made and erected thereupon, and to examine the condition of the said premises; and further, that all wants of reparation which upon such views shall be found, and for the amendment of which notice in writing shall be left at the premises, the said Lessee, his Executors, Administrators, and Assigns, will, within three calendar months next after every such notice, well and sufficiently repair and make good accordingly."

"8. *That the said* [Lessee] *will not use premises as a shop;*" (thus given in column 2)—

"And also that the said Lessee, his Executors, Administrators, and Assigns, will not convert, use, or occupy the said premises or any part thereof into or as a shop, warehouse, or other place for carrying on any trade or business whatsoever, or suffer the said premises to be used for any such purpose, or otherwise than as a private dwelling house, without the consent in writing of the said Lessor."

"9. *And will not assign without leave;*" (thus given in column 2)—

"And also that the said [*Lessee*] shall not nor will during the said term assign, transfer, or set over, or otherwise by any act or deed procure the said premises or any of them to be assigned, transferred, or set over, unto any person or persons whomsoever, without the consent in writing of the said [*Lessor*], his Executors, Administrators, or Assigns, first had and obtained."

"10. *And that he will leave premises in good repair;*" (thus given in column 2)—

"And further, that the said [*Lessee*] will, at the expiration or other sooner determination of the said term, peaceably surrender and yield up unto the said Lessor the said premises hereby demised, with the appurtenances, together with all buildings, erections, and fixtures now or hereafter to be built or erected thereon, in good and substantial repair and condition in all respects, reasonable wear and tear, and damage by fire, only excepted."

"11. *Proviso for re-entry by the said Lessor on nonpayment of rent or nonperformance of covenants;*" (thus given in column 2)—

"Provided always, and it is expressly agreed, that if the rent hereby reserved, or any part thereof, shall be unpaid for fifteen days after any of the days on which the same ought to have been paid (although no formal demand shall have been made thereof), or in case of the breach or nonperformance of any of the covenants and agreements herein contained on the parts of the said Lessee, his Executors, Administrators, and Assigns, then and in either of such cases it shall be lawful for the said Lessor, at any time thereafter, into and upon the said demised premises, or any part thereof in the name of the whole, to re-enter, and the same to have again, re-possess, and enjoy as of his or their former estate, any thing herein-after contained to the contrary notwithstanding."

"12. *The said* [Lessor] *covenants with the said* [Lessee] *for quiet enjoyment;*" (thus given in column 2)—

"And the Lessor doth hereby, for himself, his Heirs, Executors, Administrators, and Assigns, covenant with the said Lessee, his Executors, Administrators, and Assigns, that he and they, paying the rent hereby reserved, and performing the covenants herein-before on his and their part contained, shall and may peaceably possess and enjoy the said demised premises for the term hereby granted, without any interruption or disturbance from the said Lessor, his Executors, Administrators, or Assigns, or any other person or persons lawfully claiming by, from, or under him, them, or any of them."

Such then is the present simple form by which leases of lands may now be granted—an advance in legal good sense, which it is to be hoped will materially facilitate the acquisition of leases, and thus as a natural consequence of increasing a fixity of tenure, encourage the application of more capital to land. The friend of his country therefore will rejoice at this tardy effort of legislative good sense; since the results to which I have alluded will lead to better modes of cultivation, greater fertility of the soil, more individual comfort and prosperity, and still further advances in national riches.

CHEPSTOW FARMERS' CLUB.

THIRD ANNUAL REPORT.

The committee of the Chepstow Farmers' Club, in introducing their Third Annual Report to the members, must begin by troubling them with a few observations relative to the past and future proceedings of the society. Owing to the difficulty experienced in procuring so frequently fresh subjects for discussion, it has been deemed advisable to alter the meetings from once a month to once a quarter, which, including the anniversary, will make five meetings in each year. The committee sincerely hope that the members will continue to change their books with the librarian every month as heretofore, convinced as they are that it is only by studying the agricultural publications of the day that a farmer can become acquainted with the new improvements, and thus be enabled to keep his ground during the rapid progress that is now making by all classes in the acquirement of knowledge. Should the pressure of business or the number of subjects for discussion justify such a measure, it will be easy for the members, at any meeting, to fix upon an extra day to assemble at any convenient time besides those named at the end of this report.

The committee have again to congratulate the members on the addition of many new members, and they have also to express their gratitude in the name of the club to those gentlemen who, as honorary members, have so liberally contributed to its support. Still, there are many names that they would willingly see on the list, who have not yet favoured the club with their aid, whose assistance would enable the committee to offer a more extended list of premiums to labourers and servants in the different branches of agricultural labour.

The committee recur with pleasure to everything connected with the anniversary. The number of teams entered, and the superiority of the ploughing, both exhibited a decided improvement, when compared with the preceding year, which at that time, it must be admitted, were thought worthy of great praise. The attendance at the dinner was much larger than last year, though the committee are compelled to acknowledge that they hope to see more of the landlords meeting their tenants at the next anniversary. They also hope to be favoured with the company of the neighbouring clergy, upon whom would devolve the pleasurable duty of saying grace, and returning thanks for the toast, "The Bishop and Clergy of the Diocese,"—the performance of which latter duty would give a minister of our church an opportunity of suggesting any measure for the improvement of the religious and moral condition of the labouring classes that he might consider likely to prove beneficial.

The committee have great pleasure in announcing that Dr. Morris (a gentleman of great scientific and literary attainments) has not only offered to give lessons in chemistry, geology, and natural philosophy, to any of the young members, but has also promised to give books on those subjects as prizes to those who make the most progress in their studies. The committee fervently hope that many will take advantage of this liberal proposal, and thus combine science with practice in pursuing the study of agriculture.

At the January meeting the secretary read the following extract from Davy's Elements of Agricultural Chemistry, "on the effect of lime," forwarded by a gentleman residing in the neighbourhood :—

"Quick-lime, on being applied to land, tends to bring any hard vegetable matter it contains into a more rapid state of decomposition and solution, so as to render it a proper food for plants. It is upon this circumstance that the operation of lime on the preparation for wheat crops depends, and its efficacy in fertilizing peats, and in bringing into a state of cultivation all soils abounding in hard roots or dry fibres, or inert vegetable matter.

"Lime made from the Breedon limestone is used in Leicestershire, where it is called 'hot' lime; and I have been informed by farmers in the neighbourhood of the quarry that they employ it advantageously in small quantities, seldom more than 25 or 30 bushels to the acre, and that they find it may be used with good effect in larger quantities upon rich land.

"Magnesia has a much weaker attraction for carbonic acid than lime, and will remain in the state of caustic or calcined magnesia for many months, though exposed to the air ; and as long as any caustic lime remains, the magnesia cannot be combined with carbonic acid, for lime instantly attracts carbonic acid from magnesia.

"When a magnesian limestone is burnt, the magnesia is deprived of carbonic acid much sooner than the lime; and if there is not much vegetable or animal matter in the soil, to supply by its decomposition carbonic acid, the magnesia will remain for a long time in the caustic state; and in this state acts as a poison to certain vegetables. And that more magnesian lime may be used upon rich soils, seems to be owing to the circumstance that the decomposition of the manure in them supplies carbonic acid; and magnesia, in its mild state, *i. e.*, fully combined with carbonic acid, seems to be always a useful ingredient of soils.

"That the theory which I have ventured to give of the operation of magnesian lime is not unfounded, is shown by an experiment which I made expressly for the purpose of determining the true nature of the operation of this substance. I took four portions of the same soil: with one I mixed 1-20th of its weight of caustic magnesia; with another I mixed the same quantity of magnesia and a proportion of a fat decomposing peat equal to one-fourth of the weight of the soil ; one portion of the soil remained in its natural state; and another was mixed with peat without magnesia. The mixtures were made in December, 1806, and in April, 1807, barley was sown in all of them. It grew very well in the pure soil, but better in the soil containing magnesia and peat, and nearly as well in the soil containing peat alone ; but in the soil containing the magnesia alone it rose very feebly, and looked yellow and sickly.

"I repeated the experiment in the summer of 1810 with similar results ; and I found that the magnesia in the soil mixed with peat became strongly effervescent, whilst the portion in the unmixed soil gave carbonic acid in much smaller quantities. In the one case the magnesia had assisted in the formation of a manure, and had become mild; in the other case it had acted as a poison.

"It is obvious from what has been said, that lime from the magnesian limestone may be applied in large quantities to peats; and that where lands have been injured by the application of too large quantities of magnesian lime, peat will be a proper and efficient remedy. I mentioned that magnesian limestone effervesced little when plunged into an acid. A simple test of magnesia in a limestone is this circumstance, and its rendering diluted nitric acid or aqua fortis milky."

Mr. John Sandford introduced the subject for the evening, "The best manner of keeping Farm Horses in the Summer," by reading the following paper:—

"The best and cheapest method of keeping farm horses through the summer is, in my opinion, to feed them on lucerne: you will be enabled to cut the lucerne three or four times during the summer, so that I think two acres of land of middling quality will be sufficient to keep four horses five summer months. And I should give the lucerne to the horses out of doors, I mean in cribs in a fold-yard with a shed instead of in a stable, being as I consider more healthy for the horses, and it is also attended with less trouble. I prefer lucerne to any other summer feed, knowing it to be quite as good or better keep than vetches, and it is also much cheaper; and when you have a plant of lucerne it is much more sure than vetches, for the winter or slug sometimes destroys your vetch crop, which is not the case with lucerne, and to my knowledge lucerne will last on the same land twenty years in as great vigour as ever, coming to cut three and sometimes four times in a season. The cheapness will be evident from the following calculation:—Take four acres of land of middling quality for vetches, which I consider equal to keep four horses five months; now I shall charge two acres at half the full rent, &c., because the vetches will be off in time to sow turnips, and the other two acres I shall charge at the full rent, being too late for a turnip crop; and I shall also take two acres of lucerne, which I consider equal to keep four horses five months, supposing the same quality of land at the same price per acre:—

	£	s.	d.
Rent, tithes and taxes of 2A. of land for vetches at 30s. per acre	3	0	0
Ditto, ditto, cleared for turnips, at 15s. per acre	1	10	0
Seed for 4A. 10 bushels at 7s. . . .	3	10	0
Sowing and harrowing 4A.	1	0	0
Cutting 4A.	0	8	0
	9	8	0
Per horse for five months . . .	2	7	0
Rent, tithes and taxes of 2A. for lucerne, at 30s. per acre	3	0	0
Cutting 3 times at 2s. per acre . . .	0	12	0
Allowance for seed per yr. at 2s. p. acre .	0	4	0
	3	16	0
Per horse for five months . . .	£0	19	0

The discussion then turned on the best method of cultivating lucerne, whether in drills or broadcast, when the opinions in favour of each method were equal, though all agreed that the land should be perfectly clean previous to being sown.

The subject for the evening's discussion at the February meeting—*The best manner of cultivating sainfoin, and the soil best adapted for its production*—was introduced by Mr. C. Blunt, who said: I consider that a great deal of the stony, hilly land in this neighbourhood ought to be cropped with sainfoin, because I know from actual experience that it pays better under that crop than any meadow land. To grow it successfully a dry soil is indispensable, and with that proviso it will flourish on most soils. I am not prepared to say from actual experience whether thorough draining will sufficiently alter the texture of clay, so as to adapt it to the growth of sainfoin or not; but I rather conclude it could never become so well suited to the habits of this plant as the other descriptions of soil. The first step in the cultivation of sainfoin is to have the land intended to be sown clean; though it is true that once, having just entered on a farm in a very foul state, I sowed a piece of land with sainfoin that was far from clean, and it succeeded very well: but I only quote this as what I did once as a matter of expediency, and would by no means recommend any one to follow the example. The best manner of putting in the seed is with a spring crop of corn, neither too early nor too late, as I have found the young plant, just as it comes out of the ground, is too tender to bear the frost, and when late and dry weather sets in, the seed is apt only to vegetate partially. I think it may be sown any time from the beginning of March to the middle of April. The best way of putting the seed in the ground is to drill at 6 inches wide: when sown broadcast, it is difficult to cover. I should recommend four bushels per acre to be drilled, and five bushels to be sown broadcast; and I think it better not to sow any clover or grass seed with the sainfoin. The crop should be allowed to stand for seed the first year, and not be cut too low. I am of opinion there cannot be a more useful grass: it is invaluable for lambs in the fall of the year, but should never be grazed in the spring. It not only prevents lambs from scouring, but I have often cured some of this complaint by putting them on the sainfoin. It is very early at harvest, and is very easily made into hay, only requiring to be turned once in good weather, and should not be shaken more than can be avoided: it should be cut for hay when in full blossom, at which time the flowers are red, and as soon as they turn blue the hay is fit to carry. It is not liable to heat in the stack: it will last many years, mowed every year, without manure, and when broken up will leave the land in much better condition for corn than when it was laid down. I should particularly recommend none but new seed to be sown, as the husks of old seed become so tough as to prevent it from vegetating. I consider the crop to be in its prime about the fifth year, though it will last as good for several years. I have grown about twenty-five bushels of seed to the acre, and have found the straw excellent to cut for horses after thrashing out the seed, while sheep will eat it much better than clover, owing to the stems of the sainfoin being sweet, and those of the clover bitter.

Mr. R. Phillpotts recommended trefoil to be sown with the sainfoin, because it ensured a crop the first year, and then died off without injury to the latter.

Another Member said that he once sowed clover with the sainfoin, and had a good crop of the former the first year, but the latter never came to any thing, which he attributed to the injury it sustained by the clover.

Mr. C. Townsend said he sowed the worst piece of ground on his farm with sainfoin, and had cut three waggon loads of hay per acre every year since.

Mr. Blunt added, that although sainfoin could do very well on stony land where the roots would get between the stones, still if the soil were very thin, on a flat rock, it would be very liable to burn up in a dry summer.

At the March meeting, Mr. T. Pride introduced *The best manner of draining land,* as a subject for discussion.

Mr. Pride commenced by saying, that he could not undertake to enter into all the different plans of draining that are successfully practised, varying according to the different nature of the soil, and the causes which render it too wet for proper cultivation, especially so since he had not come prepared to enter on the subject at all, it having been intended for discussion at the next meeting. As it is, he considered draining to be of the first importance; and whoever delayed the process on land that required it, incurred a serious annual loss to himself, and did not fulfil his duty to the community in general. For himself, he had drained some land with complete success, and was now draining on a small farm he had taken into his hands expressly for that purpose. He was not prepared to enter into a description of the best manner of draining land where the superabundant water came from partial springs, for he was convinced that it was only by long experience and closely observing the land to be operated upon, that any one would be competent in su h a case to decide upon the most effectual and economical method of removing the superfluous water. He would confine his remarks to land that required parallel or thorough draining, and give his opinion, as far as the little knowledge he possessed on the subject enabled him, as to the best manner of effecting the desirable end. In the first place, he was decidedly in favour of running the drains right up and down the fall, instead of what is called oblique or diagonal draining: he considered that the deposit from the water was much more likely to lodge in oblique drains, and consequently made them liable to blow up. Where they were to be obtained, he preferred stones to anything else for forming the drain; he uses flattish stones at first, which are put in edgeways, so as to form an opening in the form of a triangle with a base at the bottom, and then has the drain carefully filled up to within twelve inches of the surface with broken stones about two inches in diameter. He was laying his drains 18 to 20 feet apart, but in very stiff land he should not put them wider than 15 feet. He was now draining some land at a depth of 30 inches, and in cutting the drains he found stones enough to fill them up. He paid 9d. for seven yards of drain, cutting and filling: if the stone had to be carted, it would of course cost him more, but now this was the whole of the expense. He should recommend the drains to be from 30 inches to 3 feet deep, never less than the former.

Mr. T. Perkins preferred diagonal draining, taking the main drain up the middle of the ground, and bringing the cross drains obliquely into it from both sides. He drained a piece of land with the fall eleven years ago, but did not find the remedy effectual: he had now cut other drains across, and had completely dried the field. He found all the drains open and acting when they were cut through, but they did not thoroughly drain the land: the first were only 20 inches deep, while the other drains were from 2 feet 6 inches to 3 feet.

A Member stated, that the difference in the depth most probably caused the difference in the result, and had the first drains been deeper, he thought the cross drains would not have been requisite.

Mr. W. Baker once tried cross draining, which did not answer; but finding some benefit from the main drain, which went straight up the field, he put some more parallel with it, which effectually drained the piece of land. He considered that draining with the fall was decidedly best.

Mr. D. Baker said, he intended to sow some cow grass instead of red clover; but a member advised him not to do so on the land, which was a shallow soil at a considerable elevation. He found that it required a good deep land to grow it to advantage, and then the produce was nearly equal to broad clover, and the stem being solid did not cause hoven in cattle. He had tried it repeatedly on a shallow soil with very poor success.

At the meeting in April, the following paper from Mr. D. Morris was read:

"Having had the opportunity of reading your report for 1843, I observed an article introduced by Mr. C. Blunt, on the cultivation of that most useful root, the turnip. As I have had some little experience in growing turnips, and as you are naturally desirous of obtaining all the information you can, I think there can be no harm in forwarding a line or two on the subject. The first thing to be considered is the fallow; for without a clear fallow, thoroughly pulverized and properly manured, a crop cannot be expected.

"Mr. C. Blunt says, the land intended for turnips, previously cleaned, should be ploughed deep and left rough for the winter. This deep ploughing should never be omitted; and after it is completed, the hedges round the field should be kept in good order, and the gates locked to prevent stock of all kinds from treading the land in wet weather. The late celebrated Arthur Young said, that not even a hunter should be allowed to cross the field. The land done thus, with these precautions attended to, will be thoroughly pulverized by the action of the frost, and in cross ploughing the land in the spring it should be at the same depth as the previous ploughing: if turned up any deeper it will cause a bad tilth, because the fresh land, when brought to the surface, and exposed to the sun and wind, will bake as hard as bricks, and never can be reduced to a proper tilth for turnips. I am speaking of our stiff limestone land, though soils of all kinds must be improved by having a deep furrow before winter. The next thing to be considered is manure: there are so many kinds offered to the farmer at the present day, that he is puzzled which of them to choose, and when he has made his selection, he wants to know the least quantity of these expensive manures that will produce a full crop of turnips. Here we want to know a little of chemistry—a science of which I am sorry to say I know nothing, and I am not acquainted with any farmer who is better informed in this respect. Then the only way is for us to try these manures in different quantities and various ways, and to communicate the result to each other. The only artificial manure I have tried is bones, and as far as my trials have gone I will state to you. In 1840 I drilled six quarters of neat bones on two acres, with white globe turnips: the field was six acres, and the crop by no means a good one. If one quarter of bones, with three quarters of well screened coal ashes, had been used to the acre, the bones would have manured the whole field instead of only two acres, and would have produced a better crop. In 1841, I sowed a field of Swedes: the manure was two qrs. of bones and two quarters of soot per acre. This was nearly a failure; as wherever the soot came in contact with the seed it was present death to it, and the soil so preserved the bones that they could be seen twelve months after.

"In 1842, I sowed a field of Swedes; the manure was bones and coal ashes over three-fourths of the field, at the rate of four quarters to the acre. I divided the field into four parts of two acres each:

To lot No. 1, 3 qrs. bones and $\frac{1}{4}$ ashes.
No. 2, 2 qrs. bones, 2 qrs. ashes.
No. 3, $\frac{1}{4}$ bones, $\frac{3}{4}$ ashes.
No. 4, 8 qrs. ashes, per acre.

"The crop on No. 1 was very strong in the leaf, with a large long top; No. 2 was a heavier crop with a small top; No. 3 was not far short weight to No. 2; No. 4 was not a quarter of a crop. The field was drilled the first week in June. From what I have stated you will perceive there is a waste of bones in No. 1, and that if the bones had been equally divided over the field there would have been an even and a good crop. I think coal ashes mixed with bones is for better than bones alone: two quarters of bones and two quarters of coal ashes will grow a better crop than four quarters of neat bones. The bones and ashes should be mixed thirty-six hours previous to sowing, because the mixture gets into a high state of fermentation, and when drilled the bones decompose very fast, and cause a much more rapid growth of the plant than when used in a dry state. The next thing to be considered is the seed. Every farmer should prove his seed by putting forty into a pot, and covering them one inch deep with fine mould. Should every seed vegetate, 2 lbs. per acre will do, but if one-fourth fail (which is often the case) $2\frac{1}{2}$ lbs. and so on. Mr. Coke, the late Earl of Leicester, made it a rule to drill 3 lbs. of good seed per acre, and he never failed in his crop: he used to say there was plenty for the fly, plenty to hoe, and plenty for a crop.

"Mr. C. Blunt says, the best time to sow Swedes is from the last week in May to the middle of June. In 1842 I sowed three drills on the 5th of May, and the rest of the field the first week in June, and there was more weight of Swedes on those 3 drills than on 9 of the others. The manure was twelve loads of dung to the acre, ploughed in before Christmas. Last year I repeated the same experiment on the same dates, and the whole of this field was a good crop; but the three May drills were double the weight of those sown in June: the manure the same as for the first trial. It should be borne in mind that a Swede is a much slower growing plant than a common turnip; the latter will grow as much in one month as the former will in two.

"In the Report of the Monmouth Farmers' club for 1843, p. 34, we read of a liquid mixture applied to the soil as a manure for turnips; but I think the method of applying it a very clumsy one, being a broadcast method with the manure, and the drill system with the seed; consequently the crop does not get half the benefit of the manure. I should say, as an improvement on this plan—take a tub made in the shape of a sugar-loaf, with a lid that will fit tight on the large end, and a fixed bottom in the small end: inside the tub, two inches from the fixed bottom, let there be a moveable bottom bored thick with holes to act as a strainer; the tub should hold nine or ten gallons. In the side of the tub, between the moveable and fixed bottoms, fix a cock open at both ends; it must be a stop cock with an index attached to it, that it may be readily turned to a point to answer the quantity to be applied to the acre. Then remove the box or hopper from the bone drill, and fix this tub in its place. Then take a lead tube with a bell mouth, and fix it under the cock with the small end in the bone dust share. With a steady horse and a few drills practice, keeping the cock turned to the desired point, liquids may be drilled much easier than solid manure. If farmers would take the trouble to collect the urine made by the stock that is housed in the winter months, they would be able to let the bones remain quiet in their grave."

The best mixture of clover and grass seeds for sowing with corn in the spring, and the best management to avoid failure in the crop—was introduced by Mr. R. Philpotts in the following paper:—

"In introducing to you the best varieties of artificial seeds and grasses for spring sowing, I beg to state, that in my opinion, thick planting is the most certain way of ensuring a crop. I think from 6 to 8lbs. of broad clover, 4lbs. of trefoil, and 2lbs. of white Dutch, with one peck of rye grass, should be sown per acre: I think the Italian rye grass preferable. These seeds to be sown with barley from the latter end of March to the latter end of April. The land to be worked down very fine before planting, and the small seeds to be covered as lightly as possible, as we often put the seed in too deep when the land is in a rough state, and I think that seed deposited in the earth one inch under the surface will not one half of it vegetate. Therefore, I should recommend the harrows to be very light for covering the seed.

"In the autumn, about October, after the barley crop is taken off, I should recommend the land sowed with seeds to be rolled down with a heavy stone or iron roller, and not to be eaten off with sheep after that time; and in the spring of the following year, in February or March, to have a second rolling, should there be any appearance of the plants failing. I believe the cause of the uncertainty of securing artificial grasses in perfection is the too frequent repetition of them; the general system being to sow clover once in four years, of which regular course the land has become tired. Therefore, I have found the most certain way of securing a crop is to vary the seeds as much as possible, as I think once in eight years is quite often enough for broad clover. I have found that by sowing marl or cow grass on some of my land, and white Dutch on another portion, I have succeeded for the last three or four years in growing the artificial grasses."

The May meeting falling on Whit Monday, very few members attended, and there was no discussion.

The June meeting was entirely devoted to the arrangement of the prize list.

The whole of the time of the September meeting was taken up in receiving the candidates' claims, and making arrangements for the ploughing match. It was unanimously resolved to accept the offer of a field of clover ley, for the ploughing match, made by Mr. S. Matthews, of Ifton-hill, and to return him the best thanks of the club.

Extract from the Farmer's Mag., Jan., 1845.

To the Members of the Chepstow Farmers' Club.

"REPORT.—In giving a brief report of what we observed during our survey of the farms of the 8 candidates who competed for the cup presented by John Buckle, Esq., to the Chepstow Farmers' Club, to be awarded to the occupier of the best cultivated farm above 100 acres, we consider we are only fulfilling our duty as judges; and in so doing, we will try to avoid any personal allusion, confining our remarks to general observations on what we have seen worthy of commendation or censure.

"In the first place, we will address a few words to the landlords, whom we wish to convince that in no way can they do more towards improving their estates than by giving premiums for good cultivation. A tenant occupying two or three hundred acres of land would be sure to lay out many times the value of the prize in preparing his farm for exhibition, with the hopes of obtaining such an honorary testimonial of agricultural skill; and, at the same time, this expense would benefit the candidate himself, inasmuch as good cultivation, provided the outlay be judicious, is always more profitable than slovenly farming. We would also wish to draw the attention of both landlords and tenants to the mutual advantage of leases; though we are decidedly of opinion that the only eligible form of lease must be founded on a corn rent, and then it should be of such duration as would enable a good farmer to improve his farm to the utmost. No tenant without a lease can feel secure in investing capital in the permanent improvement of his farm. We are well aware that the landlords in general in this neighbourhood will not take advantage of the enterprize of a tenant; but still, by six months' notice, there is a power to deprive him of the whole of his expenditure. It is well known to all practical men, that to bring a farm into a good state of cultivation is a work of years, and that the most experienced agriculturist cannot effect this desirable object in a year or two, let his command of capital be ever so ample.

"To commence with the cropping. The quantity of Swedes and turnips was more than one fourth of the arable land on all the farms we visited, except two; and in these exceptions very little less than one-fourth was planted with these roots. In the case of the successful candidate the proportion was much larger, he having nearly half his arable land under Swedes and turnips; but it must be stated, in justice to the other competitors, that he has about three acres of pasture to one of arable.

"We found the general plan was to sow one-year old clover with wheat at one ploughing. We saw some fallows, but the quantity was comparatively small. Where the clover has been sown on foul land, which should never be the case, the only remedy is to fallow for wheat; part of the turnip land is generally sown with wheat, and the quantity of land under barley was, in consequence, small. We found the Swedes and turnips for the year very good without exception, though, of course, superior on some farms to others; but we noticed a much greater difference in the *cultivation* than the weight of crop. We were sorry to see some good Swedes and turnips that we could not consider clean, many acres not properly horse or hand-hoed; and nearly all those broadcast were far too thick; and we wish to lay particular stress upon the necessity of remedying this defect, as, on the four-field system, the only chance of cleaning the land is when under a root crop. We have this year seen land intended for Swedes made as clean as a garden by means of the Uley cultivator, first using the broad shares to pare off all the stubble; then the grubbers, till all the weeds were brought to the surface; and lastly, all the rubbish was gathered together with a horse-rake, and carted into a heap to rot. The average proportion of land in clover and grass seeds is about one-fourth, part of which is sown with the wheat after a root crop. We were surprised and delighted to see many fields with a capital plant of clover; and in other instances we had the mortification to witness a complete failure, which is to be attributed to the dryness of the spring and summer. We think that, by some alteration in the rotation, the quantity of clover might be lessened, and the extent of root crops augmented, without reducing the proportion of corn; thus avoiding so frequent a repetition of clover. We do not at all mean to lay down an arbitrary course to be followed for years without any deviation. In fact, we have known this done, and the plan materially altered in a few years. Still, we would suggest, on the light lands of this district, something like the following rotation:—

LIST OF CROPS FOR 200 ACRES OF ARABLE LAND.

First Year.		Second Year.
5 acres	tankard turnips	30 acres wheat.
10 "	mangel wurzel	
10 "	carrots	
2 "	potatoes	
3 "	cabbages	
20 "	swedes	35 " barley, seeded.
15 "	turnips, after vetches	
65 "	green crops, all after wheat	
65 "	wheat	65 " roots, &c.
35 "	barley	35 " clover
35 "	clover	35 " ley wheat
200 acres.		200 acres.

"Without pursuing this course any further, it will be evident to every farmer that the crops may be varied so as not to repeat clover, Swedes, and turnips so often as in the usual rotation.

"As regards the implements, with some few exceptions which we intend to mention, we only observed those in general use, viz: ploughs, old fashioned drags, harrows, rollers, horse-hoes for turnips, &c. Some of the land we noticed was too stony for scufflers or cultivators to be used profitably; but we saw much land where one of Lord Ducie's implements would be most valuable. Wherever the Uley cultivator can be used, the manner in which it will pare off the foul surface, and bring all the couch-roots to the face of the ground, is so far superior to ploughing the weeds in. We observed that admirable implement for reducing rough land for barley, turnips, &c., Crosskill's clod-crusher, at Mr. John Dowle's, of Claypit; a horse-gripping plough, a hand ditto, and a mole plough, at Mr. Thomas Perkins's, of Matherne. We also noticed one of Finlayson's harrows, and a horse-hoe of simple construction, for hoeing turnips when drilled on the flat; the latter was made to fix on to a pair of light cart wheels, and consisted of three shares, to take three rows at a time. The width between the shares could be altered, and narrower shares might be substituted to fit it for hoeing wheat. This hoe was made by a country blacksmith at a very moderate price. These two last implements we saw at the house of Mr. S. Matthews, of Ifton-hill, who was not a candidate for Mr. Buckle's cup.—The carts and waggons we saw were all of the heavier description, which certainly require to be replaced by others of a less cumbersome character; but whenever this takes place, we are aware that the change must be gradual.

"The largest quantity of stock was rather less than two sheep to an acre, and one head of cattle to every five acres, taking the whole farm for both. On one farm we saw three sheep to each acre of arable land, but the proportion of meadow and pasture to the arable land was as three to four, which reduces their number to our standard. In every instance the number of cart horses was greater than we consider requisite, in all cases exceeding one pair to every fifty acres of arable land, which we should say was quite sufficient. The breed of horses for farm purposes in this district is generally bad.

"We found great cause to complain of the management of some of the hedges and headlands. In many places a belt of two or three feet wide was left uncultivated round the fields, full of couch, nettles, and other weeds. In but one instance did we perceive any attention paid to the land adjoining the fences to prevent the weeds from seeding over the farm. We should like to see every inch of ground kept clean round the hedges, and all the weeds in them cut out two or three times in the course of the summer, to prevent them ripening their seeds. Many farmers may complain of the expense of this, but it would pay enormous interest in the saving of future labour. We recollect once seeing a fallow for wheat, which was very clean except a few roots of knotted couch, all of which laid on the surface and were ploughed in. For 6d. an acre they might all have been picked off, and surely by its not being done, a much larger expense was incurred in clearing the land for turnips.

"We sincerely wish the management of farm-yard manure were better attended to. We did not see a single tank to collect the drainings of the yards, stables, pigsties, &c. In some places the liquid manure escaped into the roads and ditches, in others it was led into the nearest field, and, when there, suffered to *soak* into the ground, only benefitting a very small spot; and worst of all, some of the yards and buildings were allowed to drain into the pool where all the horses and cattle were taken to drink. A little knowledge of chemistry here would show the farmer that the ammonia and other salts contained in this liquid are strong stimulants, and therefore liable to cause violent inflammatory disorders.

"We observed that lime is not used at all as a manure on the light lands we inspected; but we think a moderate quantity, applied once in a rotation, would pay well for the outlay. Chemical analysis teaches us that lime is contained in both the straw and grain of wheat; in short, that there is only one plant yet discovered in which no trace of lime can be detected. We recommend all those who are opposed to the use of lime to read some of the many scientific and practical articles on the subject that have been published lately in the agricultural periodicals, and can be obtained at our library by every member.

"The only complete set of farm buildings we met with was on the farm of Mr. Thos. Dowle, of Ifton, and they only require tanks to be every thing a farmer could wish. The drains are all laid in readiness, and the tanks are to be added shortly. The buildings are mostly new, but not being quite completed, we consider they would be seen to much better advantage another year. The roofs are all covered with reeds (combed straw) under the tiles, which keep the buildings warmer in winter and cooler in summer than tiles alone.

"In giving our decision, we have no hesitation in awarding the prize to Mr. Thos. Perkins, of Matherne. He has a great breadth of his arable land under Swedes and turnips, all clean, and the rest of his arable land in a better state of cultivation than the other competitors, though we think there is still room for improvement; and we wish all who read this paper to observe, that we cannot consider a farm to be *well cultivated* because the tillage of some of the fields is good, but expect them to be all clean and in a high state of cultivation.

"It is in the management of his grass land that Mr. Perkins so much excels, he having been at great expense in claiming his fields from bushes, and laying down some miles of drains, besides which, he has cleared away all the banks formed by clearing out the ditches. The soil he procures in this manner he mixes with farm-yard manure or lime, and annually dresses a considerable portion of his grass land.

"In conclusion, we must state, that in a brief article like the foregoing, much is unavoidably omitted, and only a mere sketch given of the subjects mentioned; but that is all we intended, because to have entered fully into every point would have made this a much more voluminous report than is at all requisite for the purpose we have in view.

"We will merely hint, that we should like to see some cattle soiled all the year, with every particle of their manure preserved and taken out upon the land; and we think that any gentleman who wished to encourage improvement in farming, could not do better than offer a premium for the largest number of cattle kept in houses and yards all the year round.

"R. W. Purchas,
Hon. Sec. Mon. F. Club,
"Arthur Hall,
Hon. Sec. C. F. Club, } Judges."

The ploughing match came off on the 23rd of October, in a field belonging to Mr. S. Matthews, of Ifton-hill, a clover ley of nearly 30A. Thirty-two teams started to compete for the prizes, in the presence of a numerous company attracted by the beauty of the day. The ground allotted to each competitor was about 8 perches more than half an acre, and was all ploughed within the four hours. The ploughing was all capitally executed, and the most experienced members declared that they had never seen work done better.

A little before 5 o'clock, about 70 gentlemen sat down to an excellent dinner. The chair was ably filled by the worthy chairman, Mr. T. Pride; and the vice-chair was taken by Mr. A. Hall. On the removal of the cloth, the usual loyal and complementary toasts having been drunk.

The Chairman called on the secretary to read the decision of the judges respecting the premiums.

A silver cup, value £5 5s., presented by Colonel Lewis, for the best general crop of turnips and Swedes, each claimant to show one-fourth of his arable land under these roots, is awarded to Mr. Thos. Dowle, of Ifton. Judges, Messrs. Morgan Williams and Daniel Baker.

A silver cup, value £5 5s., presented by John Buckle, Esq., for the best cultivated farm, each claimant not to occupy less than 100 acres of land, is awarded to Mr. Thomas Perkins, of Matherne. Judges, Messrs. R. W. Purchas and Arthur Hall.

A silver tankard, value £10, presented by Captain Edwin Carter, for the best cultivated farm, open to any one residing within 12 miles of Chepstow, and not occupying more than 150 acres of land, is awarded to Mr. John Sandford, of Mounton. Judges, Messrs. George Dowle and J. V. Powles.

A silver cup, value £5 5s., presented by J. B. Snead, Esq., for the best 4 acres of Swedes, each claimant not to occupy more than 150 acres of land, is awarded to Mr. Thomas George, of the Beaufort Arms Inn, Chepstow. Judges, Messrs, John Dowle and Samuel Matthews.

Ploughing.

Judges.—Messrs. Bate, C. Blunt, and N. Rowland.

A silver cup, value £5 5s., presented by the tradesmen of Chepstow to the son of a member who shall plough half an acre of land, within four hours, in the best and most workmanlike manner, is awarded to Mr. William Pride; and two silver spoons, value £2 2s., also given by the tradesmen, for the second-best ploughman, the son of a member, to Mr. Wm. Langley.

As each award was announced, the successful candidate was called to the head of the table, and the prize formally presented to him by the chairman. Those present briefly expressed their acknowledgments; and for those unavoidably absent the prizes were given to, and thanks returned by, gentlemen deputed for the purpose. The cups, each of which bore a suitable inscription, were supplied by Mr. Claridge, of Chepstow, and were handed round the table for the inspection of the company, who expressed great admiration of their style and neatness.

The Secretary then proceeded—

Class 1.—To the ploughman, being the servant or labourer of a member, for ploughing half an acre of land, within four hours, in the best and most workmanlike manner, with a pair of horses without a driver. First prize, £2, to Thomas Harry, servant to Mr. T. Pride; second, of £1, to John Williams, also a servant to Mr. T. Pride; third, of 15s., to Stephen King, in the service of John Buckle, Esq.; fourth, of 10s., to Thomas Nicholas, in the service of Mr. T. Dowle; fifth, of 5s., to John Payne, servant of Mr. J. Matthews.

Class 2.—To the ploughman, being the servant or labourer of a member, under eighteen years of age, for ploughing as above. First prize, of £1 10s., to Jacob Smith, servant of Mr. G. Dowle; second, of £1, to Wm. Godson, servant to Mr. S. Matthews; third, of 15s., to John Hircum, in the service of Mr. Thos. Williams. For the fourth and fifth prizes there were no competitors.

Class 3.—To the ploughman, being the servant or labourer of a member, who shall plough half an acre of land, within four hours, in the best and most workmanlike manner, with a wheel-plough, the sum of £1. There was no competition.

Class 4.—To the shepherd or other person, being the servant or workman of a member, who shall have alive on the 1st of July, 1844, the greatest number of lambs, in proportion to the ewes put to the ram, not being less than 100 ewes. First prize, of £2, to John James, shepherd to Mr. R,

W. Purchas, who had 161 lambs from 120 ewes; second, of £1, to Henry Phillips, shepherd to Mr. Thomas Pearce, who had 133 lambs from 104 ewes; third, of 10s. to John Tilly, shepherd to Mr. John Matthews, who had 117 lambs from 100 ewes.

Ditto, ditto, not less than 50 ewes put to the ram. First prize, of £1, to James Morgan, shepherd to Mr. D. Baker, who had 101 lambs from 76 ewes. For the second prize there was no candidate.

CLASS 5.—To the male servant or labourer, of good character, of a member of this club, who shall have lived in the same family, or upon the same farm, the greatest number of years consecutively, not less than five years. First prize, of £1 10s., to Michael Baynham, who has lived in the family of Colonel Lewis for forty years; second, of £1, to James Waters, who has lived in the family of Mr. J. Birt, thirty-five years; third, of 10s., to William Smith, who has lived in the family of Mr. Charles Townsend thirty-two years.

CLASS 6.—To the in-door female servant, of good character, of a member of this club, who shall have lived in the same family, or upon the same farm, the greatest number of years consecutively, not less than five years. First prize, of £1, to Mary Summers, who has lived in the employ of Mr. J. Birt twenty-one years. For the second and third prizes there were no competitors.

CLASS 7.—To the cottager of good character, being the tenant or workman of a member, with the neatest and cleanest cottage and best cultivated garden, not exceeding half an acre. First prize, of £1 10s., to William Church, servant of Mr. Arthur Hall; second, of £1, to Lewis Williams, tenant of the Rev. F. E. Lewis; third, of 10s., to James Morgan, servant of Mr. Morgan Williams. Judge, Mr. Daniel Baker.

The premium of £2, given by the Rev. E. T. Williams to the labourer (or widow of such labourer) of a member, who, having lived upon the same farm or in the same family not less than five years, shall have brought up the largest and best-conducted family without parochial relief, and have been a communicant in his or her parish church for the last two years, is awarded to Richard Waites, who has lived with Mr. Morgan Williams 27 years, has ten children living and has buried one, has brought up his family without parochial relief, has been a communicant 7 years and his wife 20 years.

The CHAIRMAN then gave "The Judges."

Mr. BATE replied to the toast. He observed, that he had been called upon in Hereford and other places to perform a similar office: but he must say that he never had so difficult a task as on this occasion. He had never seen such good ploughing in his life, in one field, as on the present occasion.

On the health of the secretary being given, Mr. Hall said:—In rising to address you at the present moment, I do so with mingled feelings of pleasure and regret. I have the greatest pleasure in offering you all my most sincere thanks for the very kind manner in which my health has been proposed and received, while I experience the most lively regret when I consider that this is the last anniversary at which I shall meet you in the capacity of your secretary. I am happy in being able to state, that, since the establishment of the Chepstow Farmers' Club, the number of its members has gradually increased, and the prize list of to-day clearly proves the interest taken in your welfare of your society by the gentlemen of Chepstow and its vicinity. I hope that the club will continue to progress until every person residing within a reasonable distance of this town, who is at all interested, either directly or indirectly, in the prosperity of agriculture, shall become a member, and the list of honorary members occupy a much longer space. Owing to unforeseen circumstances I am about to quit this neighbourhood, and therefore shall be compelled to resign the office of secretary—an office that I accepted as the greatest honour you could confer upon me; the duties of which I have tried to fulfil to the best of my ability; and where I have not been successful, I hope you will attribute the failure to limited capacity, and not to any deficiency of zeal for the interests of the club. I beg to inform you, that it is not my intention to resign at this meeting, unless such should be your desire, but that I will gladly hold your appointment till the end of the year, when, having drawn up the annual report and passed the yearly accounts, I will give the papers into the hands of whoever you may do the honour to elect as my successor: though I must add, I shall ever look back with pride to the time when you considered me worthy to be your secretary. I have now only to declare my gratitude to you, both as a body and individually, though words will but feebly express my sentiments in this respect, for the kindness I have experienced at your hands during the whole of the time I have resided among you. Wishing you every prosperity that you can possibly desire, I have great pleasure in drinking good health to you all.

The CHAIRMAN proposed the health of Dr. Morris, a gentleman he was sure every one must respect.

Dr. MORRIS said:—Mr. Chairman and gentlemen—For this unexpected and most undeserved demonstration of your kindness accept my thanks. Although I am not a practical agriculturist, yet I feel an interest and pleasure in every society which has for its object the dissemination of knowledge and the advancement of science. Such a society I consider the Chepstow Farmers' Club. The late Mr. Burke was wont to say, that in every country the greatest creditor was the plough. If the sentiment was true, as most undoubtedly it was, what a debt of gratitude did this country owe to societies like this, whose study it was to promote the speed of this important implement! I will take this opportunity of recommending, to the rising generation more particularly, the study of chemistry in connexion with agriculture, from which the most beneficial results may be expected; and I would urge you, as parents and guardians of youth, to impress upon those under your care and guidance the necessity of devoting a portion of time to this fascinating science. Put into their hands an elementary work to begin with, which would give them an idea of the air they breathe, the light, &c., and the inquiring mind would soon aspire to works of more importance and of a higher order. It is from the ranks of the trades, from the peasantry of the people, that a host of the sons of genius rise up, and take their stations among the great shining lights of the world. Burns left the fields where he followed the plough, to become celebrated as a poet; Hogg, a shepherd too, left the Ettrick forest to follow in the same rank; Allan Ramsay was found in a lowly hut chanting the "Gentle Shepherd;" Washington left tilling the land to become the liberator of his country. I could mention a thousand other instances; but enough has already been said to show that where the seeds of knowledge are sown, they only require the necessary agents to make them germinate. Put the plant in a fertile soil, watch it with care, and it will produce goodly fruit.

The SECRETARY then begged to claim the attention of the company, while he read a letter which he had just received from Robert Evans, Esq.

"Larkfield, 23rd October, 1844.

"DEAR SIR,—I have been much gratified at observing that the attention of the Chepstow Agricultural Association has not only been directed to the encouragement of the labourers within their district, in the skilful discharge of their calling, but also in their home duties.

"With the view of assisting in this object, I beg to place the following premiums at the disposal of your society for the ensuing year:—

"For the cottager having his house and premises most cleanly kept, his fences in the best order, and his garden most productive, £1.

"For the cottager who has supported his parents for the longest period, without assistance from the parish, £1.

"For the cottager having the largest number of female children placed in domestic service, £1.

"Each candidate to bring a certificate from the officiating clergyman of the parish in which he resides, of his claim to the respective premiums, to enable the society to award them to the most deserving.

"I am, dear sir, yours truly,

"Mr. Arthur Hall." ROBERT EVANS."

It is unnecessary to say that the reading of this letter was accompanied with loud cheering, not only as evincing the high sense the company entertained of the liberality of the writer, but also from the general respect entertained towards Mr. Evans by all classes in the town and neighbourhood of Chepstow. The health of Mr. Evans was afterwards drunk with enthusiasm.

Mr. S. B. SNEAD rose to propose the next toast. He said they could not have got on without a chairman, and in their present they had a most excellent one. He would, therefore, give his health; and let it be in a bumper.

The CHAIRMAN begged to offer the company his best thanks for the compliment they had conferred on him; but he could not help regretting that the chair had not been filled by a person (and he saw many such around him) more competent to discharge the duties of the office. Had such been the case, they might have heard something of the great benefits farmers clubs had conferred upon agriculture, something about implements of agriculture, and have had pointed out to them the value of the honest and industrious labourer. He should do all in his power to support farmers' clubs, because they brought the landlord, the tenant, and the labourer together; and they had but one interest in common.

Mr. A. HALL had the permission of the chairman to propose the next toast. He proceeded to say that he had the pleasure of attending the anniversary of the Monmouth Farmers' Club, where he had met with the kindest reception, and where he had heard the toast, "Success to the Chepstow Farmers' Club," most cordially given and accepted. He would, therefore, propose "Success to the Monmouth Farmers' Club," and couple it with the health of his friend, its most worthy and zealous secretary, Mr. Purchas.

Mr. PURCHAS replied. No man, he said, could feel a greater interest in the success of farmers' clubs than he did. They were most important in their results, and had been as beneficial to agriculture as mechanic institutions had to the trading community: it was, indeed, but following out the example set by those societies. He would particularly urge upon the members to avail themselves of the libraries attached to farmers' clubs; and if hey would only read the works, the benefit would be incalculable. He might mention that in the Monmouth Farmers' Club, which had been established four years, they had 233 members, and a library of 200 volumes of all the best works upon agriculture and horticulture. In this library they had five copies of one work—"Johnson's Fertilizer;" and such was the anxiety manifested to read that work, that the librarian had often told him the copies were always taken out again as soon as they came in every month. If young men would only take a book home with them after attending the meeting, and carefully peruse it, they would find great benefit. They had now four clubs in Monmouthshire; and if they would coalesce, they would be enabled to have the advantage of a good lecturer on chemistry as applied to agriculture, at a small expense, who would also, for about half-a-crown, analyze a sample of soil, manure, or stone for individual members. They would be enabled by those means to send a portion from each field, and ascertain the properties of the land they were cultivating, and would know what manure suited it He lived in a neighbourhood abounding with lime, and by adopting the plan of analyzation he had found that the lime there was very superior; it contained no magnesia; and what had been the result? Why, that farmers had come from a distance of 15 or 20 miles for the lime from those kilns, when they could have magnesian lime at their own doors. He must be allowed to say, that he had never derived more pleasure than in visiting the several farms competing for Mr. Buckle's cup; they all possessed great merit: but the credit due to Mr. Perkins was beyond measure. He should think that gentleman had done at least 20 miles of draining, and that was the foundation of good farming. But Mr. Perkins was in a different situation from most men—he had a lease—many had not. He would press upon them the necessity of urging their landlords to grant them leases, not for 7 or 14 years, but 21 years. With this view he would suggest a corn or other produce lease, with a maximum and minimum sum, as the most equitable.—The next subject he would allude to was the condition of the labourers, and the benefits resulting from giving them allotments : there ought not to be a labouring man who has not his 20 perch, and if he has a family he should have his 40 perch, or more, according to his family. If they carried that out, they would hear of no fires—no burnings. The other day, while travelling by the London and Birmingham railway, he met with a gentleman connected with the management, who told him, that at the starting of the railway they could scarcely keep a servant—they were always changing and discontented; but since they had tried the allotment system, no men could go on better. From hearing this, he was induced to spend two hours at Woolverton, where the company had built one of the neatest towns in the kingdom, with church, school, etc. In going over the allotments granted to 300 men (and he could bear testimony to the comfort in which he found them), they all took delight in showing him over their grounds, and were thankful for any suggestions made. Before sitting down, he would make one remark,—Did they not think, that these anniversaries would be more happily spent, if they could see the labourers who had been engaged in competing for the prizes sitting among them at a side table ? He would, as a toast, give them, "The Labourers of England, good health, good earnings, and plenty of employment."

Mr. Hall proposed "The successful candidates," which was drunk with great cordiality.

Mr. Purchas, in a highly eulogistic speech, gave "Mr. Samuel Matthews, with thanks to him for the ground."

Mr. Matthews begged to assure the club, that so far from being under any obligation to him, he was much indebted to them : he had never had his land ploughed so well before, and he should at all times be ready to forward their views.

At the meeting on the 28th of October no regular discussion took place, and the whole of the time was occupied in desultory conversation and the business of the club.

The December meeting was filled up by examining the accounts, and electing officers for 1845.

A vote of thanks was unanimously passed to Mr. T. Pride, for his very able services as chairman during the past year.

Also unanimously resolved to award 2s. 6d. to all the unsuccessful candidates who ploughed at the match Oct. 23, 1844.

The Report was read, and 200 copies ordered to be printed.

In conclusion, the committee hope the members will view with satisfaction the evident progress made by the club during the past year; and earnestly entreat each individually to use his utmost exertions in promoting the prosperity of a society, whose only aim is to benefit the landlord, tenant, and labourer of this county.

For the Committee,
Arthur Hall, Hon. Sec.

The Committee for 1845, having received and examined the Report for the past year since the departure of Mr. Hall, the loss of whose valuable services they deeply regret, take this opportunity of expressing their admiration of the accuracy with which it has been drawn up, and of requesting their Honorary Secretary to direct that an account of the proceedings at a dinner given to Mr. Hall on the 22nd of January, 1845, be added to the Report.

The Committee also recommend, that a printed Report of the past year's occurrences be forwarded to gentlemen resident in Chepstow and its neighbourhood, who have not yet become subscribers, hoping that a perusal of the Society's proceedings, and the advantages to be derived from scientific discussions at its meetings, may induce many to enrol their names as supporters of its institutions.

T. Williams, Chairman.

THE POTATO MURRAIN.

(From the Medical Times of the 18th October, 1845).

"Quid quisque vitet, nunquam homini satis:
Cautum est in horas."—Horace.

——"Latet anguis in herba"—Virgil.

We make no doubt that our readers will readily hear what we have to say upon a matter very important at this time, both to the public and the profession—the present "disease" amongst potatoes. It concerns us to inquire into the subject, as well from an interest which we feel in the fate of the poor, who will be the chief sufferers by the calamity, as from a desire we have to aid the wise working of an efficient system of *hygiene*, by stating the bad effects which we have known to follow the use of this depraved food.

The "potato murrain," as it has been ridiculously called, is said to be comparatively new in this country, but has been known in America for many years past. During the present season it has visited us to so serious an extent, as to cause considerable anxiety for the physical welfare of that class of people who are in a great measure sustained by potato-food. The "disease" has prevailed more or less extensively throughout the land; the salubrious atmosphere and kindly soil of Ireland have not exempted that country from the visitation; and it has swept with various severity through the continent, but particularly in Belgium, Germany, and Holland.

As the matter interests everybody, so we find that almost everybody has got an opinion upon it. In the midst of the mass of speculation, it is not to be wondered at, that a good deal of folly as well as falsehood should be let loose upon one's credulity and wonderment. There is a certain class of people yclept philosophers, and we fear we must include in that very large class another scarcely less capacious, we mean the *soi-disant* sect of chemists, who are able to see and ready to swear anything. Give them a subject with a crotchet in it, and they will have an explanation ready in no time. The one will prove, by a series of reasoning as difficult to refute as to comprehend, that such and such causes are at work, and, *ergo*, that such and such consequences must follow; the other will prove the precise opposite, and confirm the truth of his theory by chemical analysis, carried out with such decimal minuteness, that, like the lote-tree in Mahomet's seventh heaven, there is no going beyond it. The one silences you with an awful profundity that neither himself nor anybody else can fathom; the other knocks you down, or rather tries to do, with ultimate analysis and the talismanic name of Liebig. There are some people with whom this system of illustrious humbug operates like Mesmerism, but we old-fashioned folks don't belong to the class of greedy gullibles, and we feel little inclined to trust either the words or the figures of one half of the Giessen-bitten boys of the present day, without something more than their own proof, *per se*, of the integrity of what they utter.

To return to our subject, as one upon which philosophic, microscopic, and chemical speculation are magnificently rife just now, we find all sorts of theories propounded to account for the mysterious phenomenon. The wise saws, who are great in the magic of the marvellous, consider the potato disease as in some sort a sign that the world is nearly as old as it ever will be, and that the present crop of tubers, though a bad one, is the last reaping we shall have. What necessary connection there is between the end of the world and the potato epidemic, or whether this said calamity is any proof that the aforesaid globe is nearly worn out, we are not able to say, nor on this point do the mystery-mongers inform us. The physical philosophers say that electricity is at the bottom of it all, or rather that *it is not at the bottom;* in other words, that the potatoes have not been electrified enough! Without telling us to whose measurement, calculation, or instinctive sagacity they are indebted for the fact, they gravely give us to understand (if we had sufficient sagacity of belief for the feat), that in those parts of the island and continent, not forgetting America, in which the electricity above has behaved better to the territories below, and, to use a monied phrase, "has come down handsomely," that in those said spots the potatoes are in their usual health and strength, and looking "very much like themselves." If we were in the mood for joking, as unfortunately we are not, we should say that this sublime enunciation looks "very much like a whale." Taking advantage of the experience of that stupid old man who tried to pelt a lad out of an apple tree with tufts of grass, they suggest (the philosophers we mean) that we should compel the electricity, whether it chose or not, to come down to the dust, and do its work as quick as lightning, instead of idling away its time in visiting amongst the clouds, and doing no good at all. Some propose to disturb and displace the said fluid by the erection of multitudes of iron rods, well spiked, bristling like bayonets, and seeming to say that they don't mean to be trifled with; others suggest that it shall be invited to sundry iron pots, made attractive by being permanently electrified; and others propose to traverse the earth with metallic culverts for the electricity to run up and down in. "In the name of the prophet—*figs!*" These sublime ingenuities, these vast creations of fancy, these mighty minds in travail with mighty projects, which

> "Seem as 'twere
> An ocean in labour an ocean to bear,"

all tend to the solemn secret of growing potatoes! Would that as much talent were brought to bear upon the more hidden and important secret of cooking them! The physical philosophers aver, and they may safely do so for any practical disproof they are likely to meet with, that if only the means be employed which any one of them proposes, we may always calculate upon an immunity from potato disease. We don't doubt it for a moment; we feel as certain of it as of catching sparrows by throwing salt upon their tails!

Less sublime and speculative than the physical philosophers, but far more practical and minute, come the microscopists to settle the question of the potato epidemic. They see deeply into the depths of things, and of course are expected to draw therefrom much valuable matter that unaided optics must always be strangers to. In fact, a man with a microscope may see anything; and as "seeing is believing," we see no just cause why he should be expected to doubt anything. We anticipate, consequently, that the time is not very far distant when *credulity*, properly so called, will be regularly defunct, and such people as our forefathers would have called "easy of belief," will be *boná fide* matter of fact men under the irresistible pursuasion and proof of the microscope. This instrument, as we have said, has been brought to bear, with artillery-like precision, though with less point, upon the "potato murrain," and wonderful have been the discoveries in consequence! Fungi of all sorts, sizes, shapes, and colours have been found fattening themselves, cormorant like, upon the poor potato; sporules, granules, cells, and dust that deserved no better name, all have been found upon the potato; and many a discoverer has been obliged to rub up his Greek to furnish technicals for the unknown objects that have tumbled in the way of his observation. Talk of special trains! they go nothing so fast as discovery has lately gone along the line of damaged potatoes!

Next come the chemists, with their prodigal paraphernalia of apparatus and tests, to acquaint us with the malady of the potato. They find alkalies where acids ought to be, and the converse; they state, to a shadow of a shade, the particular blush of blue which iodine gives the sickly potato, in contrast with what it gives the potato that is sound; they tell us, precisely, what the former has lost in mealiness and gained in waxiness—what is due to the condition of the starch, the mucilage, and other such things—that good potatoes lose 75 per cent. by drying at a gentle heat, whilst the bad ones lose 77!—and finally, the man with a chafing dish, glass tubing, oxide of copper, caustic potash, and other like simples, waves his wand, and lo! an ultimate analysis settles the point at once, by proving that some delicate decimal is wanting to make up the due amount of a certain constituent which has been most rascally robbed of "its fair proportions" by another certain one! "So much for Buckingham!" After this amount of detail, to say nothing of the amount of trouble we have had in *practically* getting it ready, we may perhaps claim a hearing for ourselves. *We*, the "plural nominative singular," in our triumph of tripod, feel that it is our right to state both what we know, and what we think, upon the matter at issue.

We have looked at the electricity with "our mind's eye," and, like Mathews in the play, can "see nothing in it." We have looked through the microscope, and have seen ten-thousand curious sights in the morbid potato, but nothing equal to what we have seen in a pinch of musty horse manure. We have tortured the poor potato in retorts, crucibles, and tubes of glass, but products and educts have told us nothing more than we knew aforetime. Amidst this Babel of investigation and discovery, it occurred to us to think that there might be something "rotten in the state of"—the potato! And after wiping from our eyes the films created by philosophy and fancy, we saw a clear evidence of a simple decomposition in this said tuber! And what is there that philosophers cannot find worthy to talk about, microscopists to stare at, and chemists to analyze, in rottenness! We have always thought it a wonderful field for minute investigation, and such it has proved to be, as the present condition of the potato crops can testify.

To close this part of our subject, for we shall take occasion to complete it finally in another article, we give it as our decided opinion that "potato-disease" and "potato-murrain" are merely idle terms that bear no direct relation whatever to existent things. There is no "disease," no "murrain," properly so called; the potatoes are just *rotten*, and that is the long and the short of it. The discolouration, commencing in this spot and extending to that, the softness, the waxiness, the fetor—all these things, and many more such like, we have seen a score times in potatoes that have spontaneously rotted in a damp dark cellar. We can confirm what the microscopists and chemists say about appearances and reactions, and tell them plenty of untold truths besides. But not potatoes only—any vegetable of similar composition will give like results when in a state of decay. These acids, alkalies, atomic defects, sporules, granules, ruptured cells, dust, dirt, &c., are a *consequence* of the potato mischief, and not a *cause* of it. There is nothing new in the circumstance; we have been familiar with it from childhood, and so have many simple observers who are older in the art of taking notice than ourselves are. It is no novelty in this country, any more than elsewhere; it attracts attention because of the almost universality of its prevalence. And has not the cause been as universal? Cold water is the *fountain head!* Take our word for it, there is no mystery in the affair; cloudy skies and drenching rains have done it all!

REMARKABLE OATS.—At a late meeting of the East Derbyshire Farmers' Club, at Mr. John Barton's, of Stanley, Mr. Holbrook, the secretary, exhibited some specimens of oats, the stems of which were six feet six inches in height, and the diameter one five-eighths of an inch. One plant produced 130 corns of oats, and another more than 300. The oats were dibbled in, the rows being 15 inches apart, and the plants six inches asunder. The ground which produced these extraordinary specimens had been pared and burned.—*Derby Mercury.*

STEWPONEY AGRICULTURAL SOCIETY.

The Secretary's Report of the Stewponey Agricultural Society, and of the other Branch Societies connected with it, October 7th, 1845.

Your society is now divided into the six following branches, each branch being governed by separate rules, and supported by the subscriptions and donations of numerous members contributing to one or all of them, according to their inclinations:—

First. The Agricultural Society, since its commencement in 1841, has given the following premiums:—For turnips and stock, £282; implements, £125; labourers, £156 10s.; making a total of £563 10s., and including premiums to be given this year amounting to £140. It has purchased about 120 volumes of standard works on agriculture for the use of its members; and has appointed an intelligent scientific chemist, who has offered his services on the most liberal and advantageous terms to the society. This gentleman (Mr. Gyde, of Painswick) delivered a very interesting lecture at your general meeting in December last, on the "Origin, Composition, and Improvement of Soils," which we availed ourselves of his permission to print and circulate with the rules, for the use of every member. Arrangements have been made with him to give us another lecture in December this year, on the "Application of Physiology to the Rearing and Feeding of Cattle." The services of this gentleman have been employed by the society, since his appointment last year, as follows:—in analyzing 38 different soils, including marls and shales, and 10 manures, including guano, bones, &c.; total, 48. Of the manures, two were adulterated, and one sold under a false certificate.

Second. The Farmers' Club met monthly last year, and produced twelve essays on several interesting subjects, which have been printed for sale at the request of several persons. I would beg particularly to allude to one on the subject of "Keeping Farm Accounts," by J. Amery, Esq., Manager of the Stourbridge and Kidderminster Banking Company, as rendering this very important and difficult subject simple and easy. The club has this year confined its labours to six meetings.

Third. The Friendly Becher Club. Three hundred and forty-six members of this society have insured for themselves a weekly allowance in sickness, a weekly payment after the ages of sixty, sixty-five, or seventy, and a certain sum payable to their families on death. The laudable efforts of these individuals have been encouraged by the contributions of one hundred and forty-seven honorary members towards the defraying the expenses of the club, and towards making the payments of these three insurances, each insurance being divided into distinct and separate sums. The members have £376 8s. 10d. invested in the Bank of England, besides a small sum in the savings' bank.

Fourth. The Endowment Society. In this branch the sum of £333 13s. is insured, payable to different members at stated periods of 14 and 21 years, with compound interest at 3½ per cent.

Fifth. The Allotment Society, established Michaelmas, 1844, for the purpose of letting allotments of land of one quarter of an acre each to labourers, at a farming price, conveniently situated for their dwellings, and for the moral and beneficial employment of their leisure hours. During the first quarter, to January, nothing was done beyond preparations, explaining the objects of the society, combatting prejudices, and waiting for the possession of land promised. Since that period, the operations of the society have been as follows:—Land underlet to tenants, up to Michaelmas, 44 a. 3r.; ready to let at Michaelmas, 33 a. 1 r. 34 p.; promised at Lady-day, 1846, 36 a. 2 r.; total, 114 a. 2 r. 34 p. Of the 149 tenants who have been cultivating these gardens the last two quarters, not one penny is in arrear; and I beg permission to read as shortly as possible some letters I have received from clergymen, chairmen of the sub-committees, on this subject.

The sixth is a Friendly Loan Society, just commenced, and limited at present to the Stourbridge district, for the purpose of lending to persons of honest, industrious, and frugal habits, small sums of not less than £1, nor more than £15, at any one time, they paying interest and giving security for the same. Mr. Hughes, in his treatise on the "Advantages of Friendly Loan Societies," page 18, states this result of the pawnbrokers' profits: "Pledges of one shilling, redeemed in a week, pay a halfpenny, and one hundred pounds, so lent every week in shilling pledges, would yield an interest of £216 12s. 8d.; and this ruinous rate of interest is, in fact, paid in England on many thousands of pounds borrowed by the poorest and most wretched class."

I have thus endeavoured to give a brief, but I fear very imperfect, summary of these societies, their results and objects; and it is to me a source of the greatest gratification to think that in these societies, supported by the cordial and united efforts of nearly one thousand individuals, the state of the labourer forms the most prominent part. Trusting to Divine Providence to grant him health to create a small capital by the sweat of his brow, doomed perhaps to maintain a large family with slender means, and assisted by a still more slender education, can any true Christian object to supply him with the same means of obtaining the proper value for his money as those possessed by the owners and occupiers of the soil? Can any one for a moment doubt that, by thus doing your duty towards your neighbour, that you will be advancing your own interest?

GREAT MEETING OF THE ROYAL AGRICULTURAL SOCIETY OF IRELAND AT BALLINASLOE.

This meeting was held on September 30, and the two following days. The number of visitors was large. The cattle, taken as a whole, were very superior in point of quality, particularly the "short-horns;" the show of horses was small.

The following is the award of prizes for the stock exhibited:—

CATTLE.

Short-Horns.

Judges.—Messrs. Hugh Watson (Scotch), Torr (English), Drought (Irish).

For the best bull calved between Jan. 1, 1840, and Jan. 1, 1843. The first prize of 30 sovs., and the challenge cup of the value of 100 sovs., to Mr. G. A. Grey, Wooler, Northumberland; the second prize of 10 sovs., to Mr. R. Holmes, Waterstown.

For the best bull calved in 1843. The first prize of 15 sovs., to the Lord Bishop of Kilmore; the second prize of 5 sovs., to the Hon. A. F. Nugent.

For the best bull calved after Jan. 1, 1844. The first prize of 10 sovs., to Mr. W. D. Ferguson, and a medal; the second prize, Mr. G. A. Grey, of Wooler.

Cows and Heifers.

15 sovs. and a gold medal, to the Hon. A. F. Nugent; 10 sovs., to Lord Castlemaine; 10 do., to John La Touche, Esq.

Long-Horns.

Judges.—Messrs. Skipworth (English), Booth (English), and Sir P. Nugent.

For best bull calved after Jan. 1, 1840. 10 sovs., to Lord Riverston. For heifers and cows, three 5-sovereign prizes, to Lord Riverston: no competitor.

Devons.

10 sovs., to Mr. J. R. Minnett, Anaghbeg; 5 do., Mr. Robert Doyne, Wells; 5 do., Mr. J. R. Minnett, Anaghbeg; 5 do., Mr. William Reilly, Belmont.

Herefords.

10 sovs., to Mr. R. Reynell. Four 5-sovereign prizes to the Hon. Barry Chas. Yelverton.

Polled Angus, or Galloways.

10 sovs., to Mr. G. D. H. Kirkaldy, Hearnesbrook; two of 5 do., Mr. Thomas Seymour, Ballymore Castle; 5 do., Mr. G. D. H. Kirkaldy, Hearnesbrook; 5 do., Mr. Hugh Watson, Keillor Farm, Coupar-Angus.

West Highlands.

5 sovs., to the Lord Bishop of Tuam; 3 do., Mr. John Netterville Gerard, Ahascragh.

Kerry, or any other Highland Breed.

5 sovs., to Mr. Wm. Chute, Tralee; 3 do., Mr. A. Bonar, Kilmeaney; 3 do., Mr. Wm. Owen, Blessington.

Horses.

Judges.—Messrs. Geo. Notts, jun., John Dennis, and Robt. Holmes.

For cart stallion, 30 sovs., to Mr. George Rait; 15 do., Mr. Ed. Fitt; thorough-bred do. (the medal), Lords Crofton and Clenbrock; for cart mare, 10 sovs., to Mr. W. D. Fergusson; do. filly, 5 do., Mr. W. Sherrard.

SHEEP.

Judges.—Messrs. Gray, Black, and Groydon.

Leicesters.

Mr. C. Going, of Traverston, took three prizes for rams; Messrs. Rail and Seymour took prizes for ewes.

Long Wools not Leicesters.

Lord Riverston, and Messrs. Rait, Holmes, Dillon, and Thane, took the prizes.

South Downs.

Mr. Hugh Watson, of Keillor Farm, Coupar Angus, took two prizes for rams, and one prize for ewes.

Cheviots.

Messrs. D. R. Ross, and W. J. Armstrong, took these prizes.

SWINE.

Messrs. Wm. Sherrard and R. G. Gampion took the prizes for swine.

Various other prizes were also awarded for poultry, improvement of flax, curing butter, agricultural implements, seeds, roots, grasses, and forage plants, and for domestic home manufactures.

SALE OF SOUTHDOWNS. — At the annual sale of Southdown sheep, by Messrs. Baker and Son, at Skreens, Roxwell, the seat of T. W. Bramston, Esq., M.P., on Saturday week, the draft ewes realized from 28s. to 34s. each; wether lambs, 25s. 6d.; ewe lambs, from 19s. 6d. to 22s.; rams, from 4*l*. 17s. 6d. to 11*l*. 10s. The company was not numerous, but a good competition was excited for the lots.

FOREST AND ORNAMENTAL TREES.

Article 2.

The Beech (*fagus*) next in order to the oak claims attention, for though it may not be so valuable for timber as the ash, it is still extensively employed in many ways, particularly in chair-making and for the wood-work of carpenters' tools; but in point of beauty and symmetry it stands almost without rival.

Botanically it ranks with the *amentaceæ*, in which order, as Louden observed, "all the timber trees of Europe, and most of cold countries, are stationed. The characters are *barren flowers* in a globose catkin; perianth *single* of one leaf, campanulate 6 cleft; stamens 5-12; *fertile flowers*—within a 4 lobed prickly involucre; perianth single, urceolate, with 4 or 5 minute lobes; germens incorporated with the perianth, 3 celled, 2 of them becoming abortive; styles 3. nuts 1, seeded, invested with the enlarged involucre."

Beech is fertile in "mast," eagerly sought after and devoured by swine; from this mast or nut the trees may be raised in abundance, provided it be collected in time, that is, so soon as it falls, and preserved till March in dry sand; but it will not generally be good after the first year.

The seeds germinate freely, and attain a few inches in height by the first autumn; they may then, or what is better, late in February following, be removed to stand in nursery rows till fitted for final transplantation.

The beech forms a handsome and compact hedge: planted as the hawthorn, duly cut down, kept trimmed, and brought to regular figure, it makes a close fence, and while young, retains its leaves during winter; which, though not green, yet afford some protection; and hence, beech-hedges are employed in nursery gardens. But in every case the beech prefers a soil with a chalk bottom; and where it finds one, there it flourishes luxuriantly. *Trees* as single ones in knoles, or in park scenery, attain a magnificence of stature that is altogether striking. Such trees there are, not many miles from Maidenhead, on the Henley road, just where the range of chalk-hills rise above Hurley, and cross the country towards the high Reading and Bath road.

Gilpin praises the trunk and the beauty of the bark; but there he stops; and he adds, "we praise no other part of the skeleton." The branches are fantastically wreathed, and disproportioned; turning awkardly among each other, and rurning often into long unvaried lines, without any of that strength and firmness which we admire in the oak. "In full leaf it is equally unpleasing, it has the appearance of an overgrown bush; this bushiness gives a great heaviness to the tree, which is always a deformity. On the whole, the massy, full-grown, luxuriant beech, is rather a displeasing tree. It is made up of littleness, seldom exhibiting those tufted cups, or hollow dark recesses, which dispart the several grand branches of the more beautiful kinds of trees."

Truth, however, constrains this delightful, but too exclusive writer on *the picturesque*, to do the beech ample justice, so far as refers to a grandeur of massive effect. "In distance it preserves the depth of the forest, and even on the spot, in contrast, it is frequently a choice accompaniment." In respect of its *autumnal hues*, "it is often beautiful. Sometimes it is dressed in modest brown, but generally in glowing orange, and in both dresses its harmony with the grove is pleasing. About the end of September, when the leaf begins to change, it makes a happy contrast with the oak, whose foliage is yet verdant."

In a country where beech predominates, the effect produced by extreme grouping of the trees is not easily forgotten. Who could pass from Maidenhead to Marlow, and over Rosehill to Henley, and view the beech-woods clothing the crescent-like amphitheatres of hills with masses of gorgeous tint, glittering like gold under the rays of the western sun, and fail to be struck with admiration? These hills range for miles, and overlook a country that may compete with the beauties of the celebrated Wye scenery.

Enough will have been said on the common, or sylvan beech, with its far-famed classic shade. But we must not forget that ornament of the lawn and park, the *copper* or *purple* beech. This tree, it should seem, is of easy culture, and might, with little difficulty, be made more common than it is. The bark is equal in beauty to that of the ordinary beech; its manner, growth, and form are not inferior, yet one seldom sees it. I have a large tree of surpassing elegance: it feathers to the ground in graceful archings, and every autumn these are covered with nuts; which appears to me to produce young plants true to their parent, and without receding to the old primitive beech. I have found young plants on the lawn and borders, the foliage always copper-tinted; and from these I might readily have raised a nursery of red beeches. Many persons believe that this variety is barren; and others assert that the seeds, if any, always produce common beeches. It may be so in some localities; but in ours I find the tree true to itself.

If this be the real fact, the copper-beech ought to be raised from seed, and treated in seed and nursery beds just as is the common beech; and then, as the tree, compared with its type, is as the scarlet oak of a previous article to that of the forest, the lawns and parks of a gentleman's estate might be adorned with another tree now rarely seen, and which, moreover, when viewed in various aspects and positions with reference to the sun's beams, displays sportings and variations of tint that are equally striking and peculiar. Let any one place himself at the bole of a purple beech, fully lighted up by a blaze of sun, and view it in every part, and he will understand what it would be a vain attempt to describe.

The common beech may attain the altitude of 70 feet: the purple variety fall short of this, as we rarely observe a tree above half that height; in this respect, to say nothing of its colour, it is far better adapted to the lawn.

Another variety is the cut, or *fern-leaved beech*. (*Fagus sylvatica incisa*): it is extremely beautiful, and comparatively of small dimensions—Louden says 10 feet; but this must be an error, as in favourable soils it rises to double that height, and if I mistake not, there is such a fine tree on the lawn of Taplow-house, the seat of the Marquis Thomond. It is very graceful, beautifully clothed with fern-like leaves of a palish green, in no way resembling those of the other varieties. This charming plant ought to be better known, as its habits are striking and peculiarly fitted to adorn the expansive lawn of a noble estate. The soil, however, should be particularly attended to, as it seems to affect a more sandy loam, and one not so firm and chalky as that which suits the other varieties.

J. Towers.

THE CORN CROPS OF EUROPE.

We extract from the *Gazette d'Augsburg* the following article on the crops of 1845 in Europe :—

" According to the custom we have adopted, we shall divide our account of the results of the last crop into two parts—one referring to the east, and the other to the west of Europe. For several years past the east threatened us with sterility ; it first of all began in Russia, spread over Poland and Prussia, and appeared even this year likely to diffuse itself in the east of Germany. Experience has generally proved that in the boreal latitude the rainy years are more sterile than the dry ones. This fact has again been confirmed during the last years. It was humidity that diminished the crops a few years ago in Russia, and which produced the like effect in Poland, Galicia, and Upper Silesia in the course of last year. In Germany the humidity has not produced any unfavourable consequences, but in certain countries; there are others, on the contrary, which have suffered from want of rain. The results of the crops are, in the mean time, far from being satisfactory, and, from the calculations which have been made, will not suffice the public consumption.

" It is far from our intention to represent the situation of things in more dreary colours than belongs to it ; but we do not wish, and we ought not, to exaggerate the advantages of it, desirous as we are of attaining our present object, which is to furnish an exact appreciation of actual circumstances. We shall separately name the different countries, and indicate the supplies they stand in need or can dispose of.

" Russia will have sufficient corn for the whole empire, without purchasing any foreign corn. Its Governments are in a position to assist mutually each other, but it is very doubtful whether they can send much corn abroad.

" The crops of Poland are not sufficient for its general consumption ; and, unless it has been previously supplied, will suffer from a scarcity, or be obliged to receive corn from abroad. But whom can one have recourse to when one's neighbours have only had themselves but middling crops, and have not wherewith to supply the deficiency ? Money also is scarce in Poland, and important sums cannot be sent abroad to purchase corn.

" The kingdom of Prussia has greatly suffered last year and this from inundations, which have ravaged precisely its most fertile countries ; and want, which is generally felt there, is on the point of transforming itself into actual famine.

" The news from Pomerania agrees in stating that the results of the last crops are very mediocre.

" In the Grand Duchy of Posen only a middling crop has been obtained, and anterior provisions can alone prevent a scarcity. The author does not remember having heard such numerous and general complaints, unless it be in the years 1804 and 1817. God grant that the unfortunate events of that epoch be not again reproduced ! There are in this province whole countries where the usual corn sellers will be obliged themselves to make purchases the next spring. The situation of Galicia is still worse. The price of rye rose 60 per cent. immediately after the crops : it is still on the rise.

" In Hungary, which is usually so productive, the Government has been obliged to lay in large stores of corn to prevent a famine. The hope entertained of having good crops has been still more cruelly disappointed than in Silesia.

" In Austria, Moravia, and Bohemia, the results of this year's crop are below those of the average ones, and must scarcely suffice for the general consumption.

" If we consider the west of Germany, we find, first of all, that the crops in Saxony have not precisely failed, although they are very far from being abundant. The same may be said of the provinces of Brandenburg and of Magdeburg.

" Bavaria, like other countries, has suffered greatly this year from hail-storms and water-spouts ; the results of the crops have in consequence been diminished, as likewise by the state of the atmosphere, which has shown itself but little favourable to the cultivation of corn.

" Wurtemburg, the country of Baden, Westphalia, and the Rhenish provinces, have been better treated ; but the disease which has ravaged the potato crop will be severely felt. Nevertheless, the potato crop has been generally good throughout Western Germany ; it will supply many deficiences in the crops of other places, although they are not so much grown as in other parts of Germany.

" Belgium and Holland have had but bad crops ; and the news from France sufficiently proves that this year has not been a productive one.

" Spain occupies but an inferior rank among corn-growing countries ; still reports from this country do not mention that the crops have been deficient.

" England, where the states of the European continent generally find a market for their surplus corn, appears to-day to be reassured on the wants of its internal consumption, or at least the alarming news which arrived from that country has been succeeded by much more favourable intelligence. Those who count upon corn supplies from the Baltic and provinces of the North Sea will be greatly deceived ; the prices of these productions will first of all be very high, and in the second place the quantities that can be supplied very small. A great quantity of wheat has this year been struck by blight ; and this disease, which has spread throughout Germany, Poland, and Hungary, has deteriorated the quality of the corn as well as diminished the quantity. Further, it cannot now be accurately known whether at a later period England will not be reduced to supply itself from abroad, for it is well known that it is only in case of an abundant crop that enough corn can be grown for the country. In the contrary case, she will look to supplies from America, or from the countries bordering on the Black Sea.

" In Scandinavia, that is to say Denmark, Norway, and Sweden, the crops have not been satisfactory. In a few words, then, it may be said that for many years past there has not been so unfavourable a year as the present one ; and if it be added that last year only furnished but indifferent crops in comparison with the preceding ones, this circumstance ought to give rise to measures being taken to prevent the danger which threatens us."

AGRICULTURAL QUERIES.

TO THE EDITOR OF THE FARMER'S MAGAZINE.

Sir,—Being but a young farmer, I lately committed that common error of my class—overstocking my land with cattle; which, in spite of sundry after expedients, entailed a loss on me. And yet the number of my beasts, in proportion to the land, was much less than those of of Mr. Price of Poole House, of whom you give an interesting memoir in your magazine of the present month. Nor were my cattle of an unthrifty sort (young Scots), nor very dearly bought, nor the land very poor.

How Mr. Price managed to keep 100 head of cattle, 250 sheep, and cart and other horses, on 150 acres of land, is more than I can comprehend; and if any of your readers would give a detail of Mr. Price's system, or point out where it is to be found, I am sure he will greatly oblige many of your subscribers, at well as confer a real favour on

A Recent Reader of your Magazine.

Chigwell, Oct. 15, 1845.

CULTIVATION OF PARSNIPS.

TO THE EDITOR OF THE MARK LANE EXPRESS.

Sir,—Being desirous of cultivating parsnips, but finding myself totally at a loss, from a want of knowledge of the best mode of management, I should feel obliged if any one would, through your assistance, inform me of the kind of soil best adapted for the purpose, the best description of manure, the mode of sowing the seed, and other information it may be thought desirable to know. Yours, Mr. Editor,

A Young Farmer.

Sir,—I shall feel extremely obliged if from some of your numerous correspondents you can obtain me information on the following subject. In a piece of woodland in my occupation, I have a considerable quantity of teazles growing, and I think they are fine and good; but as they are never cultivated near here (in Essex), I do not know enough of them to be satisfied with my own opinion. I should be glad, therefore, to be informed if it would answer to have them gathered How are they prepared and packed for sale? how could I best dispose of them? and what is the best criterion to judge of their quality or goodness? As the teazle seems indigenous to this piece of land, I should like to cultivate it on a few acres if it would be likely to pay. I should, therefore, be glad to receive any information on the subject from some of your better-informed correspondents.—I am, Sir, yours obediently, H. C.

A correspondent wishes to know the best mode of treating the seed of the potato, and the best time of gathering, preserving, and planting it.

Sir,—It strikes me that many of the potatoes which are likely to be thrown on the dung-heap or elsewhere this year, as utterly valueless, from the disease amongst the crops, and partial decay therefrom, might be rendered valuable so far as the undecayed part is concerned, if a simple apparatus or mill was arranged for separating the floury or farinacious part from the decayed; perhaps some of your readers, of a more mechanical turn than your correspondent, or some who are more conversant with chemistry, would lend their advice on this subject, and suggest some practicable means whereby this desirable end could be obtained at a trifling expense.

Yours, Mr. Editor,

A Grower of Potatoes.

Sir,—I shall feel obliged by any of your readers informing me the best mode of keeping Swedes or mangel wurtzel, for winter feeding. I have hitherto when drawn stored them in a house, but find they become damaged quickly. Your obt., servt.,

September 29, 1845. A Subscriber.

Sir,—Being a cultivator of a little hop ground in this (the North Clay) district, can you, or any of your correspondents, favour me, through the paper, with a chemical analysis of the fixed parts of ingredients contained in the hop plant, viz., in the bine, in the flower or hop, of course in their growing or green state, before they are bined?

In this district there is no lack of manure applied; but is better management required?

The crop here is a bad one, averaging about two cwt. per acre.

I am yours faithfully,

Retford, Sept. 19. Charbro.

ANSWERS to AGRICULTURAL QUERIES.

STREET SEWERS.

TO THE EDITOR OF THE MARK-LANE EXPRESS.

Sir,—"Economist" states that he wishes to learn something of the chemical nature of the contents of street sewers, &c., and the quantity of refuse that may be running daily into the Thames about London. "By carefully conducted experiments and very accurate gaugings it has been found that the chief London sewers convey daily into the Thames about 115,000 tons of mixed drainage, consisting on an average computation of 1 part of solid and 25 parts absolutely fluid matters; but if we only allow 1 part in 30 of this immense mass to be composed of solid substances, then we have the large quantity of more than 3,800 tons of solid manure daily poured into the river from London alone, consisting principally of excrements, soot, and the *debris* of the London streets, which is chiefly carbonate of lime; thus, allowing 20 tons of this manure as a dressing for an acre of ground, there is evidently a quantity of solid manure annually poured into the river, equal to fertilizing more than 50,000 acres of the poorest cultivated land! The quantity of food thus lost to the country by this heedless waste of manure is enormous; for, only allowing one crop of wheat to be raised on these 50,000 acres, that would be equal to the maintenance (calculating, upon an average produce of three quarters of wheat per acre) of 150,000 persons. The absolutely fluid portion is still rich in urine, ammoniacal salts, soda, &c. According to very careful experiments, the fluid parts often contain 16 per cent. of animal matters, salts, &c., intimately or chemically combined with the water." X. Y. Z.

[We beg to call attention to our advertising columns, where the prospectus of "the Metropolitan Sewerage Manure Company" may be seen; and from the highly respectable Committee who have brought this Company forward, there is no doubt but that it must be an eligible investment for the capitalist. The letter of X. Y. Z. above inserted, will throw sufficient light on this subject to show the profitable results which must follow the establishing such a company.—Ed. M.L.E.]

TURF ASHES.

Sir,—"An Irish Farmer" will find that it is upon clover that the influence of turf ashes is most surprising. There is no risk of giving too large a quantity of them to the land; 60 bushels per acre would be a moderate quantity for clover. They may be scattered over the frozen ground in winter, and raked in during the spring

Good turf-ashes should weigh about one hundred-weight per sack, not more, and ought to be white and light; when they are of a red colour, and very heavy, they are inferior for a manure. The red colour and weight are owing to the ashes being made from a turf containing iron pyrites. If, in the burning, the iron pyrites have not been well destroyed, the ashes will, on exposure to the air, by the absorption of oxygen, tend to the formation of green vitriol or sulphate of iron, and thereby prove prejudicial instead of beneficial to the land. A great peculiarity in the ashes of turf is, that among their constituent parts chemists have been unable to detect any of the phosphates: here, then, is a particular difference between these ashes and the general ashes of plants. Yours, Mr. Editor,

AGRICOLA.

CULTIVATION OF PARSNIPS.

SIR,—A correspondent of the *Mark Lane Express*, who signs himself "Young Farmer," asks after the management necessary for cultivating parsnips. Parsnips will thrive in any deep land, whether stiff or light. Some break up old grass land for parsnips in September; and after the turf is well rotted, twenty tons per acre of stable manure are spread over the land. A trench is then opened through the centre of the field, between two and three feet wide, and, where the soil will admit of it, from a foot to eighteen inches deep; a small two-horse plough then turns the manure and about three inches of soil into the trench, and this is immediately followed by a large trench plough, with three or four or more horses, which turns a foot or more of clean soil upon the manure and scurf, when the land has been recently skim-ploughed. The soil is then harrowed, and the parsnip-seed, which should be new, is sown at the rate of three or four pounds to the acre. The plants, when they are an inch high, are weeded, and are thinned out to nine inches or more at the second hoeing: they are taken up with a fork or ploughed up in October or November. The average produce per statute acre is nine to eleven tons. Parsnips certainly form one of the best preparatory crops for wheat. Before the roots are stored it is advisable to remove the leaves, and they will keep in store until April. Being a very hardy plant, the frost does not injure the seed or young plant, and, if thought desirable, the former may be sown as soon as they are ripe, in autumn. Yours, Mr. Editor, J. S. T.

TO EXTRACT THE FARINA FROM POTATOES.

SIR,—In your paper of September 29, "A Grower of Potatoes" inquires about "a simple apparatus for separating the farina from the remaining portion of the potatoes, such an apparatus at this particular time being very desirable, for by its means much of the nutritious property of partly-diseased potatoes might be extracted, and rendered available as a good and proper article for food?"

For common domestic purposes, a small hand machine for extracting the farina of potatoes may readily be made by any country mechanic. Let him take as his guide for the design a cylindrical turnip-cutter; viz., an outer case and a cutting cylinder, worked by a handle revolving inside the case. Instead of knives on the revolving cylinder, he may cover it with sheet iron, punched full of holes by means of a sharp-pointed instrument, so that burrs may be formed sticking outwards; this cylinder will then act the part of a rasp. A hopper must be constructed over the cylinder, for holding the potatoes until those beneath them get completely rasped away. The rasped portion may be received into a tub of any kind, and will require well triturating with water; the farina or flour can then be separated from the pulp by straining the fluid mass through a wire gauze sieve. The pulp will remain in the sieve, but the farina will pass through with the water, and will afterwards settle from the water, when the water may be poured away, and the half-liquid mass can then be put into suitable vessels to be dried, and afterwards stored away.

The preceding method is rather after a rude fashion, but it will be found effective; and, where disease has shown itself amongst potatoes, the plan will prove economical, and the best method for obtaining and preserving the nutritive portion of the potato.

I am, Mr. Editor, yours, &c.,

ECONOMIST.

SIR,—In answer to the queries of a letter from "A Farmer," I believe there has been no drag publicly known but Thacker's, which is a self-actioned drag, or rather brake, which acts by pressure upon the naves of the wheels; therefore whatever weight it takes to stop or partially stop the wheels is thrown upon the cart, in that part which is the same distance in front of the axle as half the diameter of the wheel; therefore it throws an extra weight upon the horse's back in proportion to the steepness of the hill descended, which is a great disadvantage. I beg to state that I invented a drag four years ago, upon a very simple principle, which takes the whole of the weight off the horse's back, and drags the cart more or less according to the steepness of the hill. It is merely a strong rest, with a slipper screwed to the bottom of it, from which a chain is attached to the near shaft of the cart; by the lengthening of which the cart is raised more or less, according to the height of the horse used, or the weight required to drag sufficiently. In applying it, all the man has to do is to let down the drag, with the required length of chain, and then raise the shaft of the cart, when the weight of the slipper brings it to the extent allowed by the chain, and the whole weight that is in front of the axle is thrown upon it. As the hill is more or less steep, it bears more or less weight; therefore drags more or less, causing the horse always to have a little draught, even in descending the steepest hills. It also answers as a rest to take the weight off the horse's back when loading and unloading; and although the horse moves on, it is not displaced. If my drag is of any advantage to "A Farmer," I will get him one made, and send it to him, with directions how and where to apply it. The expense will be about twenty-five shillings. It can be applied to any cart.

I am, Sir, yours obediently,

PETER LOVE.

Manor House, Naseby, September 27, 1845.

SIR,—In reply to the inquiry of "A Farmer," in the *Mark-lane Express* of September 22nd, I beg to inform him that I am the maker of an improved one-horse cart, fitted with "Thatcher's patent self-acting break." It is expressly adapted for hilly counties.

By this simple invention, the pressure of a loaded cart, when descending a hill, is made to pass from the brichin and back of the horse to the naves of the wheels. It is found to be effective in relieving the horse from the heavy pressure, and in regulating the speed of the cart in its descent.

	£	s.	d.
Price of one-horse cart, to carry 30 cwt.....	10	10	0
,, Harvest shelvings to ditto, extra ..	2	10	0
,, Patent self-acting break, extra	2	10	0

For further information apply to

Yours, &c.,

WILLIAM CROSSKILL,

Beverley Iron-works, Hull, Yorkshire.

"An old Subscriber at Lewes" inquired of us, in September, if Mr. Blacker, in his pamphlet on house-feeding, made his calculations upon an Irish acre, which is equal to 1 A. 2 R. 19 P. English. We have communicated with Mr. Blacker on the subject, and in reply he states that he is "now on a journey, and does not exactly recollect the quotation alluded to; but, as the land in the county of Armagh is all measured by the English acre, I have no doubt it is the English acre my calculation was made from, on whatever it may have been. In passing through Dublin, I may perhaps meet with the July 'Farmer's Magazine,' and if I find it necessary to contradict the above, I will write to you again."

BURNT CLAY.

SIR,—"A Practical Farmer" will find in "Johnson's Farmers' Encyclopædia," under the head of "ashes," that reference is made to General Vavasour, of Melbourne Hall, Yorkshire; Mr. Hewit Davis, of Spring Park, near Croydon; and Mr. Poppy, of Witnesham, as experimentalists and writers on the preparation and efficacy of burnt clay for manure.

Mr. Poppy remarks that clay burning is certainly not a modern Suffolk improvement, and adds "I have constantly seen it practised for half a century; and the oldest man I ever conversed with on the subject spoke of it as common as long as he could remember. I have a workman on the farm, who is I think upwards of eighty years of age, and has always followed the vocation of burning earth."

Yours, Mr. Editor, RUSTICUS.

An "Old Subscriber," if he wishes to employ the refuse of gas-works for manure, must proceed in his early practisings with extreme caution. The *gas-water*, or ammoniacal liquor, is undoubtedly an excellent manure, but it requires much diluting to fit it for a liquid manure. If it be applied as received from the gas-works to grass, it will apparently burn up and destroy the plant, but the next year the spot will be distinguished by very much increased fertility; the *refuse lime* through which the coal-gas has been passed in the process of purifying it from the sulphuretted hydrogen becomes impregnated with the sulphuretted hydrogen, and is partly converted into hydro-sulphuret of lime; a portion of ammonia is at first also in combination with it, but the carbonic acid gas of the lime combining with the ammonia, converts it into carbonate of ammonia or the volatile alkali; and in a very short time, from exposure, no ammonia will be found remaining in the refuse lime. Refuse lime may be applied either direct to the land or in compost, and in addition to its property as a manure, it is considered very offensive and destructive to many insects and grubs. *Gas-tar* contains the elements necessary for constituting a good manure, but has hitherto been but little used as a fertilizer. Mr. Bowley directs the compost heap to be formed with long dung about three feet deep, and coal-tar to be poured regularly over it, upon which another layer of dung or turf is to be put, and over all, on the top, is to be spread the lime; the whole is to remain in this state for two or three months before it is turned.

If the lime be placed under the tar, the tar will find its way through the dung to the lime, and, uniting with it, will form a hard cement, which will be broken with difficulty, and which he supposes will be but of little service to the land.

I am, Mr. Editor, yours, &c., AN OLD FRIEND.

CALENDAR OF HORTICULTURE—NOVEMBER.

RETROSPECT.

Rain, with scarcely two days' intermission, continued to characterize the weather till the 12th of last month; and therefore the operations in the garden were retarded, for everything was accompanied with dirt and dribble. The weeds could not be exterminated by hand or hoe; and to tread on the surface became injurious to it, as much so as in the depth of winter. We have heard and read of frosts; and certainly some dahlias, in low grounds, were shorn of their beauties before the end of September; but kidney beans, with us, are even now unscathed; and therefore, though the weather, as a whole, must be reckoned cold and chilling, yet the season remains favourable to vegetation, being more than usually free from frosty rime.

Since the 12th we have had brilliantly fine October weather, with night temperature between 42° and 50°, and a maximum by day at 55° to 58°. It was higher in London by three or four degrees. Fruit falls very fast, and has done so during many weeks. Half the apples appear to have thus come down, and each is defective. Some pears also fall; and thus our supplies will be diminished.

Potatoes, if experience at home, and near, can be received, rise far better than sombre anticipations led us to expect. We have kept the few bad ones we had—not one in twenty—some for six weeks, others (later, of course) for a shorter time, without perceiving any progressive deterioration; but there is one circumstance which has been communicated, and it is well worthy of remark. Some discoloured tubers, left in the ground near the surface, had produced considerable lengths of young shoots, as if vitality, checked precociously by disease inducing torpor, had been followed by premature activity. Before concluding this notice, closer observation shall be taken, and results reported.—October 17.

OPERATIONS IN THE VEGETABLE GARDEN.

The potatoes ought to be up without further loss of time; the drier the better. Rigid inspection will be required, so as to select those that may be tawny-blotched, keeping them apart in order to watch the course of the disease. We have discerned no advance of it in any tubers when once raised, and now possess many, that are hard as a cricket-ball, which were digged in September. In damp, warm pits, where growth usually commences early in the year, it were reasonable to fear decay; but if the store be laid on a dry, sandy, or chalk floor, and be deeply covered with new straw—or, again, if deposited in a potato-house, always cool and dry, but never frosted—there will be no great cause of apprehension.

Peas.—The frame, early May, or Charltons, can be sown in warm sites, to afford a chance of early crop. The same may be said of Mazagan and long-pod beans.

Cabbage.—Transplant again from the August sowings.

Carrots and Beet-root.—Dig these entirely, and store them in sand.

Parsnips.—A few as wanted, because they improve by frost.

Celery.—Earth up finally. The soil should be dry as possible.

Asparagus rows, if single, should be at least four feet apart, to admit of digging a spade-wide trench between each; the earth from which, taken out a full foot deep, is to be laid over the beds, so as completely to cover the short stumps of the haulm. The haulm itself might with great advantage be placed at the bottom of the trench, trodden down, and sprinkled with salt. Thus the refuse of the plant would be returned to the ground, over which a good coat of dung and leaves is to be laid. These decay and settle during the winter; and at the spring-dressing the earth from the rows is forked and raked upon the manure, and forms alleys between them. The routine, therefore, will be one of continual enrichment, because the decayed haulm and manure are digged out, and laid over the plants every autumn; and the trenches thus formed are, at the same period, similarly replenished. If the asparagus be grown in "three-row" beds, a similar mode of treatment will be attended with proportionate advantages; and

Seakale rows and *beds* are likewise retained for years in corresponding fertility; for it is evident that, by burying the leaves with a small addition of salt, superposing sound manure, the elements of vegetables which like nitrogenous and saline manure, will be supplied by a method of treatment which is perfectly safe and congenial.

Forcing Seakale. — The earliest rows, being dressed and trenched, should be covered with pots, boxes, or frames, and immediately lined and coated with warm manure, which must from time to time be renewed. Destroy weeds everywhere. Trench and dig vacancies, if the weather be favourable and dry.

FRUIT DEPARTMENT.

Vines in the open air—prune, and finally train them; the earlier the better. Those in the earliest forcing-house, if not already regulated, should be spurred quite close, even to *one eye*—that is, if they be strong and certain bearers—and then secured to the trellis-rods in due order. We affect not very early grapes, because the vines are really injured by severe winter forcing. December is quite early enough for a commencement. The beds should be sprinkled with bone-dust, and forked lightly, before the deep covering of dung be laid on; and it is well to remember that vine-leaves and small prunings are a natural appliance, acting upon the principle of "self-manuring."

Fig-trees ought to be trained quite close to the wall; the branches and shoots orderly as possible. When finished, they should be guarded from frost by the spray of the spruce-fir, otherwise by mats.

Nectarine and *peach-trees* should remain till February, unless pressure of business constrain a more early regulation.

Apricot, plum, and *cherry-trees* may be trained in neat, regular order, cutting back the spurs to low-seated, full buds.

Strawberry-beds and *rows* are benefited by a dress of good rich loam, incorporated with horse-droppings as scraped from the roads, to which a shovel of bone-dust has been added for every barrow. This dressing should be so ample as to rise close up to the leaves. Thus the new roots of early spring, which start always from the collar, can strike at once into new and rich earth.

FLOWER-GARDEN AND SHRUBBERY.

Bulbs. — The beds for tulips, hyacinths, narcissus, and the *too* scarce, most sweet jonquil, ought to be ready. A light, sandy loam, with a sprinkling of salt, a fourth part of leaf-mould or decayed droppings, and some few shovels of pure guano, would be appropriate. Plant each by line and trowel, observing that around every bulb a quantity of dry sand, sufficient to fill the hole as high as the neck, be put in close contact with it. Finish off the bed or row with a fine rake. The bulbs ought to be two inches below the surface at their termination.

Hyacinths in pots are to be deeply plunged in sand, and so kept till the plants have pushed some length. When raised, they will soon acquire the full green tint.

Shrubs.—Cut and trim these as required, always pruning to other shoots, so as to retain the natural figure. Leaves lying upon the ground form a secure covering, and most excellent manure.

Azaleas, and all American bog-plants, should have the ground hoed a little, prior to covering the surface with an inch of leaf-mould and white sand. If cakes of moss could be compactly secured around the plants, and, indeed, over the surface of a bed, the defence and effect to the eye would be equally good.

Greenhouses and pits require plenty of air in drying, open weather; but *some fire*, with air by front and back openings, in damp days. Keep the hot-water channels always free. Frosted water would destroy them; therefore, it is prudent to have a little fire occasionally, even where there is no forcing contemplated.

The *flower-house* must be brought up to 55° or 60°. In general, however, a season of rest is required, as plants, after it, revive to more vigour.

The weather became windy about the 18th: this condition prevented the threatened rain, and thus the third week has been really fine, and very favourable to all operations.

On inspecting our neighbour's potatoes, we find a tendency to growth in a few. One had four distinct shoots; but we have as yet no evidence of anything worthy of attention. Watchfulness is required this season; and we hope to report faithfully all facts of moment.—October 20th.

The Northampton Agricultural Book Club have resolved on establishing schools for the education of labourers' children, and procuring cottages with one rood of land to each, establishing clubs on sound and permanent bases for the relief of the sick and superannuated, and adopting every possible means of giving constant employment to the agricultural labourers throughout the year, and of paying them according to the work performed, and not according to their necessities. We hope that this praiseworthy effort to improve the condition of the English agricultural labourer will be followed by the different agricultural clubs in the kingdom.

METEOROLOGICAL DIARY.

Barometer.			Thermometer.			Wind and State.		Atmosphere.		
Day.	8 a.m.	10p.m.	Min.	Max.	10p.m.	Direction.	Force.	8 a.m.	2 p. m.	10 p. m.
	in. cts.	in. cts.								
Sep. 21	29.66	29.35	51	59	54	S. West	brisk	cloudy	cloudy	cloudy
22	29.72	29.94	48	58	50	Westerly	gentle	fine	sun	cloudy
23	30.04	30.23	48	52	42	East	brisk	fine	sun	fine
24	30.24	30.10	35	54	43	E. to S.W.	gentle	fine	sun	fine
25	29.96	29.77	40	56	52	S. West	gentle	cloudy	cloudy	cloudy
26	29.74	29.97	42	58	47	W. by North	gentle	fine	sun	fine
27	29.94	29.80	43	57	55	W. S. W.	strong	cloudy	cloudy	fine
28	29.87	29.92	49	59	49	Westerly	gentle	cloudy	sun	fine
29	29.97	29.79	42	54	49	Westerly	brisk	cloudy	cloudy	cloudy
30	29.74	29.80	48	54	51	W. by North	lively	cloudy	sun	fine
Oct. 1	29.97	29.90	42	55	55	W. W. by S.	gentle	fine	sun	cloudy
2	29.77	29.73	50	60	59	Westerly	brisk	cloudy	cloudy	cloudy
3	29.66	29.57	55	57	55	S. West	brisk	cloudy	cloudy	cloudy
4	29.60	29.60	48	58	54	S. West	brisk	fine	cloudy	cloudy
5	29.90	30.00	46	54	41	N.W. S.W.	gentle	fine	sun	fine
6	30.00	29.50	36	50	47	S. East	brisk	fine	cloudy	cloudy
7	29.44	29.48	42	51	42	Westerly	gentle	cloudy	cloudy	fine
8	29.48	29.23	36	52	49	S. East	gentle	cloudy	cloudy	cloudy
9	29.30	29.38	40	50	42	S.E. W.by N.	gentle	cloudy	cloudy	fine
10	29.40	29.44	36	52	45	S. East	gentle	cloudy	sun	fine
11	29.44	29.80	40	54	44	Northerly	gentle	clondy	sun	fine
12	30.00	30.19	40	53	45	N. West	gentle	fine	sun	cloudy
13	30.23	30.28	44	59	48	South	gentle	fine	sun	fine
14	30.40	30.38	44	59	48	S. East	gentle	fine	sun	fine
15	30.25	30.10	44	56	54	S. by East	gentle	fine	sun	cloudy
16	30.09	30.20	50	57	45	N. West.	gentle	fine	sun	fine
17	30.18	30.05	40	57	56	N.W. S.W.	brisk	cloudy	cloudy	cloudy
18	30.13	30.20	50	58	54	N. West	brisk	fine	sun	fine
19	30.26	30.18	50	57	53	Westerly	brisk	cloudy	cloudy	cloudy
20	30.07	30.15	50	57	47	W. N. W.	brisk	cloudy	sun	fine
21	30.27	30.34	42	57	47	N. N. W.	brisk	fine	sun	cloudy

ESTIMATED AVERAGES OF OCTOBER.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.61	28.74	68	27	48.9

Real Average Temperature of the period.

High.	Low.	Mean.
55.6	43.3	49.45

North and N. East Winds..	$6\frac{1}{4}$ days.
East and to South	$5\frac{1}{2}$
South and South West......	8
West and to North	$11\frac{1}{4}$

Weather and Phenomena.—Sept. 21, Profuse showers—22, Equinox at $\frac{1}{4}$ past 4, a.m.; about which time the wind changed to east—23, 24, both beautiful; but wind returned to S.W.—25, Rain—26, A little rain, generally fine—27, Rain and strong wind—28, Changeable and finer—29, Small rain—30, Fine cheerful day. The temperature of these ten days has been pretty equable; we had cold on the 24th, and in low valleys there was strongrime.

October 1, Vapour, calm and warmish—2, Rain, moist, warm—3, Abundant showers—4, Rough and changeable, drying—5, Beautiful, fine rich sunset—6, Profuse rain—7, Chilly and very damp—8, Rainy afternoon—9, Rainy morning, then finer—10, Some sun, damp—11, Much rain in the night, day improving—12, Fine day, evening overcast—13, Superb day, beautiful sunset—14, Airy forenoon, superb sun—15, Changeable—16, Beautiful—17, Changeable, strong current—18, Fine cumulous dry clouds, beautiful weather—19, Starchy clouds, threatening brisk wind—20, Again changes to dry, and barometer again rises—21, More confirmed, but the air is keen.

Lunations.—Sept.: Last quarter, 23rd day 26m. past noon. October: Newmoon, 1st day, 10h. 59m morn.; first quarter, 8th day, 11 h. 31 m. morn; full moon, 15th day, 9h. 56m. morn.

Remarks referring to Agriculture.—Regular in temperature as this period has proved, the weather was far too rainy for the late crops still a-field. An auspicious change, with a great rise in the mercury, took place on the 12th, after a wet month. This change must do good; at all events, ploughing proceeds well. Agricultural prospects are improved by higher prices, and men are full of work: numbers of hands have been taken from the London poor-houses, to aid in hop-picking; but the cry of injury to the potatoes prevails over all. We shall see!

J. Towers, Maidenhead Thicket.

AGRICULTURAL REPORT.

GENERAL AGRICULTURAL REPORT FOR OCTOBER.

During the greater part of this month the weather, in nearly all parts of England, has been extremely variable; hence, harvest work in the north and some other quarters has been protracted to an unusual length. Although nearly the whole of the wheats and other produce has at length been secured, we regret to observe that its quality is proving bad, and the yield far beneath that of last season. The consequence therefore is, that a considerable advance has taken place in the value of all kinds of grain in the various markets of consumption in the country, as well as in London. This advance has been productive of a great outcry on the part of the free-trade party for an immediate alteration in the corn laws, or, in other words, a demand for an order in council to admit the whole of the bonded stocks of grain free of duty. Now, we are not prepared to suppose for one moment that Sir Robert Peel will comply with these levelling demands; and why should he? It is a well known fact that during the last two years farming has been carried on at a fearful sacrifice of capital; and now that the agriculturists are only getting back a portion that they have been compelled to lose from almost unprecedented low prices, the cry is raised, "The corn laws must be repealed!" The farmers of the country, be it observed, do not desire exorbitantly high rates for their produce; but they have a right to expect, as they have faced severe losses, a continuance of protection, in order that their lost capital, or at least a portion of it, may be returned.

From the most careful inquiries, we find that the failure in the potato crop, arising from the heavy rains experienced during the months of July and August, is alarmingly extensive, particularly on heavy lands; indeed, in many instances, it has amounted to full half the produce. This is forming matter for serious consideration, as it is very apparent that every effort should be made to save even portions of the diseased esculent. That the value of potatoes will continue to advance, and the present high prices of grain be supported, is beyond a doubt: still, with these facts before us, looking at the activity everywhere pervading our commercial operations, and the full employment afforded our artizans and others, we do not anticipate those evils so freely predicted.

In our large agricultural districts, depastured stock is faring extremely well. In all parts there is a most plentiful supply of herbages, and an immense one of succulent roots, &c.; it is, consequently, fair to presume that our markets will continue to be supplied with really good stock. A great scarcity of sheep is still complained of on many farms, arising from the high prices demanded in the spring for store animals, and which prevented many of our graziers from purchasing adequate quantities of that stock. The imports of live stock from abroad, under the new tariff, still continues to increase. The beasts and sheep received from Holland, Germany, &c., in the past month, have not been of very superior quality; nevertheless, we have observed many useful animals amongst them. The numbers imported into London since the date of our last report have amounted to 629 oxen and cows, 27 calves, and 1,628 sheep; into the outports, 514 oxen and cows. These added to those previously reported this year form the following totals:—

Oxen and cows	11,460
Sheep	7,290
Total........	18,750

As comparisons are useful, we may state that up to the same time in 1842, we received a total foreign supply of 1,147; in 1843, 1241; and in 1844, 2,566 head.

Both in Ireland and Scotland, farm operations are going on favourably, though several patches of land still remain to be cleared of their wheats. The corn trade has again ruled active, and prices have been considerably on the advance, in consequence of the partial failure in the potato-crop.

The following is our usual monthly statement of the transactions in Smithfield cattle market. The supplies have been as under:—

Beasts................	17,781
Cows..................	473
Sheep	120,370
Calves................	1,385
Pigs..................	2,601

The above, compared with the supplies exhibited during the month of October, 1844, shews a large increase in the numbers of beasts, but a great falling off in those of sheep. Thus:—

In October, 1844.

Beasts	14,000
Sheep...............	162,000
Calves...............	1,260
Pigs..................	1,429

Notwithstanding the large arrival of beasts, the beef trade has ruled firm, at, in some instances, an advance in the quotations of 2d. per 8lbs. Sheep, calves, and pigs have ruled active, at higher prices. The comparison of value for last year and the present will be found below:—

Per 8lbs. to sink the offal.

	Oct. 1844.	Oct. 1845.
	s. d. s. d.	s. d. s. d.
Beef	2 6 to 4 0	2 4 to 4 2
Mutton	2 8 to 4 0	3 4 to 5 0
Veal	3 4 to 4 4	4 2 to 5 4
Pork	2 6 to 4 0	3 10 to 5 4

The supplies of beasts for the past month have been derived from the following quarters:—

Northern counties	9,600 head.
Eastern do.	1,500
Western do................	2,100
Other parts of England.....	1,450
Scotland	530
Ireland	300

The remainder have been chiefly derived from the neighbourhood of the Metropolis.

Up to Newgate and Leadenhall markets, the receipts of slaughtered meat from all quarters have been on a very limited scale, they having amounted to about 300 carcasses of beasts, 2,200 sheep, 1,100 calves, and 3,400 pigs. The trade has ruled firm, at 2s. 4d. to 3s. 8d. for beef, 3s. 4d. to 4s. 8d. for mutton, 4s. 2d. to 5s. 4d. for veal, and 3s. 10d. to 5s. 6d. per 8lbs. for pork.

AGRICULTURAL INTELLIGENCE, FAIRS, &c.

RETFORD FAIR.

With respect to horned cattle, a very large number was exhibited, and these were generally in much better condition than we have been wont to see them. This fact may easily be accounted for from the general character of the past summer; for such has been the plentifulness of grass, that many of our agriculturists, especially the small farmer, has had more keep than stock; and to buy in with any prospect of ultimate remuneration was extremely more than probable. Good drapes for feeding were somewhat scarce, and being in good flesh brought highish prices. Owing to the great abundance of after-grass, incalvers were rather scarce, and they could only be purchased at higher rates—say from 10*l.* to 12*l.* a-piece. Fat stock was tolerably plentiful, but somewhat higher rates being demanded at the commencement of the fair caused business to be somewhat slack until two or three hours had elapsed, when the sellers gave way, and nearly every thing of good quality was bought up; the prices averaging from 6s. to 6s. 6d. per stone.

The quantity of sheep penned exceeded those of any former year, and amounted to about 6,500. This was contrary to general expectation; for, in addition to the goodness of the pastures, and the plentifulness of keep at the present time, there is a prospect of a capital crop of turnips. About five or six weeks ago, this root generally was at a stand still; but latterly it has made immense progress, which has completely lulled all apprehension of any scarcity for the ensuing winter. Good store sheep were in considerable demand, and every thing of reasonable quality were readily sold at from 30s. to 40s. a-head, being from 5s. to 6s. a-piece more than could be obtained for the same kind of stock a twelvemonth ago. The number of lambs offered exceeded any thing of the kind ever offered at Retford; but there being plenty of buyers, most of them were sold at prices varying from 21s. to 26s. a-piece, being from 3s. to 5s. per head advance on last year's rates. Good fat sheep were not so plentiful, yet a fair quantity was exhibited, and there being plenty of purchasers present, all were soon bought up at from 6d. to 6½d. per lb. The best pen of lambs were said to be those offered and sold by Mr. E. J. Smith, of Laneham.

Of the show of horses we cannot say much in favour. The numbers in were decidedly less than on many former occasions, and many of these were of a very inferior sort. The best kinds of horses, however, were much sought after, especially useful cart horses, which obtained capital prices. Many were sold at from 26*l.* to 40*l.* a-piece, and several of the dealers complained of being unable to complete the number wanted. We also heard more than a few of the farmers wish that they had brought part of their spare stud forward, in consequence of the high range of prices. Good foals were scarce, and these fetched a high figure. As is usually the case, there were plenty of *screws*, which, in many instances, were bought at much more than their real value, and in others whatever the seller could get. Altogether, and notwithstanding the extension of railway travelling, horses fetched as good prices as we ever recollect; and the demand unusually brisk for good ones.

Owing to the plentifulness of grass during the past summer, and the absence of any disease of a serious nature amongst store cattle, it had been anticipated that cheese would be in abundant supply, and consequently to be had at moderate prices. But this is not the case altogether. With respect to our home-made Trent-side cheese, we believe a large quantity has been made, but the demand has fully equalled the supply; and such has been the anxiety of the wholesale dealers to purchase, that many of our largest dairies had been purchased at home previous to the holding of the fair. This circumstance tended to lessen the quantity pitched, and induced prices to be looking up. The quality generally was good, much of it very superior. With respect to Cheshire makes, very little was exhibited; but it realized high prices, and was all sold. Of Derbyshire dairies there was a fair sprinkling, and of a superior quality: indeed it was admitted that one make sold by Mr. Littlewood, cheesefactor, was as prime as ever was tasted. The fair, notwithstanding the untoward nature of the weather, commenced briskly, and continued so throughout the day, so that by four o'clock nearly the whole had been disposed of. Mr. Littlewood's lot, consisting of several tons, of almost every English make of good quality, entirely disappeared early. Old Cheshire obtained 75s. per cwt. Derbyshire 55s. to 63s. Trentside (new milk) 55s. to 60s.; old milk 42s. to 50s.

As it regards the quantity of hops exhibited we must make two or three preparatory observations. After a severe and backward spring, the bine made its appearance both tardily and irregularly; yet the colour was favourable, and during the month of May the shoots ran rapidly. In June, the pluvial results gave an immense impetus to the bine, and an abundant crop was generally and reasonably anticipated. In the succeeding month, however, these were materially checked by the lowness of the temperature during the nights, as well as to the excessive quantity of rain which fell during its progress. During the first fortnight in August the weather was of a more settled character, and the bines and foliage now proceeded to fill up rapidly, so that on our visit about the 15th and 16th we never saw so many of the plantations so well filled in, or look more promising. Nevertheless, to us there seemed to be a something lurking about the constitution of the plant which exhibited itself mainly in the dryness and huskiness of the leaf, and which to us was indicative of something seriously amiss; to remove which would require all the assistance which a succession of the most seasonable weather could possibly afford. At length the plant proceeded into bloom, and presently after into bur; and here some of them got no further. It is an old remark, which has been highly verified during the past season, that whenever the plant continues too long in bur, there seldom follows a crop. So it was; the bur continued so long that when it did get into hop, the wet weather and frosty nights, incident to the extreme lateness of the season, cramped its energies, and ultimately, in many instances, so far prostrated the crop, as to render it altogether nugatory. From our principal grounds, such as Rufford, Southwell, Markham, Ossington, &c., scarcely a bag was exhibited, and we never recollect such a meagre show at our October fair since we have been acquainted with it. In 1823, such was the complete overthrow of the hop crop, that the North Clays only paid 7*l.* duty; yet at our fair during that year upwards of 1,400 bags were exhibited, of the growth of 1822, and previous years. At our last fair, however, there was no such resource to fly back upon, and all that were exhibited amounted only to 205 pockets of new, and 19 bags of old ones! With a few exceptions, the samples were exceedingly indifferent. Those belonging to Mr. Gilbert, of Muskham, Mr. Hudson, of Retford, Mr. Johnson, Elksley, John Parkinson, East Leyfields, and Col. Markham, Bellmoor, appeared to be the best, and we believe most of them were sold. The principal factors present from London, Hull, and Leeds, either by themselves or by their representatives, were Messrs. Wood, Field, and Wood; Mr. George Russell; Messrs. Thomas Russell and Co.; Mr. Craster Humble; Messrs. Joseph Hitchen and Co.; Messrs. Gambles; Mr. B. McTurk; Mr. Skilbeck; Messrs. Wigan and Co.; Messrs. John Boyd and Co., &c. &c. Owing to the partial failure of our own crop, a capital business was transacted in south country hops at very fair prices. With respect to these the samples varied extremely; some of the Kent growths being thin, whilst others were as good as we usually find them. The samples from Sussex run more level, and, taking them as a whole, are of better quality than from any other district. The produce of the Weald of Kent, as well as of Mid-Kent, are tolerably fair; especially the latter, which are good. A most choice sample was exhibited by Mr. George Russell, of his own growth, which were the very best we have seen of the present year's growth. The following scale of prices will be found to be about the general currency:—

	£ s.	£ s.	£ s.	
Mid Kents......	8 0....	8 10....	9 9	choice
Wealds of Kent.	6 15....	8 0....	8 8	,,
Yearling Kents..	6 0....	6 15....	7 10	,,
Sussex	6 10....	7 0....	7 10	,,
Clays	7 12....	8 8....	9 0	,,
Yearling Clays..	5 12....	7 7....	8 0	,,

With respect to the duty which the present year's produce is likely to afford, there appears to exist a great variety of opinions; but it is ours that it has been much overlaid during the past month. The calculation for the North Clays is only 370*l.* The following are the estimates of two of the principal factories in the kingdom, namely:—

	£	£
Kent	84,000	82,000
Sussex	54,000........	50,000
Worcester ...	7,000........	8,000
Farnham	4,000........	3,500
Kingdom	1,000........	2,000
	150,000	145,000

The last six years, the North Clay District has been a losing concern to the grower. The management of a hop yard is 20*l.* per acre; and the average during that period has not been quite 3 cwt. per acre. The consequence is, that the planters are beginning to adapt their hop grounds to other and more profitable purposes; so that in a few years hop-growing in Nottinghamshire will become a mere matter of history. — *Doncaster Gazette.*

HULL.—This annual mart, chiefly noted for the sale of foals, was more numerously attended both by buyers and sellers than for many years. An unusual number of superior foals were shown, which met quick sale at high prices. Mr. Shaw, of Acomb, near York, was one of the principal buyers. There were a few pens of sheep, and a small show of cattle, for which the prices of recent markets were offered.

MARKET HARBOROUGH FAIR, LEICESTERSHIRE.—This great cattle fair was commenced on Monday, and will continue eight days following. The supply of stock was large, and came up in excellent condition. The prices obtained were considered high for this time of year, which is attributed to the abundance of the aftermath, which is of great importance to the stock and sheep breeders in this county, which is one of the largest in England. Many flockmasters appeared reluctant to sell, the weather continuing dry, and permitting sheep to remain on the low lands. Bullocks (fat) averaged 4s. 6d. per stone; ditto in fine condition, 12*l.* to 14*l.* a head; steers, 8*l.* and 9*l.*; cows with calves from 9*l.* to 12*l.*; heifers (down calving), from 7*l.* to 9*l.*; yearlings, 4*l.* to 6*l.* a head; sheep, prime fat wethers, fetched 4s. 6d. per stone; and a few pens of superior made 5s.; two-year-old wethers, for folding, ranged from 35s. to 2*l.* 2s.; tags, 27s.; lambs (fat), 5s. per stone; ditto for stock, 16s. to 22s.; well-bred ewes and young, 30s to 35s.; ditto half-breds, 29s. to 34s. There were a few pens of south downs, which sold well and readily. In the horse field a good business was done, and well-bred young carriage horses made prices varying from 80 to 100 guineas a pair, and many were destined for London. Nags and hunters sold according to age and pedigree; cart colts ranged from 16 to 24 guineas each; ditto horses for farming purposes, from 15*l.* to 18*l.*; and although a great number of stock was turned out sold the first day, the fair continues large, and more stock is daily brought in.

YARM GREAT OCTOBER FAIR.—This important fair, held on the 20th instant for horses and cattle, and on the 21st for sheep and cheeses, and also the horse show on the 18th instant, were well attended: some superior roadsters, field horses, and coaching colts were purchased in the principal stables and yards at remunerating prices. Good draught horses were also in demand; considerable purchases were made by several dealers who were in quest of military horses and horses for the coal works, and there was an excellent show of Scotch ponies, and a very great many were sold. The show of shorthorns was large, and the quality good. Calving cows and nice heifers met with ready sale, and large forward steers were also well sold. Beef sold at from 5s. 6d. to 6s. and upwards per stone. On the 21st there was, as usual, an excellent show of rams, which met a good market. There was likewise a very large show of shearlings and other fat sheep, which were speedily purchased at from 5½d. to 6d. per lb., with a tendency to an advance upon those rates at the latter end of the market. The choice of breeding ewes, sheep for turnips, and Highland wethers was particularly good. The show of cheeses was very large, and the quality being good a clearance was readily effected. New milk sold at from 50s. to 58s., general price, 54s. per cwt. of 112lbs., and old milk at from 26s. to 32s. per cwt.

MICHELL FAIR was plentifully supplied with cattle. The sale was dull in the early part of the day; but subsequently nearly all were sold at better prices than in the morning. Beef 48s. to 52s. 6d., plough oxen 35s. to 37s., cows and calves 50s. to 52s. 6d., and store cows and steers 30s. to 33s. per cwt. About 3,500 sheep were penned, which sold at 6d. per lb., fat 6d. to 6½d., and store ewes from 4½d. to 5½d. per lb.

ASHBOURN FAIR was abundantly supplied with cattle of all descriptions, and good in-calved cows and heifers were greatly in demand, in fact all good stock met with ready sale at advanced prices. The usual good show of rams and stores from the breeders in the neighbouring villages were much admired, aud considerable business done in them. Good heavy cart and dray horses were much sought after, but were scarce; and those of inferior kinds fetched better prices than were expected. Beef may be quoted at from 5½d. to 6d. per lb., and Mutton about 6d.

BALLINASLOE FAIR.—Ballinasloe, Oct. 6.—This was the second day of the sheep fair. There is an improvement in prices, and the average may be fairly taken from 1s. 6d. to 2s. beyond the rates of Saturday. Some high prices were obtained. One lot of maiden ewes sold for £3 5s. There were a good number of rams, which sold from £10 to £30. Mr. James Dillon and Dean French, so celebrated for purity of breed, got highest prices. The horses were numerous—much more so than I remember on show-day; to-morrow sales will take place. There was a greater number of the foal class than I remember to have seen here on previous occasions; some sales did take place, and for large figures :—

Captain Bolton, a chesnut horse	£140
Mr. Huddersfield, a bay mare	150
Captain Barry, a bay horse............	105
Mr. Nugent, chesnut mare	80
Mr. Dudley Persse	105

The following returns of the number of sheep and horned cattle sold and unsold at Ballinasloe at the annual October fairs, from the year 1833 inclusive, will give a better idea of the general superiority of the present fair than anything which could be collected by a casual observer :—

	Sold.	Unsold.	Total.
Year—1833....	51269	5143	56412
— 1834....	57810	8904	66714
— 1835....	55199	7312	62431
— 1836....	54162	9416	63578
— 1837....	63219	6117	69336
— 1838...	79583	12686	92269
— 1839....	71822	24409	76231
— 1840....	74286	16996	91282
— 1841....	70121	7061	77189
— 1842....	63865	12950	76815
— 1843....	63228	1998	65286
— 1844....	62033	8545	70578
— 1845....	66661	2922	69583

The prices on all classes of sheep varied from 4s. to 5s. above those of 1844; and on Monday (the second day) were so high as from 6s. to 7s. above the sales at that fair.

Black Cattle.	Sold.	Unsold.	Total.
Year—1833	6194	2567	8761
— 1834	7521	2116	9637
— 1835	7142	1442	8584
— 1836	6117	3366	9483
— 1837	7735	1402	9137
— 1838	10689	3454	14143
— 1839	10774	976	11750
— 1840	11163	1045	12208
— 1841	11954	2210	14164
— 1842	8674	6290	14364
— 1843	8767	1041	9808
— 1844	7538	3847	11735
— 1845	8423	1214	9637

Horned cattle were above the prices of last October, from 15s. to 20s. on store stock, and from 20s. to 30s. on fat stock, which I find, upon reference to the prices in the official returns from which I have made the foregoing extracts, are fully as high as those obtained for similar stock within the period which I have limited myself to, and the number of unsold was small. The official return is in the possession of Admiral Trench, the baron of the fair, and goes back for more than the last half-century, showing the prices and numbers of cattle, &c., sold and unsold in each class within that period.

The town fair takes place to-morrow, and I am inclined to think it will be confined to rather inferior stock, owing to the sales already made. A few horses will be on the green. To-day there were not many horses in town, and those were even very inferior, and few sales were made. There were no sheep whatever for sale, or to be seen in the fair.

OFFICIAL RETURN OF THE CATTLE SOLD AND UNSOLD.

	Horned Cattle.	Horses.	2 years' old Heifers.	Yearlings.
Sold	8,423	142	178	40
Unsold ..	1,214	...	159	49
Total	9,637	142	337	89

SALE OF SHORTHORNS AT WHITWORTH, DURHAM.—Mr. Gilbert Wood's sale of shorthorned cattle came off at Whitworth on Friday, September 26th, where the talent of Mr. Wetherell as auctioneer was again called into action. The following is a list of the purchasers, and the prices that the stock realized:—

Cows and Heifers.—Peeress, by Mr. Bretham, for 29 guineas; Helen, by the Marquis of Londonderry, for 41 guineas; Young Rosebud, by Mr. Watkin, for 20 guineas; Flora, by Mr. Torr, Lincolnshire, for 42 guineas; Young Fanny, by Mr. R. Booth, for 29 guineas; Henrietta, by Mr. Sober Watkin, for 31 guineas; roan, by ditto, for 15 guineas; roan, by Mr. Shaftoe, for 27 guineas; white, by Mr. Corner, for 18 guineas; white, by Mr. Faint, for 40 guineas; roan, by Mr. Torr, for 46 guineas; Young Peeress, by Mr. T. Parkinson, for 60 guineas; roan, by ditto, for 80 guineas; red and white, by Mr. Faint, for 20 guineas; light roan, by Mr. Ward, for 21 guineas; light roan, by Mr. Wetherell, for 62 guineas; red and white, by Mr. Watkin, for 18 guineas; roan, by Mr. Ward, for 33 guineas; white, by Mr. Torr, for 16 guineas; white, by Mr. Wetherell, for 20 guineas.

Bulls.—Noble, by the Marquis of Londonderry, for 40 guineas; roan, by Mr. Ward, for 24 guineas; red and white, by Mr. Richard Crofton, for 20 guineas; red and white, by Mr. Dormand, for 11 guineas; roan bull-calf, by Mr. Wearmouth, for 20 guineas; roan, by Mr. Kirton, for 10 guineas; roan, by Mr. John Wood, for 10 guineas.

We may also notice that the pigs were very prime, and sold at high prices. The noted Old Boar of the North was sold for 20 guineas.

EAST ESSEX AGRICULTURAL SOCIETY.—The annual stock and produce show of this society took place on Wednesday last, in the Castle Bailey, Colchester. With the exception of roots, of which there was a very good exhibition, the show-yard presented a very meagre appearance. The company was, however, numerous. Among the implements were an improved Biddell scarifier, manufactured by Mr. Hunt, of Colne (highly commended); and Mr. R. Coleman's patent expanding harrow. The latter also exhibited a moveable sheep-fold for the prize of £10 offered by Mr. Hobbs, but the judges declined to award the premium. In the absence of the president, T. White, Esq., from domestic circumstances of a melancholy nature, G. Round, Esq., distributed the prizes to deserving labourers and servants.

Stock Prizes.—Stallion—£5, Mr. John Grimwood. Brood mare—£2 10s., Mr. John Ward. Two-year-old filly—£1 10s., Mr. G. B. Ward. Year-old colt—£1 10s., Mr. John Grimwood. Pair of plough horses—£1 10s., Mr. G. B. Ward; and Mr. J. T. Hedge's were highly commended. Bull—£5, Mr. W. F. Hobbs; yearling ditto—£1 10s., Mr. Hobbs. Two-year-old heifer—£1 10s., Mr. C. Hall; yearling heifer—£1 10s., Mr. Hobbs. Lot of neat stock—£1 10s., Mr. Hobbs. Fat ox—£3, Mr. G. B. Ward; £2, Mr. Hobbs. Sheep—£2, Mr. Daniel Green; 30s., ditto; long-wool ewes—£1 10s., Mr. George Ward; short-wool wethers—£2, Mr. G. Ward; ditto (offered by the late General Rebow)—£2, Mr. J. G. Fenn.

Boar—£1 10s., E. G. Barnard, Esq.; Sow—£1 10s., Mr. Lithgow.

Farm Produce.—Red wheat, £3, Mr. C. Hall; other exhibitors, Mr. J. B. Brown, Rev. J. C. Blair Warren, Mr. G. Ward, Mr. T. Speakman, Mr. Thomas Cooper. White wheat—£3, Mr. George Ward; other exhibitors, J. Bawtree, Esq., Rev. J. C. B. Warren, Mr. C. Hall, and Speakman. Barley—£2, Mr. Speakman. White turnips (two prizes)—Mr. Speakman; Swedes—1st prize, Mr. Lithgow; 2nd, Mr. Daniel Green. Globe mangel—1st, Rev. J. C. B. Warren; 2nd, Mr. James Brown; long mangel—1st, Mr. J. Brown, 2nd, Mr. C. Hall. Cabbages—E. G. Barnard, Esq. Carrots (2 prizes)—Mr. C. Hall. Neatest rick-yard—£3, Mr. J. G. Fenn; £1 10s., Mr. G. Ward; that of Mr. A. Constable highly commended.

In consequence of the unavoidable absence of the president and several of the patrons of the society, no public dinner took place; but about thirty gentlemen assembled round the festive board at the Cups Hotel, where they spent an agreeable evening, under the presidency of W. F. Hobbs, Esq.

REVIEW OF THE CORN TRADE

DURING THE MONTH OF OCTOBER.

For some years past we have not had so protracted a harvest as that of 1845. The month of October is now fast drawing to a close, and considerable quantities of corn are still abroad; some portion has been so much injured by the excessive wet as to be wholly unfit for present use, indeed all the grain which has been carried during the last three or four weeks will have to remain a long time in stack before it can be in fit condition for thrashing.

In looking back at the state of the weather experienced the past summer, the principal characteristics will be found to have been a great degree of humidity and a want of solar heat. A dry warm season is known to be favourable to the growth of wheat in our moist climate, and it is therefore more than probable that the yield of that crop would have proved deficient, even if the time of the ingathering had been propitious; unfortunately, however, the case has been quite the reverse. The harvest commenced with showery weather, and much of the wheat secured in the early part of August was got in in very indifferent order—always a detriment to the quality, if it does not take from the productiveness of the crop. Subsequently we had an interval more auspicious, and probably a third of the harvest in the southern counties was secured in fair condition; but the fine weather did not last sufficiently long to enable the fields to be entirely cleared, even in the most forward districts; whilst the return of wet caught the greater proportion of the grain north of the river Humber in different stages of preparation for carrying. During the latter part of September and in the first two weeks of October, the work in the fields was constantly interrupted by frequent showers; latterly the elements have been rather more propitious, but, as already remarked, even now the ingathering has not been finished. This state of things must have done more or less injury to all discriptions of corn, pulse, and seeds; and we fear that the farmers of Great Britain have reaped a very different return to what appearances in the early part of the spring gave grounds to hope for. It is yet too early to give anything like an accurate estimate of the result of the harvest, but that wheat is decidedly deficient both in quantity and quality is certain. In carefully looking over the reports from the different agricultural districts, not one has come under our notice computing the produce at a full average. The most favoured counties are stated to have grown nearly an average, whilst in the majority of cases the deficiency in the yield per acre is stated to be from four to eight bushels, and in many instances the falling off is believed to be even greater. Besides the difference in measure, there is a very material deficiency in weight. Last season at this time most of the wheat brought to the different markets averaged 63 lbs. per bushel, whereas it is now rare to hear of a greater weight than 61, and by far the larger proportion of the new will, we fear, barely reach 60 lbs. This is certainly a sufficiently gloomy state of affairs; but the worse is still to be named. A good crop of potatoes might in some measure have compensated for an indifferent return of wheat, and have tended to alleviate the pressure high prices of bread-stuffs must always occasion to the poorer classes of the community. It is therefore with extreme regret we have to confirm the worse fears entertained respecting the mischief done by a perfectly new disease which has this year attacked that highly useful root. The first notice we had of the disorder having reached the British dominions was from the Channel Islands; afterwards it made its appearance in the southern counties, and it has since spread gradually to the east, the west, and the north; no part of the kingdom having entirely escaped.

A good deal of discussion and correspondence has taken place to assign a cause for this before unknown disease; but no plan has been discovered to stop its progress, and the potatoes once infected have proved to be nearly useless. The great question now is, "whether those apparently sound will keep through the winter?" but on this point too all is speculation.

The shortness of the wheat-crop, and the extensive failure in potatoes, preclude the possibility of low prices during the approaching winter. For many weeks past the value of wheat has moved upward steadily at all the principal markets, and at present the article is from 15s. to 20s. per quarter dearer than at the lowest period of this year. How much greater may be the rise must depend mainly on the point we have just refered to, viz.—"whether that portion of the potato-crop not destroyed will keep, and afford wholesome food?" What we already know is quite sufficient to keep prices of wheat where they now are; and should it unfortunately prove that the potatoes when stored go off as some affirm they show a tendency to do, high as wheat now is it might still rise materially.

The lateness of the harvest, and the damp condition of the new wheat which comes to market, have caused a very extensive drain on the stocks of old; and though there was an unusually large surplus of last year's crop on hand at the commencement of harvest, farmers are now pretty nearly cleared out, and comparatively few old ricks are to be met with in any part of the country. Meantime, there is little or no free foreign wheat in the kingdom, and the entire quantity under the queen's locks amounts to only 500 or 600,000 qrs.

So important an advance as that which has taken place in prices of wheat must, of course, afford great inducement to thrash, and it may be expected that growers will be tempted to send all they can spare forward for sale. A large increase in the deliveries may act as a temporary check to the upward movement, but we feel pretty certain that quotations will be even higher than they are at present before the close of the year.

Owing to the generally flourishing state of trade, and the extra demand created for labour by the formation of the numerous new railways, there is plenty of employment for labourers; the consumption of food, which has all through the year been extraordinarily great, seems likely, therefore, to go on at the same ratio, even though prices continue to advance; indeed, in the present position of affairs we cannot discover a single circumstance calculated to check the rise, whilst abundant grounds are afforded by the shortness of the wheat crop, the disease in potatoes, the reduced state of the stocks of old wheat, and the power of the people to consume, to reckon on still higher rates.

As the trade at most of the other markets has been greatly influenced by the transactions at Mark Lane, we shall confine our notice of the operations of the month to what has occurred in the metropolitan market.

Up to about the middle of the month, the arrivals of wheat coastwise into London were on a very moderate scale; but subsequently we received increased supplies from the east coast, being mostly the growth of Lincolnshire and Cambridgeshire. The bulk of what has come to hand from the last named counties was purchased by the millers free on board at the ports of shipment, and not having been offered for sale at Mark Lane, nothing has thereby been added to the quantity on the market. The show of samples has, therefore, been almost wholly from Essex, Kent, and Suffolk, and at no period of the month has the display been particularly abundant. The first Monday in October (the 6th) the quantity on sale proved inadequate to satisfy the wants of the local millers, and the whole was readily disposed of at an advance of 2s. per qr. During the subsequent week several orders to buy wheat were received from Yorkshire, and on the 13th inst. a further enhancement of from 2s. to 3s. per qr. was established, making the total rise in a fortnight 5s. per qr. This, as might naturally be supposed, drew forth somewhat increased supplies, and the recipts having since kept pace with the demand, the upward movement has for a time been checked.

The narrow compass into which the granaried stocks of old wheat have been reduced, and the necessity for buying the finer kinds to mix with the soft-conditioned parcels of new English, have caused the value of the former to advance in the same proportion as that of home growth; and at present, fine Danzig and good qualities of Lower Baltic red wheat are at least 4s. to 5s. per qr. higher than they were at the close of last month. To prove how much difficulty millers have experienced in supplying themselves with old wheat of suitable quality for mixing, it is only necessary to mention that they have in some instances been obliged to enter parcels lately received from abroad for home consumption at 17s. to 18s. per qr. duty, though from the position of the averages they were fully aware that in the course of a few weeks the duty must recede to 14s. or perhaps below that point. This fact strikingly shows how much old wheat has been wanted, and how small are the available stocks. It may easily be conceived that no person would voluntary make government a present of 4s. per qr., and that pressing necessity has been the only reason for entering a single bushel under such circumstances.

Whilst we are on the subject of duties, it may not be amiss to state what are our impressions relative to the future range thereof. That ultimately wheat will be admissible at a very low rate is, we think, certain. Hitherto, the inferiority of the quality of a large proportion of the new wheat has prevented the averages rising so rapidly as they otherwise might have done; still, as good wheat is now worth nearly 70s., an aggregate average of 60s. must speedily be attained; we are, consequently, inclined to think that before the end of November the duty will have receded to 12s. per qr. By that time the extent of the injury done to the potato crop will have been ascertained, and we may also expect that the deficiency in the wheat crop will have become better known than at present.

In proportion as the present apprehensions of scarcity are found to be well or ill grounded, importers will most likely be induced to release their wheat, or allow it to remain in bond. The former proceeding would at once be an acknowledgment that the deficiency of the harvest had been overrated; whilst an unwillingness to pay so moderate a duty as 12s. per qr. would be received as a direct evidence that those well calculated to form a correct opinion saw reason to reckon on higher prices and a lower rate of duty.

A considerable extent of speculation has been carried on in bonded wheat since our last monthly report, and the rise has been even greater than that established on free.

Latterly, moderately good qualities of red wheat have commanded 53s. to 55s.; superior Rostock, 56s. to 60s.; high-mixed Danzig has been selling at over 60s., and the best sorts have been held as high as 63s. per qr. The difference between these rates and the present value of the same sorts free is not above 10s. to 12s. per qr., from which it may be inferred that the parties making investments feel tolerably certain of the duty receding to the lowest of the points named.

The continued and important rise in the value of the raw material has obliged the millers to advance the price of flour; and at present the principal London manufacturers are unwilling to enter into contracts to deliver their best marks below 60s. per sack, which must be considered as the top quotation.

Though fair supplies of ship flour have come to hand, the enhancement established on the latter has been quite equal to the rise on the former, and the best Norfolk households have lately been selling in London at 50s. per sack.

For United States flour, in bond, a very lively speculative demand has been experienced, and fine brands have risen to 30s. per brl. Canadian has also been in much request, at 34s. to 35s. per brl.

Public attention has been so much directed to wheat and potatoes, that very little authentic information can be obtained relative to the result of the harvest as regards spring corn and pulse.

That wheat is more apt to be injured by a wet summer than other sorts of grain, is an acknowledged fact; and we are inclined to think that the produce of barley and oats would have exceeded an average, if the weather had been moderately propitious for the ingathering. So strong is our impression on this subject, that we even question whether there will be found any deficiency in the *quantity* of these articles, notwithstanding the extremely unfavourable auspices under which the great bulk of the corn has been housed. The *quality* must, however, have suffered; that of the barley in particular. Really fine malting samples will, in all probability, be very scarce; but of ordinary sorts we are inclined to believe more than the usual proportion has been grown. The high value of wheat will most likely cause grinding barley to be in request at remunerating rates, whilst fine samples must, owing to their comparative scarcity, command high prices. Barley is, therefore, likely to be one of the best paying crops to the farmer this year.

Hitherto, only small supplies have appeared in the London market; and the malting season having hardly as yet commenced, the transactions in the article have not been important. The first samples of new Chevalier exhibited from Essex and Kent sold at 34s. to 35s. per qr. Since then, prices have gradually crept up: and at present fine parcels of malting are worth, at Mark-lane, 39s. to 40s. per qr. All other descriptions have risen in the same proportion; indeed, the inferior sorts have advanced to a somewhat greater extent than the finer kinds, and lately stale old parcels of foreign have realized 28s. to 30s. per qr. The averages have moved up sufficiently, since the close of last month, to cause a reduction in the duty of 1s. per qr., and a more important fall may be anticipated. Rather extensive shipments to Holland and Belgium have, however, so much reduced the stock in bond, that the rate chargeable on importations is at present of little consequence.

Malt, the price of which is generally more or less influenced by the value of barley, has risen 2s. to 3s. per qr. during the month. The stocks of old are reduced into a very narrow compass; and the best sorts may be expected to advance still further, as the malting properties of the new barley are not very favourably spoken of.

We have already given it as our opinion that the produce of oats may be estimated at quite an usual average in quantity, and judging from the samples which have hitherto appeared at Mark Lane, it may be safely affirmed that that portion secured previous to the 13th September was saved in good order. The few parcels which have reached us from Lincolnshire of this year's growth have proved very fine, and the small lots of farmers' corn from Essex and Kent have given no cause for complaint. Many of the early shipments from Ireland to London and Liverpool have also turned out exceedingly well; but it must be recollected that a very large proportion of the crop of this grain was still in the field, when the weather became stormy and wet, and that even now there is no inconsiderable quantity out in the backward parts of Scotland and Ireland, the whole of which must have suffered seriously in point of quality.

The disease of the potato is likely to have a more direct influence on prices of oats than on the value of any other grain, inasmuch as the consumption of oatmeal must be enormously increased thereby. Already purchases of the last named article have been made at Liverpool on Irish account, and the sister isle is likely to require so large a portion of her crop of oats to provide food for her people, that a very material falling off in the supplies from thence must be reckoned on. These considerations have naturally had the effect of raising prices, and oats are now dearer at Mark Lane than has been the case for some years past. To give an idea of the rise which has taken place within the short space of two months, we may state that Archangel oats were currently selling in the London market, on the 1st of September, at 20s. 6d. per qr. duty included; the same variety has recently been sold at 25s. to 26s. per qr. in bond, and at 30s. to 31s. free.

New Irish oats, which in the beginning of the present month were only worth 25s. per qr., now command from 30s. to 34s. per qr., according to quality; whilst fine Scotch potato cannot be bought below 35s. to 36s. per qr. The article is so scarce at the near continental ports (from which alone it is possible for shipments to be made before winter closes the navigation), that the supplies from abroad must necessarily be extremely small. Many parties expect the duty to fall to the minimum point before the close of the year, though at present it still remains per 6s, qr.

Beans promised, up to a very recent period, to be an excellent crop; but, from the long exposure to wet in the fields, a falling off in the quantity and quality must be anticipated; still, we think the produce will not be bad. The high value of other feeding articles and the reduced state of the stocks of old have, however, given an upward tendency to prices. The new which have appeared at Mark Lane, having been secured early, have come to hand in good condition, and have commanded extreme rates; whilst the best samples of old English have actually been sold at 50s. per qr.

Almost the only kind of foreign beans in the market are Egyptian, which are at present worth 38s. to 40s. per qr., and, considering that these were mostly cleared in at 1s. per qr. duty, importers must have realized a very handsome profit on their investments.

In prices of peas the most extraordinary fluctuations have taken place; but at the close of the month quotations do not differ much from what they were at the end of September: good white boilers were last sold at 55s. to 56s., blue from 54s. up to 60s., and maples at from 43s. to 45s. per quarter. The demand from Holland and Belgium, though less active at one time than another, has been sufficiently extensive to take off nearly the whole of the supplies; and as what has hitherto been brought forward has actually left the country, this article is likely to continue relatively high throughout the winter, particularly as an increased consumptive demand must be calculated on in consequence of the failure of potatoes.

The excited state of the British corn markets, and the prospect of England requiring foreign aid, together with the fact that the harvest in Holland and Belgium has proved so extremely defective that the Governments of those countries have considered it necessary to open their ports for the free importation of grain, have caused prices of all kinds of corn to run up rapidly at the leading ports in the Baltic; and it is evident that, if our wants should hereafter prove urgent, we shall have to pay extravagantly for foreign assistance. By the most recent accounts from Danzig, it appears that the best qualities of high mixed wheat had been bought there, on speculation, at 55s. to 57s. per quarter; whilst secondary descriptions had risen in the same proportion. Many holders had become unwilling to sell even at these extraordinary rates, deeming it certain that extensive British orders would be received at considerably higher limits. In how far these calculations may prove correct still remains to be seen; but that our foreign neighbours are determined to profit by our necessities is tolerably plain. Danzig is the only place in the Baltic where any stocks of old wheat remain on hand; at the lower ports the stores are empty, and it would therefore be a difficult matter to collect half a million quarters in the North of Europe.

The reports from Poland respecting the yield of wheat are not favourable; the quality is, however, described as good, and the trifling supplies which had come to hand up to the date of our latest advices had averaged 60 to 61 lbs. per bushel in weight.

In those countries from which Stettin, Rostock, Wismar, and the neighbouring ports derive their supplies of wheat, the crops have turned out more satisfactory than in almost any other quarter of Europe; but it is not likely that the deliveries from the growers will be sufficiently extensive until next spring, to afford any large quantity for shipment. The news from hence, and the orders from Holland, had, by the last accounts, caused the finest qualities of Pomeranian, Mecklenburgh, and Ukermark wheat to advance to 48s. to 50s. per qr. free on board, and a further enhancement was confidently expected. At Hamburgh prices are equally high, 51s. to 52s. per qr. free on board having lately been paid there for fair qualities of red Upland.

If we turn to the Mediterranean, we find affairs in much the same position; indeed, making allowance for the difference of quality and freight, prices are higher in the southern and eastern parts of Europe than in the Baltic.

Letters from Leghorn, of the 14th October, inform us that large contracts had been closed for Polish Odessa and Marianopoli wheat at 42s. per qr., free on board. At Marseilles quotations are equally high; and it is evident that unless the duty falls to a very low point, it will be no easy matter to make good our deficiency by foreign importations. The free traders will, no doubt, make use of this state of things to further their views; but all right-thinking men must at once perceive the impossibility of any legislative measure guarding against so universal a calamity as a defective harvest over the whole of Europe.

On the other side of the Atlantic the seasons appear to have been more propitious; but as we shall not be their only customers, the Dutch and Belgians having already sent out large orders for the purchase of wheat to the United States, we must expect the next mail from thence to bring us tidings of a material enhancement in the value of flour in that quarter also.

CURRENCY PER IMPERIAL MEASURE.

OCTOBER 27.

WHEAT, Essex & Kent, red ..	54	62	White	59	70
Do. new ..	52	61	Do. new ..	59	67
Norfolk and Suffolk ..	54	60	White	58	68
RYE, new				35	37
INDIAN CORN				34	35
BARLEY, Chevalier, new......	36	38	Malting ...	35	36
Distilling	30	33	Grinding ..	29	31
Scotch	30	31	Irish	—	—
MALT, Brown................	51	54	Pale Suffolk & Norfolk	56	58
Ware pale	60	62	Chevalier..	62	64
OATS, English, feed..........	25	26	Potato, &c.	31	33
Irish, Youghall & Cork, bk.	25	26	Cork, white	29	31
Dublin..............,	25	26	Westport ..	29	31
Clonmel .... ,,	25	26	Limerick ..	29	31
Londonderry........ ,,	25	26	Sligo	29	32
Newry.............. ,,	25	26	Galway	26	29
Waterford........... ,,	25	26	Ballina....	29	31
Scotch, feed .... ,,	27	29	Potato	33	36
PEAS, white, Essex and Kent, boilers.......... .. new				50	56
Do. fine Suffolk				54	57
Do. do. extra				57	58
Do. non-boilers........				—	—
Maple new........				43	45
Blue				50	56
Grey or Hog........				42	44
BEANS, Tick ....new	38	40	old	42	45
Harrow	40	44		43	46
Pigeon	46	48		45	50
Mazagan	—	—		—	—
FLOUR, Town-made and first country marks, per sack..				55	60
Norfolk and Suffolk				46	50
Stockton and Yorkshire				44	48

FOREIGN.	Free.		In Bond.	
WHEAT, Danzig and Konigsberg, finest high mixed	63	70	50	60
Do. mixed	59	63	46	55
Saale Marks, Anhault	58	63	50	54
Silesian and Stettin	56	61	50	52
Mecklenburg and Pomeranian	61	65	52	52
Polish Odessa	53	56	—	—
RYE	—	—		
BARLEY, Hamburg, Konigsberg, Dantzig, and Russian malting	29	31	—	—
Do. distilling and grinding	28	29		
OATS, Dutch and Friesland, Brew or Poland	30	31	—	—
Danish or Swedish	28	29	—	—
Russian and Mecklenburg	27	28	—	
PEAS, white boiling	none		—	—
Grey or hog	none			
BEANS, Small or Pigeon	42	46	—	—
Egyptian	38	40	—	—
FLOUR, Danzig, per brl. of 196lbs.	—	—	—	—
American	35	36	—	—
Canadian	34	35	—	—

COMPARATIVE PRICES OF GRAIN.

WEEKLY AVERAGES by the Imp. Quarter, from the Gazette, of Friday last, Oct. 24th, 1845.	s.	d.	AVERAGES from the corresponding Gazette in the last year, Friday, Oct. 25th, 1844.	s.	d.
WHEAT	58	2	WHEAT	46	3
BARLEY	32	0	BARLEY	34	0
OATS	23	5	OATS	20	8
RYE	34	5	RYE	38	0
BEANS	44	5	BEANS	36	9
PEAS	43	0	PEAS	34	10

IMPERIAL AVERAGES.

Week ending	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.	
Sept. 13th	54	1	31	0	22	3	33	2	42	10	35	5
20th	52	6	30	9	21	7	32	8	42	5	37	0
27th	53	2	30	2	22	2	33	1	42	5	38	9
Oct. 4th	56	0	31	1	23	4	33	8	43	1	42	6
11th	57	9	31	3	23	4	34	2	43	1	44	4
18th	58	2	32	0	23	5	34	5	44	5	43	0
Aggregate average of the six weeks which regulates the duty.	55	3	31	0	22	8	33	6	43	1	40	4
Duties payable in London till Wednesday next inclusive, and at the Outports till the arrival of the mail of that day from London	17	0	7	0	6	0	9	6	1	0	2	6
Do. on grain from British possessions out of Europe	4	0	1	0	1	6	1	0	0	6	0	6

PRICES OF SEEDS.

OCTOBER 27.

The Seed trade was quiet, there being no response here to the increased rates quoted in Germany and France for red and white Cloverseed; but Trefoil is a better sale. Canaryseed was held higher, and was in fair request.

English Cloverseed, nominal.
SEED, Rape.......... 27*l*. 28*l*. Irish .. 22*l*. 26*l*. per last.
Ditto, new .... 25*l*. —*l*. per last.
Linseed, Baltic..40 44 Odessa 45 47
Mustard, white 10 12 brown — — per bush.
Linseed Cakes, English..—12*l*. 0s. to —13*l*. 0s. per 1000
Do. Foreign.. —*l*. 0. to —*l*. 0s. per ton.
Mediter. & Odessa 44 45
Baltic............ — —
Linseed, English, sowing 52 58 crushing 43 45 per qr
Carraway .... 42 44 new .. 46 48 per cwt.
Coriander .... 12 16 per cwt.
Mustard, brown, new.... 10 14 white..10 12 p. bush
Hempseed.............. 35 38 per qr.
Trefoil .... 17 24 old.. — new —
Tares, Winter .... 7s. 9d. to 8s. 3d.

PRICES OF HOPS.

BOROUGH, MONDAY, Oct. 27.

There has been a firm market for Hops, and the duty is estimated at about 165,000*l*.

POTATO MARKET.

SOUTHWARK, WATERSIDE, OCT. 27.

There have been several arrivals from Yorkshire since our last. Some samples that were shipped off high lands, and in fine weather, were in good condition, and were very little affected with the disease; but there are several lots, which were shipped in the late rains, that are considerably damaged, and some are a total loss, but the injury is attributed as much to the wetness of the weather as to the prevalence of the disease. There have been several arrivals from Scotland, and in some samples the disease was too apparent; but it is the general opinion that after the potatoes have been placed in the pyes or clamps for a short time, to allow the heat to evaporate, and those that are damaged picked out, we shall then have a much better sample. York reds are selling from 40s. to 100s.; Regents, 100s.; Scotch reds, 40s. to 80s.; but there are some samples, both of York and Scotch reds, that are unsaleable.

WOOL MARKETS.

BRITISH.

LEEDS, October 24.—This branch of trade remains without any alteration from last week's report.

LIVERPOOL, Oct. 25.

SCOTCH.—Our Wool market partakes of the general depression that pervades most other articles in consequence of the uncertainty as to the result of the potato and grain crops, and the fear that this may have an unfavourable tendency on trade. Prices, in the meantime, are without change; and as soon as all cause of apprehension is removed, there will no doubt be more animation, as the Wool trade itself is in a very flourishing condition.

		s.	d.		s.	d.
Laid Highland Wool, per 24lbs		9	6	to	10	0
White Highland	do	12	9		13	3
Laid Crossed	do.. unwashed	11	6		13	0
Do.	do..washed	12	0		13	6
Do. Cheviot	do. unwashed	11	0		13	6
Do.	do..washed	14	0		17	9
White Do.	do	24	0		26	0

FOREIGN.

The Wool sales closed on Friday, having lasted, with the interval of Sunday, just 22 days. These are likely to be the last sales of the season. They comprised 33,100 bales, including 15,502 bales from Sydney, 6,692 from Port Phillip, 1,466 from Van Diemen's Land, 608 from South Australia, 82 from New Zealand, 3,445 from the Cape of Good Hope, 439 from the East Indies, 753 from Spain, 1,337 from Russia (Merino), 241 do. (Autumn &c.), 560 German, and 1975 Turkey, South America, &c. The colonial alone, therefore, made up 27,802 bales of this large quantity; or, if we include East India, 28,241 bales. The result of the series is regarded as satisfactory, and the attendance of buyers has been large. The best qualities have realized fully July rates, but the inferior sorts were scarcely supported, being relatively in less demand. Burrs and prickles are still complained of, as being mixed in with the wools; but generally their condition was good, and shows improvement. Van Diemen's Land has realized comparatively full rates, being scarce. Port Philip is much better got up. Cape has been in request, and has ranged at high prices. East India has rather advanced. Odessa merino wool has been at 1s. 6d. to 2s. 2d. per lb.; Spanish at 1s. 8d. to 2s. 2½d.; and German at 2s. to 2s. 8d. Buenos Ayres has been worth 6d. to 10d. per lb.

LEEDS, October 24.—Foreign wools have not been very considerably dealt in during the past week; but as the London sales are now drawing to a conclusion, and recent rates have been there fully realised, a generally improved demand in this market may be fairly expected.

PRICES OF SHARES.

Shares.	Div. last half year	RAILWAYS.	Price per Share.
		Aberdeen ... $2\frac{1}{2}l$ pd	5 a $\frac{1}{4}$
24,000	$2l$ p sh	Armagh, Coleraine, Portrush $25l$ sh $1\frac{3}{8}l$ pd	$1\frac{7}{8}$ a $\frac{5}{8}$
4,000		Aylesbury and Thame .. $25l$ sh $1\frac{3}{8}l$ pd	
		Belfast and County Down ...	
		Bideford and Tavistock ... $1\frac{3}{8}l$ pd	
9,500	10s	Birmingham and Gloucester $100l$ sh pd	126
10,000		Do. New, iss. $7\frac{1}{2}$ dis. .. $25l$ sh $17\frac{1}{2}l$ pd	
30,000		Birmingham and Oxford Junction, $20l$ sh $2l$ pd	$4\frac{1}{4}$ a $3\frac{3}{4}$
		Boston, Stamford, and Birmingham, 22s. pd	$1\frac{1}{8}$ pm
9,500		Brighton, Lewes, & Hastings, $50l$ sh $20l$ pd	
15,000	$1l$ 8s p sh	Bristol and Exeter ... $100l$ sh $70l$ pd	92 a 1
		Ditto New ... $33\frac{3}{8}l$ sh $2l$ pd	$11\frac{1}{2}$ a $10\frac{1}{2}$
6,610	12s p sh	Bristol and Gloucester .. $50l$ sh $30l$ pd	56
		Bristol and Liverpool Junction ...	
36,000		Caledonian ... $50l$ sh $5l$ pd	$12\frac{1}{4}$ a 11
		Do. Extension ... $50l$ sh $2\frac{1}{2}l$ pd	$4\frac{1}{4}$ a $3\frac{7}{8}$
50,000		Cambridge and Lincoln .. $25l$ sh $1\frac{1}{2}l$ pd	$5\frac{1}{8}$ a $4\frac{7}{8}$
		Do New ... $25l$ sh $1\frac{3}{8}l$ pd	$4\frac{3}{8}$
		Canterbury and Dover ... $1\frac{3}{8}l$ pd	
		Cheltenham and Oxford ... $2l$ pd	
		Chelmsford and Bury ... $1\frac{3}{8}l$ pd	
42,000		Chester and Holyhead ... $50l$ sh $15l$ pd	$18\frac{3}{4}$ a $17\frac{3}{4}$
		Chester and Manchester ... 42s pd	$0\frac{1}{2}$ pm
		Clydesdale Junction ... $5l$ pd	
		Cork, Blackrock, and Passages .. 22s sh 22s pd	
		Cork and Killarney ... $50l$ sh $2\frac{1}{2}l$ pd	
40,000		Cork and Waterford ... $25l$ sh $1\frac{1}{2}l$ pd	$1\frac{7}{8}$ a $\frac{5}{8}$
		Cornwall ... $50l$ sh $3l$ pd	$3\frac{1}{4}$
4,800		Coventry, Nuneaton, Bir. & Leicester, $25l$ sh $1\frac{1}{4}l$ pd	$2\frac{1}{4}$ a $1\frac{5}{8}$
		Derby, Uttoxeter, and Stafford $2\frac{3}{8}l$ pd	$2\frac{3}{8}$ a $\frac{7}{8}$
		Direct Manchester (Remington's) $20l$ sh $2\frac{3}{4}l$ pd	$3\frac{1}{4}$ a $\frac{5}{8}$
		Do. Do. (Rastrick's) ... $5\frac{1}{4}l$ pd	5 a $\frac{1}{4}$
		Direct Northern ... $50l$ sh $2\frac{1}{2}l$ pd	$2\frac{5}{8}$ a $\frac{3}{8}$
35,000		Direct Norwich ... $20l$ sh $1l$ pd	
		Dublin and Armagh ... $1\frac{3}{8}l$ pd	
21,600		Dublin & Belfast Junction .. $50l$ sh $5l$ pd	9
19,000		Dublin, Belfast, & Coleraine, $50l$ sh $2\frac{1}{2}l$ pd	
12,800		Dublin and Galway ... $50l$ sh $4l$ pd	$4\frac{5}{8}$ a $\frac{1}{4}$
17,000		Dundalk and Enniskillen $50l$ sh $2\frac{1}{2}l$ pd	
144,000	3s p sh	Eastern Counties .. $25l$ sh $14l$ 16s pd	$20\frac{3}{4}$ a 1
		Do. New ... $25l$ sh $4l$ 16s pd	$7\frac{1}{2}$ pm
114,000		Do Perpetual, No. 1 .. $6l$ 13s 4d sh pd	
114,000		Ditto ditto, No. 2 .. $6l$ 13s 4d $2l$ 13s 4d	$\frac{1}{2}$ pm
		East Dereham and Norwich ... $1l$ pd	
4,000		Eastern Union ... $50l$ sh $20l$ pd	
		Ditto Extension ... $25l$ sh $1\frac{1}{2}l$ pd	
		East Lincolnshire ... $1\frac{1}{4}l$ pd	$3\frac{1}{4}$ a $2\frac{3}{4}$
		East and West of England ... $1\frac{3}{8}l$ pd	
18,000	$1l$ 10s p s	Edinburgh & Glasgow ... $50l$ sh pd	
18,000	7s 6d p s	Ditto Quarter Shares ... $12\frac{1}{2}l$ sh pd	
26,000		Ditto New $\frac{1}{4}$ Shares ... $12\frac{1}{2}l$ sh $5l$ pd	
26,000		Edinburgh and Northern, $25l$ sh $1\frac{1}{2}l$ pd	
		Edinburgh and Perth ... $1\frac{1}{2}l$ pd	$4\frac{1}{2}$ a $\frac{7}{8}$
10,800		Ely and Huntingdon ... $25l$ sh $5l$ pd	
		Enniskillen and Sligo ... $2\frac{1}{2}l$ pd	
		Exeter, Yeovil, & Dorchest., $50l$ sh $2\frac{3}{4}l$ pd	$3\frac{1}{8}$
		Glouc., Aberystwith, and Central of Wales ... $25l$ sh $1\frac{3}{8}l$ pd	$1\frac{5}{8}$ a $2\frac{1}{8}$
		Goole and Doncaster ... $20l$ sh 42s pd	$3\frac{3}{4}$
10,918	$5l$ per ct	Grand Junction ... $100l$ sh pd	
10,918	$5l$ per ct	Ditto Half Shares ... $50l$ sh pd	
10,918	$5l$ per ct	Ditto Quarter Shares ... $25l$ sh pd	
		Grand Union (Nottingh. & Lynn) $1\frac{3}{8}l$ pd	$2\frac{1}{2}$ a $\frac{1}{8}$
		Great Eastern and Western ... $2\frac{1}{2}l$ pd	3
12,000		Great Grimsby & Sheffield, $50l$ sh $5l$ pd	
20,000		Great Southern & Western (Ireland) $50l$ sh $15l$ pd	$21\frac{1}{2}$ a 3
		Ditto Extension ... $50l$ sh $7\frac{1}{2}l$ pd	14 a $15\frac{1}{2}$
		Great Munster ... $2\frac{1}{2}l$ pd	
10,000	$3l$ p sh	Great North of England ... $100l$ sh pd	$217\frac{1}{2}$ a $16\frac{1}{2}$
	10s p sh	Ditto New ... $40l$ sh $5l$ pd	49 a $\frac{1}{2}$
		Ditto New ... $30l$ sh $2l$ pd	
		Great North of Scotland ... $2\frac{1}{2}l$ pd	
25,000	$4l$ per ct	Great Western ... $100l$ sh $80l$ pd	146 a 2
25,000	$4l$ per ct	Ditto Half Shares ... $50l$ sh pd	87 a 4
87,500	$4l$ per ct	Ditto Fifths ... $20l$ sh $20l$ pd	34 a $2\frac{1}{2}$
		Guildford, Farnham, and Portsmouth, $50l$ sh $2\frac{1}{2}l$ pd	
20,000		Harwich ... $20l$ sh $1l$ pd	
8,000	$1l$ 15s p s	Hull and Selby ... $50l$ sh pd	$101\frac{1}{2}$ a 3
8,000	8s 9d p sh	Do. Quarter Shares ... $12\frac{1}{2}l$ sh pd	21
8,000		Do. Half Shares ... $25l$ sh $2l$ pd	
15,000		Inverness and Elgin ... $20l$ sh $1l$ pd	
50,000		Irish North Midland ... $1\frac{3}{8}l$ pd	
		Isle of Axholme ... $2\frac{5}{8}l$ pd	$4\frac{3}{8}$ a $\frac{5}{8}$
5,000		Kendal and Windermere $25l$ sh $1\frac{1}{2}l$ pd	
		Killarney Junctions ...	
16,000		Lancaster and Carlisle ... $50l$ sh $25l$ pd	50 a 48
		Leeds & West Riding Junct. .. $1\frac{3}{8}l$ pd	
		Leicester and Birmingham $20l$ sh 22s pd	$1\frac{1}{8}$ pm
		Leicester and Bedford .. $20l$ sh 22s pd	$0\frac{1}{2}$ pm
		Leicester and Tamworth, $20l$ sh 42s pd	[illegible] pm
		Limerick and Waterford $50l$ sh $7l$ pd	
5,100	$4\frac{1}{2}l$ per ct	Liverpool & Manchester ... $100l$ sh pd	
7,968	$4\frac{1}{2}l$ per ct	Ditto Half Shares ... $50l$ sh pd	
11,475	$4\frac{1}{2}l$ per ct	Ditto Quarter Shares ... $25l$ sh pd	
		Liverpool & Leeds Direct $50l$ sh $2\frac{3}{8}l$ pd	$4\frac{5}{8}$ a $3\frac{7}{8}$
		Lpool., Manch., and Newcastle Junction ... $2\frac{1}{2}l$ pd	$5\frac{1}{4}$ a $4\frac{1}{2}$
4125000l	$5l$ per ct	London & Birmingham ... Stock	219 a 17
41,250	$5l$ per ct	Ditto Thirds ... $32l$ sh $10l$ pd	43 a 4
54,450	$5l$ per ct	Ditto Quarter Shares ... $25l$ sh $2l$ pd	26 a 7
48,000	3s	London and Birmingham Extension $25l$ sh $1\frac{3}{8}l$ pd	$2\frac{7}{8}$ a $\frac{1}{2}$
		London & Blackwall .. Av. $16l$ 13s 4d	10 a $9\frac{1}{4}$
		Ditto New ... $1\frac{1}{2}l$ pd	4 a $\frac{1}{2}$
36,000	30s p sh	London and Brighton ... $50l$ sh pd	$5\frac{1}{4}$ a $4\frac{1}{4}$
4,500		Ditto Consolidated Eighths $50l$ sh $35l$ pd	
		Ditto Sixths ... $\frac{1}{2}l$ pd	$2\frac{1}{8}$
33,000	3s 0d p sh	London & Croydon ... Av. $18l$ 15s 9d	$23\frac{1}{4}$ a 2
33,000		Do. Guaranteed 5 per Ct. .. $9l$ sh $6l$ pd	$9\frac{1}{4}$
		Lon., Chelt., Oxf., Glouc., and Hrfd., $25l$ sh $1\frac{3}{8}l$ pd	9 ex-d.
43,077		London & Greenwich .. Av. $12l$ 15s 4d	
11,136	10s	Preference or Privilege .. Av. $18l$ 17s 2d	
		London, Hounslow, & Western .. $2l$ pd	$1\frac{5}{8}$ a $\frac{3}{4}$
46,200	$2l$ 0s p sh	London & South West ... Av. $41l$ 6s 10d	70 a 3
	9s p sh	Ditto Consolidated Eighths, $40l$ p sh $20l$ pd	33
		Ditto New ... $50l$ sh $2\frac{1}{2}l$ pd	13 a 12
		Ditto New ... $40l$ sh $2l$ pd	$10\frac{1}{2}$
90,000		London and York ... $50l$ sh $2\frac{1}{2}l$ pd	$5\frac{1}{4}$ a 5
20,000		London and Windsor ... $25l$ sh $1l$ pd	
		London, Warwick, & Kidderminster, $50l$ sh $2\frac{1}{2}l$ pd	$3\frac{1}{4}$ a $2\frac{3}{4}$
		London, Salisbury, & Yeovil $50l$ sh $2\frac{1}{2}l$ pd	$2\frac{3}{4}$ a $3\frac{1}{8}$
10,000		Londonderry & Coleraine, $50l$ sh $2\frac{1}{2}l$ pd	$5\frac{1}{4}$ a 5
10,000		Londonderry & Enniskillen $50l$ sh $2\frac{1}{2}l$ pd	
8,000		Lynn and Ely ... $25l$ sh $5l$ pd	$8\frac{1}{2}$
		Lynn and Dereham ... $25l$ sh $5l$ pd	$8\frac{1}{4}$ a $7\frac{3}{4}$
13,000	$2l$ 18s 5d p s	Manchester & Leeds .. $100l$ sh $76l$ pd	
13,000	25s 8d p s	Ditto Half Shares ... $50l$ sh $34l$ pd	64
13,000	2s	Ditto Quarter Shares ... $25l$ sh $2l$ pd	
22,750		Ditto Sixteenths ... $6l$ 5s sh $4\frac{1}{4}l$ pd	
30,000	$1l$ p sh	Manchester & Birming .. $40l$ sh $40l$ pd	84 a 1
30,000		Do. $\frac{1}{4}$ Shares ... $10l$ sh $4l$ pd	13 a $14\frac{1}{2}$
		Do. New $\frac{1}{4}$ Shares ... $10l$ sh $2l$ pd	$11\frac{1}{2}$ a 12
		Do. Continuation and Welsh Junction ... $1\frac{3}{8}l$ pd	$2\frac{5}{8}$ a $\frac{1}{2}$
		Manchester, Buxton, and Matlock, $20l$ sh 22s pd	4 pm ex [new
		Manchester, Bir., & Mould Junction	
4155400l	$3l$ per ct	Midland ... Stock	165 a 2
12,500		Ditto Fifths ... $20l$ sh $2l$ pd	
		Ditto New ... $40l$ sh $6l$ pd	$26\frac{1}{2}$ a 6
978500l	46s 3d p c	Ditto Birmingham & Derby ... Stock	126
15,000		Midland Grt. West. (Irish) $50l$ sh $2\frac{1}{2}l$ pd	
		Do. Extension to Sligo ... $2\frac{3}{4}l$ pd	$62\frac{1}{2}$
20,000		Newcastle & Berwick ... $25l$ sh $5l$ pd	$16\frac{1}{4}$ a 16
	$2l$ p sh	Newcastle and Carlisle ... $100l$ sh pd	
		Newcastle, Durham, and Lancashire Junction ... $1\frac{3}{8}l$ pd	
20,000	19s 6d p s	Newcstl & Darlingt Junc ... $25l$ sh $25l$ pd	57
	10s p sh	Ditto New (Brandling) .. $25l$ sh $15l$ pd	49
		Newport and Abergavenny ... $2\frac{1}{2}l$ pd	
		New Ross and Carlow ... 22s pd	
		Newry and Enniskillen, $50l$ sh $2\frac{1}{2}l$ pd	$2\frac{7}{8}$
24,000		Newark, Sheffield, & Boston $25l$ sh $2\frac{3}{8}l$ pd	$5\frac{3}{8}$ a $4\frac{7}{8}$
36,000		North British ... $25l$ sh $15l$ pd	$23\frac{1}{2}$ a 3
		Ditto New ... $1l$ pd	$4\frac{1}{2}$ a $\frac{3}{4}$
		North Devon ... $2l$ pd	$2\frac{1}{2}$ a $\frac{3}{4}$
10,256	$1l$ 10s	Northern & Eastern ... $50l$ sh $45l$ pd	70 a 68
3,136	22s 6d	Do. Scrip .. iss. 5 dis. .. $50l$ sh $35l$ pd	
12,208	7s 6d	Do. $\frac{1}{4}$ Shares ... $12l$ 10s sh pd	
		Do. New ... $1l$ pd	19 a $\frac{3}{4}$
		North Kent & Direct Dover $50l$ sh $2\frac{1}{2}l$ pd	$3\frac{1}{4}$ a $\frac{3}{8}$
		North Staffordshire ... $20l$ sh 42s. pd	$4\frac{1}{4}$ pm
12,000		North Wales ... $25l$ sh $3\frac{1}{2}l$ pd	$5\frac{1}{2}$
19,000		Norwich and Brandon .. $20l$ sh $14l$ pd	21 a 20
19,000		Ditto New ... $10l$ sh $1l$ pd	$4\frac{1}{2}$
		Northampton, Banbury, and Cheltenham ... $2l$ pd	$3\frac{1}{2}$ a 3
		Nottingham and Boston ... $1\frac{3}{8}l$ pd	4
		Nottingham, Erewash Valley, & Manchester ... $1\frac{3}{8}l$ pd	
		Nottingham and Mansfield ...	
		Oxford, Witney, & Cheltenham .. $1\frac{3}{8}l$ pd	$1\frac{7}{8}$

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London.

Hugh Watson

THE FARMER'S MAGAZINE.

DECEMBER, 1845.

No. 6.—Vol. XII.] [Second Series.

PLATE I.

PORTRAIT OF HUGH WATSON, ESQ., OF KEILLOR, FORFAR, SCOTLAND.

ENGRAVED BY J. B. HUNT, FROM A PHOTOGRAPH, BY — BEARD.

PLATE II.

REFRACTION; Winner of the Oaks—1845.

HUGH WATSON, ESQ.

Of Keillor, County of Forfar, Scotland.

In commencing a series of portraits of so thoroughly national a character as those which we are now carrying through this work, one grand—it might indeed be said, *the* grand point has been, to observe a strict impartiality with regard to the selections made. No matter how high the rank, how great the influence, or how good in a general sense the names of any party suggested, the first demand—*sine quâ non* consideration, in fact, has ever been, a natural ability for an active participation in, and a true zest towards that pursuit, of which the *Farmer's Magazine* would present him as an ornament and an example. On this principle every portrait hitherto published has been sent into the engraver's hands, and on this understanding alone, it is almost unnecessary to add, will the series be continued. Up to this time, we feel bound to say few men in any particular, either as to energy of purpose or brilliancy of success, could show higher claims to rank among the distinguished agriculturists of Great Britain, than the gentleman we are now about to introduce to our readers. Few who could pass our examination, as to what he has done and what he has won, with more credit, or universal satisfaction, than Mr. Watson, of Keillor. It is, too, with perhaps something more than ordinary interest that we regard this number in our gallery; the very distance of our sitter's Highland home, the far-away scene of his labours and experiments, tending of itself to increase that welcome his character and abilities must always command. The more general the system—the wider the range from which these portraits were chosen and sent forth, taking one from the north, then one from the south, another from the east, and then a fourth from the west—the more likely might have been their popularity. This, however, could not always be accomplished without a sacrifice of that proper regard for true merit, which, we repeat, has been our golden rule all through, although in the present instance we can fortunately accommodate any lovers of variety, in giving the features of "one right from the north," with, at the same time, a consciousness that there is personal worth far superior to any such local recommendation; a British farmer, in short, whose "credit and renown" is not simply confined to neighbours and friends over the border, but whose excellence is and has been as fully acknowledged by the Royal Agricultural Society of England, as even by the Highland and Agricultural Society of Scotland.

From his youth upwards, Mr. Watson's life has been almost entirely devoted to farming, in his various researches and studies; on which subject his great natural abilities have been materially assisted by a liberal education—an advantage, be it remembered, judged by no means so necessary in years back, to persons intended for rural occupations, as it is very properly considered at present. Thus armed with so good an ally and so ready a spirit, we are not surprised to find the name of Hugh Watson quickly chronicled amongst the distinguished agriculturists of that day—a deservedly high position, which its owner has continued to occupy for something like thirty years, keeping up to and assisting no little by his own individual exertions in the great improvements accomplished within that period. This may be thought saying a great deal; but it can still be interpreted in its most general sense: for there is scarcely a single branch in the whole science of agriculture but Mr. Watson has tried his head and hand on; and of a truth we may go on with the Latin poet: "*Nihil tetigit quod non ornavit*"—not one he has touched but that he has benefited. In all matters relating to the cultivation of land, draining, inclosing, reclaiming wastes, introducing manures, &c., &c., his efforts have been amongst the most prominent and successful; while the premium list, during the time we have mentioned, has constantly borne testimony to his judgment and spirit as a breeder of cattle. His capabilities, moreover, as a ready, clear, and forcible writer have tended considerably to increase the effect of these really patriotic actions; the good grounding allowed him enabling "the eminent Scotch farmer" to teach others almost as advantageously in print as he had taught himself in practice.

With reference to, and as a specimen of, his good deeds as an agriculturist, we may mention Mr. Watson's experiment of using bones as a manure; an advantage so signal and striking, as to call forth a public expression of approval and congratulation from his countrymen. This it appears took place about five-and-twenty years since, when, at a meeting of the farmers of Strathmore, held at Cupar Angus, a massive and elegant piece of plate was presented in proof of their admiration of his exertions in the cause of agriculture, particularly for his introduction of so valuable a manure. His trials with many other agents for increasing the produce of Scotia's somewhat sterile soil have been almost equally valuable; while another public mark of the real virtue of his conceptions and exertions, superior we should estimate even to the Cupar Angus cup, is in more than three hundred acres of land now blooming in the full height and profit of cultivation, that but a few years since were both to man and beast but a barren waste.

Great though be the honour that such purely agrarian achievements confer on the proprietor of Keillor, they are still infinitely surpassed by his triumphs as a breeder, feeder, and exhibiter of cattle. When we state that the prizes collected from his show of Angus cattle, short-horns, with different crosses in Leicesters, Southdowns, &c., &c., already exceed two hundred, we shall, we trust, be pardoned attempting any detail of this extraordinary series of success. And when we state again, that these two hundred prizes, chiefly in gold and silver, are wont, on certain occasions, to adorn Mr. Watson's sideboard, we hope that no metropolitan Particular will make use of our name in the event of his curiosity exciting him to get a glimpse of so enviable a display. To form a true idea of the value of these trophies, as well as of the merits of the animals that gained them, it should be added that they are the harvest-homes of no mere local meetings, but that many of them have been carried off from the choice gatherings of all England, and from the very heart of Ireland. The acquirement of these sterling compliments in other quarters have not, however, prevented Mr. Watson from paying due attention towards the native cattle of his native country, having amongst others been particularly successful in improving a black breed without horns, better known as the "Angus doddies." An extraordinary specimen of this kind was exhibited by his Royal Highness Prince Albert at the Smithfield Show in London, last Christmas, and met with great and general admiration. This ox had previously gained many prizes in Scotland and Ireland, and was certified by the judges on various occasions to be the most perfect animal they had ever seen in a show-yard. He is now the property of her Majesty, and is kept at Windsor Castle, where he is much prized, and, we understand, admitted to be *the most valuable fat ox in England!*

As a breeder of sheep, Mr. Watson stands quite as prominent, having very lately undoubtedly established, if not perhaps introduced, the Southdown as a permanent tenant of the Highlands. On this point, though, we had better hear the gentleman *viva voce*, in an extract of a speech we find he delivered to much effect at Mr. Jonas Webb's annual show in July, 1844: "The chairman had done him (Mr. Watson) the honour to allude to him in one of his speeches as a breeder of Southdowns. He would tell the company how it came about. There were few breeders of Southdowns in Scotland. About thirty years ago, a gallant soldier and much-respected proprietor in Scotland, the late Lord Lynedoch, had a small flock of Southdowns, but he gave them up, and he (Mr. Watson) became a purchaser of forty ewes. That was the origin of his present flock; and against much prejudice he had persevered, until he had now a flock of about six hundred. That flock was fed on an elevation seven hundred feet above the level of the sea, and he had no hesitation in backing them against any other flock, fed on similar land, in any part of the kingdom. One little incident had been of great consequence to him. Two years ago Mr. Webb brought some Southdown rams to Scotland, and showed them at one of the Highland Society's exhibitions. Mr. Webb fairly beat him out of the field. Now this beating had done him much good; for it had set him thinking how he could ever meet Mr. Webb in this world again. So he made up his mind to come to Babraham to hire a tup; and if Mr. Webb would come to Scotland again in three years, he should be found to beat him with his own stock (*Much laughter and cheers*). If he had received no other gratification that day, the speech of the chairman was a sufficient recompence to him for having travelled five hundred miles."

These are the sort of men who, in almost every word and deed, do good service to farmers and farming—such men as Mr. Webb and Mr. Watson, who give and take with so much heartiness and good-fellowship, and whose capital is supported with so much high spirit and liberality—men who, after all, however deservedly may be their own reward, do still as much for every brother agriculturist within many miles of their homesteads by the examples and opportunities they are so constantly affording. Long life, and if possible yet greater success to both, should be the wish of all who wish their cause well—to Jonas Webb and his far-famed flocks in the flats of Cambridge, and Hugh Watson with his six hundred Southdowns seven hundred feet above the level of the sea!*

With the Leicesters Mr. Watson has had far more experience, and consequently would have little reason, in this description of sheep, to beg for time with any breeder in the world. The Keillor flock of Leicesters, in fact, are resorted to for fresh blood by some of the oldest and best breeders in England; while Mr. Watson's eminent success with these in the show-yard has given rise to many an amusing anecdote, of which we subjoin a sample or two. At the meeting of the Highland and Agricultural Society of Scotland, held at Perth, 1836, about forty specimens from the English as well as Scotch flocks were exhibited as candidates for the prize for the best Leicester ram. The three judges, however—the Marquis of Tweeddale, Mr. Thomas Charge, of Yorkshire, and Mr. Heriot, of Lady-Kirk—each fixed upon a ram as being the best; and each firmly adhering to his own opinion, it was found necessary, after some hours spent in fruitless argument, to call in an umpire. In the meanwhile, great anxiety had very naturally arisen among the competitors to ascertain from which flocks these three chosen champions came, when, on Mr. Watson being admitted, he found *all three disputants his own property.* In the records of the same meeting he is shown as an exhibiter in all the (five) classes of Leicester sheep, and as the winner of every one of them. At Dundee, too, in 1843, he showed ninety-five animals of different descriptions, and received fifteen prizes. These ninety-five as a lot were privately exhibited at his own house the next day, when they were declared by many eminent judges of stock to be a very wonderful exhibition for any one man to have prepared for one particular show, there not being a single one unworthy of a first prize.

We think little more can be required of us in support of Mr. Watson's qualification as an "eminent British farmer," one who, either as a grower of of corn or cattle, we have shown is equally celebrated, and who has happily combined in his agricultural pursuits the greatest profits with his greatest pleasures. With such a master it may be easily imagined that Keillor ranks amongst the first model farms of the age. Agricultural tourists from all countries generally, and properly, making a point of visiting it, and pen and ink travellers invariably speaking of its management as something very like a realization of true perfection. Still it must not be presumed from this that it is to strangers chiefly that Mr. Watson and his system owe their fame; for no man in the whole land of cakes enjoys more the respect and confidence of lads and lassies—nowhere are his services as a judge of stock more in request, nor his many good works as an agriculturist more esteemed than round his own home. It is to the scenes of his everyday life that we must turn sooner or later for a man's real character; and from these we gather that Mr. Watson of Keillor has, in every quality of a good neighbour, a good friend, and a good magistrate, fairly earned the proud title of an excellent country gentleman.

* It is somewhat remarkable that in this speech Mr. Watson tells us he travelled *five hundred* miles, had *six hundred* sheep, kept on an elevation of *seven hundred* feet!

THE LABOURERS OF AGRICULTURE.

By Cuthbert W. Johnson, Esq., F.R.S.

Of the various classes to whom our country is so deeply indebted for its proud elevation above all other nations, there is not one whose advancement in knowledge, and in consequent comfort, has been so long retarded as the farmers' labourers; and yet no body of men deserved better of their employers—none have been found more industrious or more patiently enduring.*

It is only during the few last years that any vigorous attempts have been made to elevate them in the position they hold—it is still more recently that it has been discerned, that, to increase their comforts, you must not only find them food, give them gardens, and exhort them to industry, but that you must not stop there; you must teach them how best to apply their little capital—in fact, their all,—their manual labour. It was long indeed before this error was perceived; and even now, in very many districts, after the attention and *activity* of the benevolent are aroused to the advantages of the garden system, or fork husbandry—even now, I repeat, it is deemed quite sufficient to grant the labourer a plot of ground, and then leave him to cultivate it, unaided by even a suggestion. It is imagined, in fact, that, although larger cultivators are continually, and in too many instances vainly, warned against hiring more land than they can find sufficient capital (labour) to properly farm—

* 1. *How to improve the Condition of the Labouring Classes,* by E. D. Davenport, Esq. 4th edition. (*Johnson and Shaw's Farmers' Almanac for* 1846, *p.* 221.)

2. *A Manual of Field Gardening,* by J. Nowell, Esq., of Farnley, near Huddersfield. (*Ridgway, London*).

3. *On the beneficial Employment of the Surplus Labouring Classes,* more especially the agricultural portion of them, by James Dean, Esq.

4. *Regulations for promoting Agricultural Instruction,* and Agricultural Employment, and for improving the Condition of the Lands of Lough Ash and the adjoining District, by J. P. Kennedy, Esq.

5. *Report of the Aged Countryman's Benevolent Annuity Society.* (*Farmers' Almanac for* 1846, *p.* 111).

against over-cropping, bad rotation of crops, ill drainage, and many other very common errors, yet that still none of these instructive suggestions are needed by, or would be useful to, the poor, little industrious, and ill-instructed country labourer, for the first time entering into possession of *his* little farming occupation. Most refreshing, however, is it to find here and there the wiser and a better course adopted, that of uniting *instruction* with the ordinary modes of aiding these little cultivators. Two or three observations, chiefly collected from these, shall therefore form the subject of this paper.

In the "Farmers' Almanac" for 1845, p. 126, the reader will find some very interesting notices of the Industrial Farm, near Huddersfield, by John Nowell, Esq., of Farneley Wood, the author of the "Manual of Field Gardening" (a valuable little work, which I commend to the perusal of both the cotter cultivator and the landowner). The following report (dated August 28th, 1845), which I rejoice to be able to place before my readers, will give the labourers' friend some valuable information, as to the good results of this plan of combining instruction with the cottage farming system. Mr. Nowell remarks :—

"I rejoice to find that in the 'Farmers' Almanac' for 1846, a tribute will appear to the memory of that excellent lady (Mrs. M. A. Gilbert), whose loss none have more reason to deplore than that class which you justly term 'invaluable,' whose interest and welfare it was the business of her life to promote. (*See Farmers' Almanac for* 1846, *p.* 18.

"A time will come when she will be remembered as a great public benefactor. But while you impress upon this age, and make us acquainted with the debt justly due for her benevolence and her untiring exertions, her zeal and her talents, do not forget to remind us that science owes one of her chief ministers, Davy, to the generous patronage of Davies Gilbert, and probably of our deceased friend.

"In regard to the experiment making here, in which she took so deep an interest, it is proceeding with even greater success than was expected, and I enclose the balance sheet for the two first years, in order that you may make use of them in the Almanac for 1846. The present or third year's crops are capital, and on Friday last I had the pleasure of examining them along with the Earl of Dartmouth, and his son Lord Lewisham, who both expressed their gratification at the surprising results, and at the goodness of the crops, both in the Industrial Field and adjacent allotments. The noble Lord has given these plans his warmest patronage, and I feel no doubt whatever that with their powerful assistance we may succeed in forming, in these manufacturing districts, a complete alliance between the spade and the loom; and what is very remarkable, we find the manufacturing operatives make the best—decidedly the best—field-garden farmers; and in the numerous allotments which we already can boast of in the villages around here, if you see one cultivated with extreme care, on inquiry you will find that it belongs to a weaver, a shoemaker, a tailor, or other handicraftsman—a most pleasing circumstance to the promoters of these designs, and which makes me hope that we may yet make this mountainous region a very paradise, aided by our very numerous and expert population.

"The example set in the Industrial Farm has not been without effect upon neighbouring cultivation; the regular farmer has been roused, and the labourers having been trained there to the use of the spade, have taken very rough unsubdued land near to it, much of it being inclined at an angle of from 30 to 45 deg., and only fitted for spade cultivation; and in the Industrial Field, as well as the allotments alongside of it, instead of furze, rushes, and rough-bent grass, there are fine patches of oats, 5 ft. 6 or 9 inches high, turnips growing after tares, wheat, potatoes, cabbages, &c.; and in one of the small plots we found a hut built of wattled sticks and heather (Robinson Crusoe like), and a very nice cow repasting there upon green food in the stall. I endeavoured to show the consequences that would follow the establishment of a public farm of this kind, in a pamphlet which you quoted from in the 'Farmers' Almanac' of last year, and the 'Farmers' Magazine.' Permit me to add a pleasing fact in corroboration of what was stated there. I wished to show by roadside teaching—the only mode by which you can teach farming to some persons, or rural politics either—I wished to teach, to add demonstration to demonstration, that receivers of poor's rates may be transformed into payers. I therefore took two men (brothers) of the former kind, who during the last 20 years have, in the winter season, been chargeable to a township, and on the 1st of January last put them in possession of half an acre of land on a steep bank, part of it reared up at an angle of 60 deg., the soil miserably poor, formed from decomposed shale of the coal measures—this at the farmers' rent; and they with their children have cultivated this useless land with the most extraordinary industry. They have been watched by the public with intense interest, for they were designedly placed for that purpose close to a public road. They have the finest crops of garden vegetables, of carrots, turnips, potatoes, onions, pot herbs, and above a rood of oats now growing. They are property men: they already seek work of the farmers, not of the parish officer. We have lost our men; they are independent labourers; many thanks to the Industrial Farm, where they received their training."

To those persons who doubt the possibility of *profitably* employing the poor in fork husbandry, the careful perusal of the following accounts, to which Mr. Nowell alludes in his interesting communication, are earnestly commended :—

Dr. and Cr. account of the Industrial Field, at Farnly Tyas, for the years 1843 *and* 1844, *cultivated by the spade, and by the casual poor of that place.*

	£	s.	d.
Capital raised to try the experiment	40	0	0
Private subscription	40	16	8
	£80	16	8

First Year.—1843.

Dr.	£	s.	d.
For manual labour	36	8	3
Farm-yard manure	11	11	2
Carriage of ditto	9	12	6
Seed oats	1	3	9
Seed potatoes	6	0	0
Rent and taxes for one year	9	3	0
Guano	1	18	0
Superintendent's salary	5	0	0
	80	16	8
Balance profit	2	1	4
	£82	18	0

Per Contra.	£	s.	d.
Potatoes sold	50	14	9
Turnips sold	5	10	0
Oats sold	11	0	0
Half manure on land	10	9	4
One-third guano on ditto	0	12	8
Potatoes reserved for sets	4	11	3
	£82	18	0

Second Year.—1844

Dr.	£	s.	d.
For manual labour	25	16	1
Manure and carriage	10	1	6
Seed oats	3	5	7
Potatoes reserved last year	4	11	3
Cartage of crops, &c.	2	14	0
Sundry expences	0	17	8
Rent and taxes for one year	9	3	6
Superintendent's salary (5 per cent. on £65 4s.)	3	5	3
Half manure in first crop	11	2	0
	70	16	10
Balance profit	4	18	11
	£75	15	9

Cr.	£	s.	d.
Potatoes sold	35	16	2
Oats sold	21	1	0
Straw sold	8	6	10
	65	4	0
Quarter of first year's manure	5	11	0
Half of second ditto	5	0	9
	£75	15	9

The most common error committed by those who let their land to cottagers, is that of allowing them to hire much more land than their own spare labour can properly cultivate. This mistake, however, is easily avoided, and such landlords should remember how very easy it is to increase the size of the holding when experience and practice shall have tested and improved the labourers' skill and capital.

"The quantity of land to be allotted to cottages," observes Mr. Davenport in his pamphlet, "must depend partly on the man, and partly on the practice of the country. In a dairy or clay country, my aim was to enable the father of a family to keep his cow; and 35 years' experience confirms me in the propriety of so doing, the few acres of pasture so disposed of being almost invariably the most productive, and comparatively prosperously looking. In light soils the parties enjoying these advantages are too apt to wish to become small farmers, which should be discouraged as bad economy, since they must hire their ploughing. The spade is their best implement, and from a quarter of an acre to an acre is enough to supply their immediate wants, till the family resources suffice to furnish a cow. If this practice is objected to as interfering with and subdividing labour, so much the better. No man should in England be considered a mere tool, or "adscriptus glebæ," without the power of calling one day in the year his own. It is seldom that he finds it necessary so to absent himself from his regular employer. He has, during half the year, his hour or two of evening at his own disposal, to say nothing of his wife and children; and where more labour is wanted for his garden, it is easily hired. But let those who object to granting such advantages to their labourers devise others in exchange for them."

The experience of the late Mrs. Gilbert on the chalks of Sussex was quite in accordance with that of the author on the clays of Cheshire. She reported in one of her last letters—"The proprietor of the estate commenced the allotment system in 1830, with 50 tenants, occupying the twelfth of an acre each; these have been long increased to upwards of 400, now occupying from a few rods to five acres each, and two had ten acres each; but ten acres having been found more than one man can cultivate with the spade only, these two ten-acre tenants have been reduced to five acres each at East Dean, and are now going on well."

The principle of combining instruction with the formation of a cotter tenantry, is well and successfully carried out by Captain Kennedy, in his rules for the regulation of the Lough Ash national and agricultural day-school (*see his tract, p.* 4), the 8th and 9th rules of which provide that "a table must at all times be exposed in the school, shewing the earliest and latest days in each season upon which the different crops may be sown, &c., &c." He will also tell the boys each day what work he proposes doing on the day following, particularly when he contemplates performing anything essential in which the farmer of the district may be unskilled. This will give the parents an opportunity of attending, if they wish, to take a lesson, which should be encouraged by the master.

The practical good results of instructing the small holder of land in improved modes of cultivation are readily to be found in most districts. "I can show," says Mr. William Blacker (*Prize Essay, p*, 50), "farmers possessing land of average quality, who being induced to change their manner of cultivation, are now receiving fully treble produce from the identical farm, to what it formerly yielded." And if such are the results of attention to the instruction and improvement of the poor little cultivators in a remote agricultural Irish parish, to an equally good extent in the immediate vicinity of London have similar efforts succeeded. "The effects," remarks Mr. James Dean (p. 15), "produced in this parish, (of Tottenham, near London), containing 4,500 acres of land, and a population approaching to 9,000, by the introduction of the garden allotment system, the new poor-law, and a well regulated police, is that our poor-rates which ten years since were, exclusive of the cost of a police, 5s. 6d. in the pound, are now, including the charge for police, only 2s. in the pound. Crime was then so prevalent, that not a week passed without one or more commitments; now from the police returns, five commitments only have taken place within the last five years, and those for trivial offences; and yet our population is, from the circumstance of the contiguity of our parish to London, being only four miles distant, as mixed and various as could well be imagined."

Such noble efforts, such observations are intended for the benefit of the agricultural labourer when he is young and vigorous, and able to maintain himself; and, moreover, we trust to lay by a trifle, in some safe way, for the comforts of old age, when time shall have impaired his physical powers. Many cases, however, occur when age steals on, and poverty and destitution, notwithstanding the labourer's best efforts, follow in its train. To aid such deserving objects as are of this class, a society has recently been formed, entitled, "The Aged Countryman's Benevolent Annuity Society;" and I should not rest satisfied if in any paper of mine, when endeavouring to serve the labourer, I omitted to allude to this society. This institution, as stated in its report (*Farmers' Almanac* for 1846, p. 133) "is formed for the purpose of granting small annuities, of not exceeding five or ten pounds per annum, to aged labourers in husbandry, or other rural affairs, who, from any cause, are prevented from earning their livelihood. It is intended for those who, not being receivers of parish relief, yet still need a little assistance to render life more comfortable. This charity, therefore, presents very strong claims to the support of every friend to a class of labourers who, from their quiet, secluded avocations, are not always regarded with so much attention as is desirable. Receiving wages very commonly not nearly so high as the artisan and the mechanic, they yet manage (happily, in a great number of instances) to peacefully bring up their families by their own unassisted exertions. It is only when old age creeps on—when they can no longer labour for their daily bread, that the assistance of a friendly hand is so desirable to save them and their widows from the union house. There are very many whose little savings would, with a small annual aid, enable them to end their days with all those feelings of comfort and independence of parish relief which surely ought to be the reward of a life of honest laborious exertion. This charity, therefore, proposes, to the full extent of its funds, to great small annuities to aged persons of this class of labourers; and, for this purpose, it requests the support of the enlightened and the benevolent.

"The Committee trust that every means will be taken by the friends of the aged agricultural labourer to strengthen the hands of the society. Let no one say he can do but little in so great a cause; but rather the Committee would urge—let him do that little. They have stated the advantages to the society, and the privileges of those who collect money in furtherance of its objects; and the Committee are confident that by such friends, and other good means, the society will speedily be in a condition to add comfort to the declining days of many an aged labourer. Even the hope thus held out to the husbandman, of such a reward of a life of honest laborious exertion, may be attended with many indirect advantages; it may stimulate the indolent, it may cheer the desponding labourer to rely upon his own exertions—it will be at least a privilege reserved for the poor yet independent countryman."

And to guard against this society being regarded as offering a hope of a maintenance to the indolent and the improvident, one of its rules provides that, in the election of the annuitants of this society, a preference shall be shown to those who have, by provident societies, savings' banks, or other means, partially provided for themselves; and, secondly, to those who have, through unforeseen circumstances (after having made the attempt), failed in their honest endeavours to provide for the comforts of old age.

The friend of the farmer's labourer will gladly perceive, from some of these little notices, that attempts are now making in more than one direction to aid and to elevate the position of this invaluable class. Let such refreshing reports only serve as incentives to renewed, to steadily supported exertions; and let those who are thus employed remember that their object is of no ordinary importance, but that their efforts are directed for the benefit of a class of men, who, in all good times, have been very justly regarded as the most valuable of all the labourers of England.

REFRACTION.

WINNER OF THE OAKS—1845.

Refraction, a brown filly, was bred by the Duke of Richmond, her present owner, in 1842, and was got by Glaucus, out of Prism by Camel, her dam Elizabeth by Rainbow, out of Belvoirina by Stamford—Sister to Silver by Mercury.

In 1844, Refraction, then two years old, auspiciously and appropriately enough commenced her racing career at Goodwood, where, on the Tuesday—ridden by that now "banished man," but then regular and, we must say, good servant to the Duke, Sam Rogers—she won the Ham Produce Stakes of 100 sovs. each, h. ft. (42 subs.), beating Mr. Wreford's, jun., Winchelsea (2), Col. Peel's Hersey (3), and the following, not placed:—Lord Glasgow's b. c. by Bay Middleton, out of Miss Whip, Mr. Gratwick's The Merry Monarch, Mr. Treen's Bastion, Col. Anson's Jezail, Lord George Bentinck's Nightcap, Mr. Bowes's As-you-like-it, and Lord

Chesterfield's Stitch.—5 to 1 agst. Refraction, who won by two lengths.

The same day, ridden by Rogers, she ran third to Mr. Gully's The Maid of Orleans for the Lavant Stakes of 50 sovs. each, 30 ft. (26 subs.), Lord Eglinton's Plaudit beating her easily for second, and the following not placed:—Lord Albemarle's Tisiphone, Mr. W. Edwards's Full-Sail, Lord George Bentinck's Pug, Mr. Osbaldeston's Secutor, and Duke of Richmond's b. f. by Glaucus, out of Estelle.—3 to 1 agst. Refraction.

On the Thursday in the same meeting, ridden by Rogers, and carrying 5lbs. extra, she ran second to Mr. Gully's Nutbourne (since dead) for the Molecomb Stakes of 50 sovs. each, h. ft. (21 subs.): Lord Albemarle's Tisiphone, Lord George Bentinck's Pulse, Lord Chesterfield's Stitch, Lord Eglinton's Plaudit, Lord Eglinton's Bretwalda, Mr. Gratwicke's Titmouse, Col. Peel's Hersey, and Mr. Herbert's ch. f. by Elis out of Charlotte West, also started, but were not placed.—4 to 1 agst. Refraction, who was beaten by a neck.

On the same day, she walked over and divided a Sweepstakes of 25 sovs. each (11 subs.) with Mr. Gully's The Maid of Orleans.

On the Tuesday, in the Newmarket Second October Meeting, ridden by Edward Edwards, she won the Clearwell Stakes of 30 sovs. each, 20 ft. (31 subs.), beating Colonel Peel's Hersey (2), Mr. Payne's Sir Francis (3), and the following not placed:—Duke of Bedford's Prologue, Lord Eglinton's Plaudit, Lord Exeter's Tunick, Lord William Powlett's Energy, and Mr. Copeland's Arthur.—5 to 4 agst. Refraction, who won by a neck.

In 1845, Refraction, on the Tuesday, in the Newmarket First Spring Meeting, ridden by Flatman, ran third and last for the Coffee Room Stakes of 50 sovs. each, Lord Exeter's Lyons winning, and Duke of Bedford's Prologue running second.—7 to 4 on Refraction, who was beaten a length for second, and Prologue only a head by the winner.

At Epsom, ridden by H. Bell, she rather unexpectedly "did the deed," in winning the Oaks Stakes of 50 sovs. each, h. ft. (128 subs.), beating Mr. Bennett's Hope (2), Major Yarburgh's Miss Sarah (3), Lord Chesterfield's Lady Wildair (4), and seventeen others not placed.—25 to 1 agst. Refraction, who won easily by two lengths.

At Ascot Heath, on the Tuesday, ridden by Flatman, and carrying 6lbs. extra, she ran third for the Welcome Stakes of 20 sovs. each, Mr. Gully's Weatherbit being placed first, Lord Lonsdale's br. c. by Jerry out of Turquoise second, and Mr. Gully's Old England (3lbs. extra) fourth. The following also started:—Lord Exeter's Adrianople, Sir Watkin W. Wynn's Undine, Mr. G. Ongley's Mystery, Duke of Bedford's Captain Phœbus, Mr. Worley's John Davis, and Mr. Copeland's Arthur. —4 to 1 agst. Refraction, who ran home a very indifferent third.

At Goodwood, on the Friday, ridden by H. Bell, and carrying 9lbs. extra, she ran a dead heat with, and then beat, Sir Richard W. Bulkeley's Queen Pomare for the Nassau Stakes of 50 sovs. each (24 subs.): Lord George Bentinck's Pug, Lord Chesterfield's Stitch, Lord Eglinton's Britannia, and Lord Exeter's Topaz, also ran.—6 to 5 agst., and after the dead heat, 4 to 1 on Refraction, who won cleverly by a length.

Summary of Refraction's Performances:

In 1844 she started five times, and won twice, and divided once—

	£	s.
The Ham Stakes at Goodwood value clear	£2,500	0
Half a Stake at Goodwood	112	10
The Clearwell Stakes at Newmarket	670	0

In 1845 she has started four times, and won twice—

	£	s.
The Oaks Stakes at Epsom	3,475	0
The Nassau Stakes at Goodwood	1,050	0
	£7,807	10

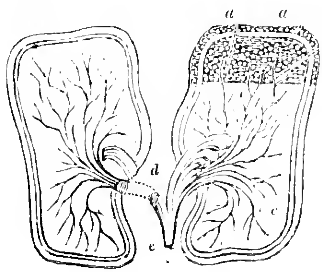
CHEMISTRY FOR FARMERS.

ON THE GROWTH OF PLANTS.

It is an important fact, with which every one is familiar, that when a seed is deposited in the ground, under certain circumstances, it will send forth a shoot, which, in time, will become a plant of the same species as that by which the seed has been originally produced. As this is a primary law of the vegetable economy, we shall proceed to investigate the circumstances under which it takes place, and by what means it may be best accelerated.

Seeds, from which plants are originally derived, present infinite variety in form and character; without, however, adverting to their minute history of their different parts, the common garden bean may be here referred to, as illustrating the general structure of a dicotyledonous seed, and as enabling us generally to refer to their functions and development. This seed, when the external membranes or coverings are carefully removed, is easily separated into two distinct portions, which constitute the bulk of the seed, and which are termed *cotyledons*, and are nearly of equal size. Between these, and joining them together, is seen the *embryo* or *germ*, of which one portion lying between and within the cotyledons is termed the *plumula*, and the projecting part the *radicle*.

The organization of the seed will be more fully understood by a reference to the annexed figure, which represents a bean magnified and laid open.



The skin *a a* is seen to consist of a number of small cells, to which the term *cellular tissue* is applied. The cotyledons *c c* have a similar structure, in the cells of which the nutritious matter is deposited. Ramifying through this cellular mass and converging to a point are a great many vessels, which seem to convey the nourishment to the rudimentary plant, which is also seen at *d*. They bring it first towards the root *e*, after which it is carried up into the stem.

This description is applicable to most of the species of dicotyledonous plants; but there are many modifications which it is not necessary to detail. Thus, sometimes the cotyledons run above the surface of the ground, becoming the first or *seed leaves* of the plant, as in the turnip and many other seeds; at other times again they remain in the ground, as in the case of the bean and the pea.

There exist many points of resemblance between the structure of a grain of wheat and the seed of the bean just described; but they differ in the former, having only one seed-lobe, while the latter has two, and hence wheat is said to belong to the class of monocotyledonous plants. The testa or skin is found to consist of an outer and inner covering, the thickness of which varies with the kind of wheat and the climate in which it is produced. A general law is, that the more severe the climate, the thicker is the skin of the seed.

The term *germination* is applied to the series of phenomena through which a seed passes, when, having arrived at a state of maturity, and being placed in favourable circumstances, it swells, bursts its envelopes, and tends to develop the embryo which it contains. Before a seed can germinate, there must, however, be a concurrence of circumstances favourable to the process.

An important condition to the healthy and vigorous vegetation of such is, that they have reached maturity. Unripe seeds seldom vegetate, because their parts are not yet prepared to form those chemical combinations on which germination depends. There are some seeds, however, whose germination is said to commence in the seed-vessel, even before the fruit is ripe, and while it is yet attached to the parent plant. But these are examples of rare occurrence, though it is sometimes necessary to sow or plant the seed almost as soon as it is fully ripe, as in the case of the coffee-bean, which will not germinate unless sown a few weeks after being gathered. Most seeds, however, if guarded from injury, will retain their powers of vitality for years.

A second condition necessary to germination is a certain elevation of temperature. No seed has ever been known to germinate below the freezing point, though in Siberia and other cold countries a very inconsiderable elevation above that temperature is found to be sufficient to excite vegetation. A warm atmosphere is known to promote the malting of barley, which is merely germination carried to a certain extent for the development of peculiar principles, which, in its natural state, that grain is not found sensibly to contain. A certain portion of the necessary heat may be supposed to be provided by natural processes in the grain itself.

Another essential condition is the access of moisture. Seeds will not vegetate if kept perfectly dry, and hence this condition is essential to their preservation. Water or a moist atmosphere is necessary; and, accordingly, rain is always acceptable to the farmer and gardener after they have sown their seeds. But the quantity of moisture is also a matter of importance, as there may be too much or too little; in the former case the seeds burst and rot, and in the latter they remain inactive in the soil. It is by the absorption of humidity that the swelling of seeds is occasioned. All seeds accordingly enlarge in bulk when immersed in water, but those only of water-plants will vegetate under such circumstances; others require the more free access of air, and grow in the soil at depths to which the atmosphere extends, and where moisture is also present. In these early stages of vegetable development the soil is of no further use, as the seed will germinate equally well out of the soil when the other necessary conditions have been secured.

The access of atmospheric air has just been mentioned as a necessary condition to germination. Seeds will not vegetate placed in a vacuum, no matter how favourably situated they may be in other respects. This has been repeatedly proved by placing seeds in moist earth in the vacuum of an air pump, and they remained inactive during the period the air was withdrawn; but on its re-admission, germination took place.

When a well-organized seed is placed in a situation in which the foregoing conditions are fulfilled, it speedily undergoes a change; it absorbs moisture and increases in bulk. But if it should previously have met with any accident to destroy its vitality, its organization decays, and it becomes putrid. The same effect takes place though the seed be alive, unless air is present; but if the seed be good, and the other necessary conditions fulfilled, this swelling of the seed, from the mechanical imbibation of water, is but the first of a series of interesting changes; the nutritious matter becomes fluid, milky in its aspect, and sweetish to the taste—chemical transformations necessary for the support of the young plant.

There are several other conditions, which, although not so indispensable as those already enumerated, yet aid the process very much; and of these there is none more important than darkness, to obtain which, along with other advantages, seeds are buried in the soil. In the usual method of sowing broadcast, much of the grain remains uncovered; and the prejudicial influence of light, in preventing the healthful germination of such seeds, is no doubt one reason why, by dibbling, a smaller quantity of seed is found to be sufficient to produce the requisite number of plants.

If seeds are sown after being gathered, they generally vegetate at the latest in the ensuing spring; but it sometimes happens that they will lie a whole year or more in the ground without being altered. This character varies extremely in different species; the power of preserving their vitality is also extremely variable; some will retain their germinating powers for many years, and in any latitude. Many plants will spring from soil newly brought to the surface of the earth, in places in which they had not been grown in the memory of man; these, however, are chiefly oleaginous seeds, which, in an especial manner, resist decomposition. Many of the rarest plants in our gardens have been raised from old seeds taken off dried specimens in herbaria; and a recent case has occurred in which wheat found in the folds enveloping the mummies of Egypt has vigorously vegetated, though it may be supposed that it existed there upwards of 2,000 years.

The earliest indication of germination consists of the parts of the seed swelling by the absorption of moisture, and a chemical change taking place in the nature of its juices. Plants in growing are known to absorb carbonic acid, and give off oxygen through the instrumentality of their foliage; but this process only takes place when they are exposed to the action of light. In the germination of seeds this is reversed—oxygen is absorbed, and carbonic acid given off: hence we can understand why the presence of air is necessary, and why seeds should be excluded from the light. While these chemical changes are being produced, the embryo swells and bursts its envelope, protruding its radicle, which pierces the earth, deriving its support in the first place from the seed, and afterwards from the soil and the atmosphere. When the germ has shot out from the seed, it is found to be possessed of a sweet taste, owing to the presence of sugar in the sap, which has already commenced to circulate. This young shoot consists of a mass of vessels, which gradually increase in length, and after a short time expand into the first true leaves.

After the formation of the true leaves, the plant has entered upon a new stage of its existence. To no part of the plant does it owe more of its beauty than to the leaf, nor are there any of its organs of more essential utility to its future growth. Without the aid of science, we have indeed sufficient proof of the importance of the leaves in the vegetable economy, from the fact that when they are stripped off, the fruit does not come to maturity; and if the practice is persevered in, the plant languishes and dies.

Leaves appear to the naked eye to be composed merely of a thin homogeneous substance, and generally possessing little interest to the ordinary observer; but when, by the assistance of the microscope, their internal structure is displayed, we find it to be one of the most complicated and highly organized character, as might be inferred from the important functions which they are destined to perform. Besides the vessels and their numerous pores, the parenchyma with its green granules, which impart colour to the leaf, and the epidermis which covers the whole, many leaves are beset with hairs, spines, prickles, and other appendages. In reference to these it may be remarked that they generally belong to the vascular structure; and as by cultivation we do not increase the vessels of a plant in nearly so great proportion as we increase the cellular substance, so many leaves which are partially covered with hairs and prickles in their natural state lose these appendages by cultivation.

The curious and important function of the leaves, by which they absorb carbonic acid and exhale oxygen, has been already noticed; and in treating of the elementary substances of which plants are composed, this has been seen to be the process employed by nature for the abstraction from the atmosphere of the constant quantities of the former, produced by the respiration of animals and by combustion, so as always to preserve it in a proper state for the existence of animal life. So long ago as 1771 it was discovered by Dr. Priestly that this function was performed by growing plants; but still the researches of that distinguished philosopher, as well as those which succeeded him, failed to show that the atmosphere was the true source of carbon in plants. Carbon is found to exist largely in all soils containing much vegetable matter, and is also abundant in the manure of the farm yard, and from these sources it was supposed that plants derived at least the greater part of their carbon, until Liebig satisfactorily showed the atmosphere to be the only source of that element. It has, however, been seen that in the atmosphere it exists in the form of carbonic acid, a combination of carbon and oxygen; and as the oxygen thus absorbed in combination with that substance cannot be assimilated in that form, it follows that, in proportion as carbon is appropriated by the growing plant, oxygen is set free. Nothing can be better ascertained than that the decomposition of carbonic acid is the only available source of carbon, and that therefore it cannot be obtained from the solid matter of the soil or the manure. It is perfectly true, that carbonic acid, to some extent, also exists in the soil, being formed and evolved there in greater or less quantity; and further, that the moisture, permeating the soil and absorbed by plants, also contains that acid in solution; so that it is perfectly possible, nay, perhaps certain, that in this way it may, to a certain extent, enter the roots. But it does not appear that any portion thus absorbed is likely to be assimilated; on the contrary, there is little doubt of its again being given off unchanged through the leaves with the insensible perspiration, which the water containing it in solution supplies.

This action is mainly promoted through the instrumentality of the leaves; but it is not confined to them: the bark, and all the green parts of plants, also in a lesser degree promote it. It only takes place under the influence of light, and proceeds with the greatest rapidity under the direct rays of the sun. In the dark it appears that not only does the evolution of oxygen cease, but an actual absorption of that gas occurs, and carbonic acid is given off in return—in small quantity, however, just as in the respiration of animals.

While considering this important action of the leaves of plants, some of their other functions may be noticed. If the roots of a healthy plant are immersed in water, it is well known that that fluid is gradually abstracted, and will at length entirely disappear. The water thus abstracted is taken up by the roots, and carried through the plant until it reaches the leaves, where being spread over a large surface, and exposed to the sun and air, it escapes in considerable quantity by evaporation. The quantity of water thus abstracted, and again diffused in insensible perspiration, varies according to the nature of the plant as well as its size, and also with the state of the atmosphere as regards temperature and humidity. It is, of course, greatest under an elevated temperature, going actively forward during the warm months of summer; while it is almost entirely suspended in the winter, and also during the night at all seasons of the year.

The water thus presented to the roots of plants, and absorbed by them, contains various matters in solution, which are also absorbed; but as the pure water only escapes by the leaves, it follows that such matters are retained in the plant, and contribute to its growth. It is in this manner that plants obtain their supply of inorganic food from the soil; and hence it will be understood why the progress of vegetables is so rapid during warm weather, and how essential a due supply of moisture is to promote their growth.

When the leaves assume the first symptom of decay, either from natural causes, as on the approach of autumn, or from accidental causes arising from injury to the plant, they no longer absorb and decompose carbonic acid. New compounds are thus formed within their substance, their green colour disappears, and they soon drop from the plant to which they belonged. They have then discharged their functions, and are subjected to a new series of chemical operations, the consideration of which does not properly belong to this part of the subject.

With this function of absorption and evaporation are connected all the phenomena that attend transplantation. If a growing plant be removed from one situation to another during the summer, the chances are that it will die; because the minute spongioles of the roots will be so much injured by the removal as to be incapable of absorbing fluid from the soil as fast as it is given off by the leaves; and hence the system will be emptied of fluid, and the plant accordingly perish. Protecting the newly removed plant from exposure to the atmosphere for a short time, by a covering, is found to preserve it, at least for a time, as retarding evaporation until the necessary supply is obtained from the soil by the roots. On these grounds, all the advantages of watering after transplanting are also explained.

The circumstances favourable to the *blanching* of plants will also now be understood. The green colour of healthy and vigorous vegetation is dependent on the presence of light, which, in the process of blanching, is carefully excluded. The surprising power of the sun-flower to follow the course of the luminary from which its name is derived is well known.

Regarding then the general purposes afforded to the vegetable constitution by the functions of leaves there can be no question. But when we attempt to consider how the peculiar secretions of different species and tribes of plants are formed; how the same soil and the same atmosphere should in the leaf of the vine or sorrel produce a wholesome acid, and in that of the sponge or manchineal a virulent poison; how sweet and nutritious herbage should grow among the acrid crowfoot and aconite, we find ourselves totally unable to comprehend the existence of such wonderful powers in so small and seemingly simple organ as the leaf of a plant. The agency of the vital principle can alone account for the existence of these phenomena, though to our limited understandings it cannot explain them.

The proximate constituents of plants—sugar, starch, and woody fibre—forming the greater part of their entire bulk, have been already seen to consist of a combination of carbon, hydrogen, and oxygen, the two latter always existing in the same proportion as that in which they form water. Having clearly seen the origin of the carbon, and the manner in which it is assimilated, it will not be difficult to account for the presence of the other elements. The hydrogen necessary for the formation of all organic compounds is supplied by the decomposition of water. The process of assimilation, in its most simple form, consists in the extraction of hydrogen from water, and of carbon from carbonic acid; in consequence of which either all the oxygen of the water and of the carbonic acid is separated, as in the formation of caoutchouc, the volatile oils containing no oxygen, and other similar substances, or only a part of it is exhaled, when substances are formed in which it is found to exist. It will readily be perceived that the formation of the acids is accompanied by the smallest separation of oxygen; that the amount of oxygen set free increases with the production of the so-called neutral substances, and reaches its maximum in the oils. Fruits remain acid in cold summers; while the most numerous trees under the tropics are those which produce oils, caoutchouc and other substances containing very little oxygen. The action of sunshine and influence of heat upon the ripening of fruit are thus apparent.

Nitrogen has been seen to exist in plants in greatly smaller proportion than any of the other organic elements, and to be absent altogether from some of their more important proximate constituents. It appears, however, to be indispensable to the proper development of plants in every stage of their existence. The immense provision of that substance in the seeds of most vegetables is a proof of its importance; and the care which Nature has thus taken to guard against any deficiency in this respect to the young plant is very remarkable. The importance of this constituent of plants was much under-rated until Liebig showed that the nitrogenous constituents of animal food are those only from which flesh and blood can be produced.

Nitrogen exists in large proportion in the atmosphere, and this is probably the source whence the original supply of that article has been obtained. In a former part of these papers, combined with hydrogen it was seen to form ammonia—a substance of almost Protean properties, and, according to the most recent investigations in chemical science, it is the true source of nitrogen for our growing crops. Ammonia is produced by various causes, but chiefly by the decomposition of animal matters. A portion of that substance produced in this manner escapes in an uncombined state, and exists in the atmosphere until it is carried down again to the earth by rains, it being exceedingly soluble; and carbonic acid being also absorbed during the decomposition of animal matters, another portion of the ammonia disengaged may unite with that acid, forming carbonate of ammonia—a volatile salt, and also liable gradually to enter again into the gaseous state. The supply of ammonia by these means existing in the air, and afterwards carried down and presented to the roots of plants by rains, is now considered the source whence it is principally derived. The proportion in which it exists in rain-water is, no doubt, very small; but still it is found to be amply sufficient for the wants of the spontaneous vegetation of the globe: but in those plants raised by artificial culture, especially when, as in the case of wheat and other grain, the whole plant, and more particularly its azotised or nitrogenous portion, is in a state of abnormal development—a state excellent for the purposes for which the plant was designed by man, but still a forced and unnatural state—the case is changed; and it is believed that, without an artificial supply, this altered condition cannot be maintained. Hence *one* of the great uses of decaying animal matters as manures.*

This view of the origin of the nitrogen of plants will account for the great value so justly attached to urine as a manure, especially to plants containing a large proportion of that substance in their composition. Solid excrements of animals contain a smaller proportion of nitrogen than the liquid, and hence the comparatively quick action of the latter on the growing plant. Guano, to which so much value has lately been attached, and justly so, as a manure, is known to be droppings of countless hosts of sea-fowl frequenting the shores of the South American continent; but in this class of animals the liquid is not separated from the solid excrement, on which account it is more valuable than any other kind of manure, as containing an increased quantity of ammoniacal salts.

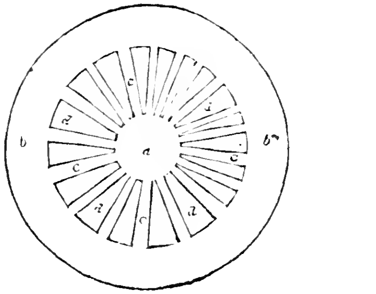
The several sources of the organic constituents of plants have now been considered in succession, and our practical readers will not have failed to learn with surprise in how small a degree plants are dependent on the soil for the supply of this portion of their food. With the exception of nitrogen, it has been seen that water and the atmosphere afford the whole supply; and when plants are not forced beyond their normal state of growth, it has further been seen that these sources are also capable of supplying the necessary quantity of that element. This knowledge is of great practical importance in the cultivation of the various crops, as showing the necessity which exists of securing the presence of a due supply of these important sources of food. The celebrated Jethro Tull was not so far mistaken in his views of the advantages of the system of husbandry which he so perseveringly advocated as his cotemporaries and successors supposed; but the importance of the inorganic constituents of plants not having been then understood, he made no provision for a due supply of them, and this formed the chief grounds of his want of success.

Plants consist essentially of three parts—the roots, the stems, and the leaves. The latter have been already briefly noticed in considering the important function which they perform in the nutrition of plants; and it will be convenient, before proceeding further, to consider the structure of the other parts, for which purpose we shall commence with the stem.

When the stem and root, or the ascending and descending axes, diverge, there commences in many plants a difference of anatomical structure, and in all a very essential physiological dissimilarity. In the case of some of the cultivated plants, the stem is not put forth until the second year of their growth, the foliage during the first year being composed of radical leaves, or such as spring immediately from the root. During the first stage of the growth of these plants, the whole supply of nutriment is stored up in the root, there to be retained until the flower stem should arise, for the evolution and support of which it is destined. This is exemplified in the case of the turnip, carrot, and several other plants. In the cultivation of these crops, the farmer takes advantage of this property, and sows them at such a period of the season that the growth of the roots shall just be completed by the time the winter sets in, this further being the time at which they are usually consumed by the domestic animals of the farm.

The *stem* is usually regarded as consisting of four parts—the pith, wood, bark, and medullary rays. The first and last of these, however, are similarly constituted, and are only continuations of one and the same substance. The pith forms a sort of cylinder of soft and spongy matter, which ascends through the central part of the stem, varying in size with the species and with the age of the trunk or branch in which it is situated. The wood surrounds the pith in the form of a hollow cylinder, which is again covered by the bark. In trees and branches of considerable age, the wood consists of two parts—the oldest, or *heart wood*, being often of a brownish colour; and the newer, or external wood, or *alburnum*, being generally softer in structure. This distinction is of much importance in the arts, the latter being altogether unfitted for purposes in which strength and durability are required. The bark also is easily separated into two portions —the inner bark, or *liber;* and the *epidermis*, or outer covering. The pith and outer bark are connected together by thin vertical columns, extending in the form of rays, or like the spokes of a wheel, from the centre to the circumference. Though they form in reality thin and continuous vertical plates, yet, from the appearance they present in the transverse section of a piece of wood, they are distinguished by the name of medullary rays. In the annexed diagram, representing a section of such a stem as above described, *a* is the pith; the circumference, *b*, is the bark; *c c* are the medullary rays; and *d d* the wood.

* Any one may satisfy himself of the presence of ammonia in rain by simply adding a little sulphuric or muriatic acid to a quantity of rain-water, and by evaporating this nearly to dryness in a clean porcelain basin. The ammonia remains in the residue, in combination with the acid employed, and may be detected either by the addition of a little chloride of platinum, or more simply by a little powdered lime, which separates the ammonia, and thus renders sensible its peculiar pungent smell. The sensation perceived on moistening the hand with rain-water, so different from that produced by pure distilled water, and to which the term *softness* is vulgarly applied, is also due to the carbonate of ammonia contained in the former.—*Liebig's Organic Chemistry*, 3rd edit., p. 46.



The pith is almost exclusively formed of cellular tissue,* commencing at the lower extremity of the stem and terminating at the leaf-buds. Sometimes, and especially in young branches and herbaceous plants, the cells of the pith are abundantly supplied with fluid matters, and filled with granulations of a green colour, as may be seen on breaking a branch of elder one year old, in which the pith presents the appearance of a green and very moist fleshy body. It communicates with the cellular and herbaceous layer of the bark by means of peculiar prolongations, which it sends through the wood, and which are the medullary rays before mentioned.

The cellular system of the pith, and that of the bark, are, in the embryo and youngest shoots, immediately in contact; but the vascular system, of which the wood is composed, as it forms, gradually interposes between them, until they are distinctly separated, in aged stems, by a space of several feet. The medullary rays have, however, been seen to form a connecting link between them, at all stages of the growth of the plant. The office of these is therefore very important. They are the great means of communication between the circumference and centre of the stem, and they enable the fluid matter which pours down the bark to reach the wood next the pith.

The woody part of the stem has too distinct offices to perform. It imparts to plants that solidity and strength which enables them to withstand the violence of storms, and maintain their erect position; and it seems as the channel through which fluid matters are conveyed from the root to the leaves, for which purpose it has a simple though elaborate apparatus of tubes and vessels. The latter, when young, serve only this purpose; when old, they act as receptacles of the peculiar secretions of the tree. In their former state they are nearly colourless, and form the *alburnum* or sap wood already mentioned; and when old, and filled with scented matter, they become dark in colour, and are then heartwood or *duramen*.

Although the main purposes served by the *roots of plants* are beyond question and universally recognised; the precise manner in which some of their functions are performed is not so well understood, owing to their situation, in a great degree beyond the control of our operations. Besides giving the plant stability in the soil, they are also capable of largely abstracting fluid matters from the soil, the influence of which on the growing plant is of the last importance. But in addition to their being thus organs of nutrition, they are also in certain cases capable of acting as receptacles of nutritious matters, a circumstance which gives them increased value to the agriculturist. These reservoirs of nutritious matters, though designed to meet the wants of the plant at a succeeding stage of its existence, are, as before observed, profitably devoted to the support of the domestic animals of the farm.

It does not appear that the fluid matters circulating in plants are capable of aiding their growth until they have been elaborated through the instrumentality of the leaves; but it frequently happens that more is elaborated by them at one time than is necessary for the immediate consumption of the plant, in which case it is stored up for future use, and serves the purpose already explained; it being again required by the plant at a period when the leaves not being in a state of activity, there is an obstacle interposed to the further formation of nutrient matter. In perennial plants which form buds, this nutrient matter is usually deposited in the cellular tissue, about their connection with the parent plant, yielding sago and other articles of food. When the plant is of that more perfect kind, where many buds are formed, and the stem contains what is properly called pith, in it the nutrient juices are stored, to be carried in another season to the embryo bud by means of the ascending sap.

But although trees, shrubs, and many forms of plants admit of this supplementary nutriment being deposited in stores at the base of the buds, and although the palms and several other plants admit of its being formed in one great mass at elevations in the atmosphere, it is seen to be contained in many other plants in their roots; and it is for the sake of this reservoir that the farmer cultivates what are termed his *root-crops*.

It has been said that in trees the superabundant nutriment is deposited in the buds; but in some plants the buds are produced underground, and this store of nutriment is conveyed down to them there. This takes place in the case of the potato. The tubers of this plant, and the fibres by which they are attached to the base of the stem, are to be regarded as belonging to a very different class of organs from the roots of the plant, though their subterranean situation commonly obtains for them that name. The tuber of the potato, unlike a root, does not contribute to the nourishment, but rather to the exhaustion of the then existing plant. It is therefore to be regarded rather as a reservoir of nutrient matter, destined to serve for the development of *future* plants, for which it acts as the germ, until they have pushed forth roots into the soil.

Carbonic acid, water, and ammonia have now been seen to furnish plants with all that is required to form the organic portion of their fabric, and for the ordinary supply of these it has been further seen that they are *entirely independent of the soil*. Manures of organic origin have hitherto been chiefly

---

* *Tissue*, a web, is the name applied to the soft and flexible parts of plants and animals; the *cellular* tissue is divided into cells, and the *vascular* into vessels.

valued as affording the means of supplying this part of the food of plants, but modern science has shown the opinions then existing on the subject to be altogether erroneous. It is only, as before stated, when an unnatural or abnormal state of growth is induced, that an artificial supply of such matters becomes necessary.

The amount of food capable of being abstracted by young plants from the atmosphere, in the form of carbonic acid and ammonia, is limited; they cannot assimilate more than the air contains. Now, if the quantity of their stems, leaves, and branches has been increased by the excess of food yielded by the soil at the commencement of their development, they will require, in a given time, for the completion of their growth, and for the formation of their blossoms and fruit, more nourishment from the air than it can afford, and consequently they will not reach maturity. In many cases, the nourishment afforded by the air under these circumstances suffices only to complete the formation of the leaves, stem, and branches. The same result then ensues as when ornamental plants are transplanted from the pots in which they have grown to larger ones in which their roots are permitted to increase and multiply. All their nourishment is employed for the increase of their roots and leaves: they grow luxuriantly, but do not blossom. When, on the contrary, we take away part of the branches, and of course their leaves with them, from dwarf trees, since we thus prevent the development of new branches, an excess of nutriment is artificially procured for the trees, and is employed by them in the increase of the blossoms and enlargement of the fruit.*

One of the most interesting questions connected with the cultivation of plants is the necessity which is found to exist for alternating them on the same soil. Many theories have been propounded for the solution of this phenomena; but being founded on incorrect data, and on erroneous views of vegetable nutrition, it is apparent that no reliance could be placed on them. The necessity for this alternation of crops has been supposed, on no less an authority than that of the celebrated Decandolle, to be founded on an excreting principle of plants, whereby they are enabled to excrete by their roots certain matters contained in their structure not essential to their development; and although the matters thus imparted to the soil are believed to be eminently injurious to plants of the same kind as those from which they were produced, yet it was supposed that they might be favourable to, and directly promote the growth of plants belonging to a different natural family. This was a beautiful and seemingly ingenious solution of the phenomena in question, and from its plausibility, and the source whence it was derived, it soon received very general assent. When this theory was propounded, however, the essential importance of the inorganic constituents of plants was not understood; and on the publication of Liebig's celebrated work, when this was placed beyond a doubt, the theory in question, previously so much regarded, was seen to be entirely without foundation. Plants are then seen to abstract certain inorganic substances from the soil during their growth; and it is evident that if a constant succession of the same kind of crop is persevered in, the soil in time becomes exhausted of such matters, and plants containing them cannot be afterwards profitably grown on them until the matters so abstracted are supplied by artificial means, or until sufficient time elapses for their production by the gradual disintegration of the mineral matters of the soil, the original source whence they were derived. The soundness of this explanation is still further shown from the circumstance of the ordinary manure of the farm-yard contributing to prolong the period of such deterioration being produced, a fact unquestionably arising from the capability of such manure to supply the inorganic substances so abstracted to a greater or less extent; we say to a *greater or less extent*, for did it actually supply the waste so occasioned, then no deterioration would take place, and the soil would continue, year after year, equally well fitted under such treatment for the constant cultivation of the same crop, due means being taken to secure the necessary degree of pulverization, so that with facility air and moisture may permeate the soil. Nor are actual experiments in corroboration of this view wanting. Carefully conducted experiments have shown that wheat, or any other grain, may be grown *ad infinitum* on the same soil, without any sensible deterioration taking place, where the precaution is taken of supplying the soil by artificial means with the matters which these crops extracted from it.

This is one of the most important results of scientific research hitherto placed within reach of the farmer. When the value of chemical knowledge, as explaining the *rationale* of the operations of husbandry, becomes more generally appreciated by the farming community, no question can be entertained but the results of chemical analysis will be extensively employed to regulate the practice which should be adopted. The constitution of the soil will then be exactly ascertained with the facility which it presents for the natural formation by disintegration, and other means, of the various matters which it is required to supply. The analysis of the various crops, with the estimated proportion of each ingredient in the produce per acre, will show what has been abstracted; and from such data no difficulty can be experienced in ascertaining *exactly* what should be supplied. The present rapid diffusion of chemical knowledge, and the extended application of its advantages, shows that this important era in the history of agriculture as a science is much less distant than might be supposed.

Notwithstanding the possibility, by such means, of continuing to grow the same crop year after year in succession, it does not by any means seem probable that it will be generally expedient to adopt this practice. Different crops exhaust the soil in very varying proportions: grain-crops, for example, exhaust the soil to a much greater extent than those which are usually denominated green-crops, and therefore it will still be proper that these crops should be made to alternate with each other. Their habit of growth is also very different, the one being advantageously grown in rows at such wide intervals that the implements of tillage can be kept in

* Liebig's Chemistry applied to Agriculture and Physiology, &c.

constant operation during their growth, by which a high degree of pulverization in the soil is attained; the advantages of which are not confined to the immediate crop, but are very perceptibly experienced in the cultivation of the succeeding one. The other of these classes, though also suited to row culture, cannot be grown at such wide intervals, and therefore admit of the introduction of the hoe only to a limited extent, and that during a comparatively short period. Hence it will always be proper to alternate such crops; but the necessity for so doing will be found to arise rather from their different habits of growth, than from any regard to their powers of exhausting the soil.

Such alternation in cropping may still further be rendered expedient on the ground of thereby economising the supply of manure. It must, of course, always be an object to follow the course of cropping best calculated to promote that object. Under an economical and judicious system of tillage, the manure of the farm-yard will in general be found sufficient to maintain the fertility of the farm unimpaired; as the excrement of the animals kept thereon will of course contain a large proportion of the ingredients abstracted from the soil by the cultivated crops. In the intervals between the corn-crops, therefore, those plants which subsist to the greatest extent on the food supplied by the atmosphere will be advantageously introduced.

J. Sproule.

FARMERS' GARDENS.

With few exceptions, these essential appendages to farming establishments are sadly in arrears; and this is the more to be regretted because there is every appliance at hand, store of manure, labour at command, and the means of employing both without any of that expense which the amateur must incur to a very considerable amount.

In the course of very long experience, I have had occasion to devote my attention to almost every subject connected with horticulture, as well in experimental practice at home as in observing that of professional gardeners in large and respectable establishments; and the result is this, that, setting aside the very great outlay, which is of little or no moment to those who possess large and independent fortunes, there is no person or class of persons who can by any means compete with the farmer in respect of power to enjoy every product of the garden; and in this term I include fruits of the hothouse, stove, vinery, equally with culinary vegetable, all of first-rate excellence, and at a cost comparatively trifling.

True it is—and so much more the pity and shame—that some landlords, among other their arbitrary covenants, restrict a worthy and industrious tenant from employing dung or straw in his garden; but this we hope may be considered the "exception" and not the "rule:" therefore, it will be my endeavour to prove that it is the interest of a farmer to take advantage of his opportunity, and improve his system of gardening, so as to add materially to the comforts and innocent pleasures of his domestic circle.

The formation of dunghills, mixens, or by whatever name masses of fermenting manure are known in different countries, is an operation of routine: it belongs to every farm in the kingdom, though the methods adopted are at variance, and have of late been the subject of much debate and animadversion. Loss and waste are doubtless incurred; and to the present day, few persons are acquainted with the laws which govern the fermentation of putrescent manure.

It is not now intended to make any allusion to this subject, but solely to direct the attention of landlord, farmer, and amateur to one source of loss which might, by a little seasonable outlay, be converted into a positive gain.

When a great mass of fermenting farm or fold-yard manure is exposed in the open air, a quantity of heat is generated by the decomposition of moisture and hydro-carbonous substances, which, were the materials differently arranged, would produce crops of cucumbers, melons, grapes, pine-apples, and strawberries, in great perfection, and at no loss of money or of manure, during at least seven months in the year.

Excavations might be made in the farm-yard, or other spare worthless ground, which could be bricked round, or otherwise secured with rough boarding, lumps of chalk, &c.; and at the bottom of these, channels could be formed, to conduct away the swillage draining into proper receptacles of liquid manure. The excavation being ready, pits, or hotbed frames of rough wood, almost costless in itself, might be constructed by any man who could handle saw, hammer, and nails; and glazed sashes are now easily and cheaply obtained, as glass is so much reduced in price. These frames ought in general to be six feet long from back to front, and the lights from three to four feet wide each; the length of a range being governed entirely by the object of the cultivator.

It is plain that manure would ferment, and yield its heat, if laid into such an excavation, and piled around the frames erected in the centre of it, just as well and permanently as it now does when heaped in the farmyard, or at some waste corner of a field; but with this advantageous difference, that as it is now useless in every sense but in that of its own electro-chemical interchange of elements, all the power of this play of agencies might be employed in the promotion and development of the finest fruits of the earth.

We are now adducing general principles, and speaking of facts that might be realized, without entering into minutiæ of detail. It may indeed be questioned by some, whether any profit could attend the adoption of the practice herein recommended; and to those who think only of pounds, shillings, and pence, it might be difficult to offer a satisfactory reply.

But, at all events, there are thousands who delight in, and relish good fruit; and instances numberless might be cited of noblemen, gentlemen, and retired tradesmen, who consider the cultivation of fruits as a *sine quâ non*, and deem no money sacrifice of moment when compared with the absence of such delicacies.

Now all these persons are constrained to purchase labour and materials at heavy money prices;

whereas the farmer occupies as it were a privileged position, and has his materials within reach, and, in point of fact, forming of necessity the very sinews of his art. He can therefore convert a portion of his manure, and of the rough boards obtained from trees felled on his farm or in neighbouring woods, into appliances, which would to a great extent be auxiliaries to his profession.

This may be easily proved by simply adverting to the nature of the labour now bestowed upon farm-yard manure, which every one knows to consist of carting, mixing, consolidating, turning, and returning.

Let any doubter only take the trouble to inspect the operations of the gardener in some noble establishment, who has to produce pines, melons, and cucumbers in bricked excavations and pits, surrounded and renewed by stable-dung, leaves, and occasionally short grass; and he will soon be convinced that, while the plants flourish in luxuriance, the dung and heating composts work to admiration, and are gradually but certainly converted into as rich a mass of black humus as the staunchest advocate of manure could covet or imagine to exist.

Thus, view the subject as one may, we come back, like those who move in a circle, to the same point, and again repeat the assertion, that, of all others, the farmer is the person who ought to avail himself of his resources for the production of fruit, and that of every variety, tender and hardy.

As a further inducement, I shall describe a case in point, which came under notice during the late summer: A neighbour, who had just taken possession of a small establishment, found an old and almost worthless *sweet-water* vine at one side of the dwelling. It had neither figure, nor well-arranged bearing wood; but there were one or two separate divisions which showed that a branch might be brought down from the wall and laid within a frame. A common workman prepared one of wood found him: it was painted, glazed, and completed at home. Two or three loads of very indifferent manure were on the premises: these were laid in a square mass, a-front of the vine, but a yard from the wall; when fresh, it might be a yard high, but it should have been four feet. On the dung the frame was placed, and slates were laid on the manure within, a lath trellis being placed a foot above, to which the shoots were to be fastened. One of the portions of the vine was then brought down, laid in the frame through a notch made at the back board, and the small shoots being tied conveniently to the trellis, the lights were closed. These operations were completed by mid-April.

For a time the mass heated pretty well, and the buds enlarged: they showed abundance of fruit, which swelled freely, and produced many scores of fine, luscious clusters, rich in colour and flavour. No more dung was added; but had there been plenty at hand to line and renew the bed, the crop would have been complete in July. The parent vine, though *conveying all the sap from the ground* to the inclosed branch, has not ripened a single good berry. Any farmer could do the like if he have a tree, and render his crop certain every year.

J. Towers.

POTATOES AND PARSNIPS, *versus* TURNIPS.

TO THE EDITOR OF THE EVENING PACKET.

My dear Sir,—As the disease in the potatoes is the all-absorbing horror of the day, I may be permitted, without fear of pushing matter of more moment out, to push some observations in, with a view of preventing greater horrors coming on us to-morrow. In that cleverly-conducted periodical by Mr. Sproule, the *Irish Farmer's Journal*, we have "A small Farmer of Ulster" availing himself of the present alarm to beat up for recruits for the turnip party. Without any intrinsic merit in these watery strangers, the rage for innovation and for foreign productions, which always pervades more or less every rank in society, as well as every human being who has more brains than a turnip, has called forth a good deal of agricultural furor in attempts to substitute this cold, meagre, pampered, pale-faced, dropsicals, for our own laughing, warm-hearted, old friend, that, in his ragged coat of poverty, has stood by us so long. My poor Pat, 'tis you that I love, and well do you deserve it. Oh! had you but a sister! I will stand by you, my boy, to the last, and fight the fight for you, *hasta et inchillo*, and it shall go hard with us if we do not beat your round, smooth-faced antagonist out of the field. Let him swell himself as large as any of those bloated reptiles that filled the world when it was fit for nothing else to live in—you poor disarted cratur you. 'Tis a pretty reason for deserting you, indeed, by the man who would not turn his best friend out of the door though he were a pig, because you are sick; and a very wise thing it is to make you scarcer in the land, because you are likely to make yourself too scarce. May all the curses in the 109th Psalm (the very perfection of all cursing) light on the man who would give you the cold shoulder now in the time of your trouble; and because you have the cholera, or fever, or who knows what—perhaps only a little touch of dropsy, which, by kind and attentive treatment, you may get the better of—would turn you, like a poor relation, out of your comfortable warm birth in the heart of the land, to enjoy dry lodgings as you best can in a roofless hut in the gripe of a ditch, the griping rascals.

Now, in this contest between the turnip and the potato ('tis but Irish politeness to give the stranger the precedence, although he does not deserve it), the parties have often met, and shillalied the question with much equality, perhaps more owing to the vantage ground the turnip had taken in the mere *recherché* care of its tillage than in its productive or beneficial qualities; and now that, in addition to the diseases that have long afflicted the potato, both in its embryo stage and in its progress to perfection, we have the dreadful apprehension of its loss when full-grown, a phalanx of sufficient force it is thought may be brought to beat our old and long-tried *quasi* indigenous root out of the field; the inversely increasing certainty of the turnip is now adduced as a sufficient reason to extend its culture, and this reason will no doubt have its weight. The selfish rich, the wretch who would gladly add to his store amidst the misery and destitution of his neighbours, and contemplate with a mercenary gratification his sleek and well-fed herds, while squalid want and famine filled the huts of the peasant with gaunt and sinking forms, may find in the greater certainty of the turnip crop sufficent motives to abandon the potato. To him I write not—to the cold, the heartless, "no poet sings"—but to the wealthy great, the generous, the spirited, who are ever ready to stretch forth the strong arm, powerful to save, I would appeal. It may be that the direst calamity that the land can suffer, may assure us the murrain which has shown itself in America, in the European continent, and in England, may or may not next year, or in some proximate ensuing year, extend itself to Ireland. Should it so extend itself—should it generally spread itself through the land, in what would a people now existing on the lowest description of human food find a refuge from this sudden and inextricable famine? In the turnip! Pshaw! an Irishman could not be starved into it! Now it is probable the loss will be more nearly total on the worst-prepared lands. It will thus fall on the poorer classes. It may be that it may light on all lands indiscriminately; but if the opinion of Dr. Lindley is well-formed, it is more likely to fall on the ill-drained and shallow-worked lands. The breadth of land annually under potato tillage is calculated to meet the annual demand in average years, and no more. The poor man finds it difficult to cultivate enough for the year's supply; he can therefore make no provision to meet the chance of failure: but it would be most unwise not to provide for a danger that menaces; and where this provision can be made without loss or injury, it were more than unwise to neglect it. Dr. Lindley —and he is no bad authority—has recorded his opinion of the possibility of twenty tons of potatoes being produced on a statute acre of land (thirty-two tons to the Irish acre); and in stating this opinion, I may say I have verified the fact—careful culture will produce it. Now, forty tons of Swedes on a statute acre is, I believe, a rare crop. I need not tell cattle feeders how much more twenty tons of potatoes would feed than forty tons of turnips. The wealthy man, who alone can extend the breadth of his potato ground, is called upon to meet the threatening danger by abandoning the tillage of a root which cannot be substituted for potatoes as food for man, and growing instead of them potatoes for his cattle. With the same labour, care, and attention in preparing the soil for them which is applied to it for turnips, he would have to the full as remunerative a crop, and perhaps as sure a one; and, in the event of failure in the potatoes in land on which less care has been taken, he will be able, in the time of need, to rescue his fellow-man from else hopeless starvation, and save his country all those horrors in which the desperation of a famishing population would involve it. He would, moreover, obtain such a price for the produce of his lands as would enable him to import oilcakes, &c., for his cattle. But if we must have a special cattle crop—and, perhaps, in the variety of diseases to which potatoes have for so long been subject, it might be advisable not to rest solely on a failing crop for the nation's food—parsnips might be more extensively cultivated. They are much more nutritive than turnips; and I think an acre of them would feed more than an acre of Swedes, possibly as much as an acre of potatoes, and they might very well be used as food for man, and I doubt not he would soon find them very palatable; they may be sown throughout the winter, and thus would not interfere with the tillage of other crops, and at all events should be the earliest sown crop in the spring. I think they may very advantageously be sown in the autumn, as I have always found them stand the frost.

But we do not derive all the advantages we might from our potato tillage; a crop of early cabbage, used as greens, and later in the spring as hearted cabbage for cattle feeding, might precede the general potato crop; and thus two very remunerating and full crops taken in one year without injury to either.—I am, my dear sir, your very obedient servant, J. M. G.

Granard, Sept. 29, 1845.

ON BANKING.

TO THE EDITOR OF THE FARMER'S MAGAZINE.

Sir,—In your September number there is a communication from "Daniel Dubious," on the subject of banking, in which, for the sake of his own property and that of his customers, it is to be hoped he is not engaged. He may well complain that nobody takes the trouble to answer his remarks. To do so is certainly a work of supererogation. With those who know anything of business, they carry their own refutation with them; and the wonder to me is, how they could find insertion in a respectable journal like yours. The subject is too important to the community to be handled in the inefficient manner in which this precious "Daniel" attempts to grapple with it. I need go no further, to show his incapacity in the matter, than to point out the enormous blunder he has committed in his supposed case of a company with a *paid-up* capital of £250,000, upon which he calculates the interest, at six per cent., as amounting to £30,000, instead of half that sum; so that, upon his own showing of one of the most absurd and extravagant schemes ever concocted on paper, this reckless company can wind up at the end of the year with a surplus profit.

Banking, like other commercial pursuits, has been, is, and will be profitable, both private and joint-stock, as long as it is conducted on sound principles. That some have found it otherwise is not to be wondered at, because sound management does not universally exist, and men of straw have embarked in what required both capital and judgment. If this D.D. knew as much about the profits of banking as he pretends, he would be at no loss to discover the advantages to be derived by it, in the splendid fortunes amassed by private bankers *since the war*, as well as the successful investment in joint-stock companies it has proved to many who have had confidence in the machinery of a system which is evidently destined, from the success hitherto attending it, to prevail universally in the United Kingdom. J. W. S.

Wareham, Nov. 8, 1845.

ON THE FORMATION OF MANURE-HEAPS AND THE ECONOMIZING OF LIQUID MANURES.

BY MR. T. ROWLANDSON, LIVERPOOL.

(*From the Quarterly Journal of Agriculture.*)

Several papers touching this most important topic have appeared in the last two numbers of "The Farmer's Magazine:" I allude to the translation, by Mr. G. Law, from Boussingault's "Rurale Economie" (*subjects* — "The Ammoniacal Combinations in Urines, Excrements, and Manures," and "On the Management of the Dung-heap and the Manufacture of Farm-yard Manure"); "The Water contained in Manures," by Cuthbert W. Johnson, Esq., F. R. S.; and, lastly, "On the Management of Stable-dung Manure, especially as regards Exposure to Rain;" by Dr. John Davy. *En passant*, I may remark that the two articles of Boussingault do not convey any new theory or practical suggestions of note; Mr. Johnson's paper is a very useful one; Dr. John Davy's is, however, of a most important nature, so much so, that I shall extract the paper at length, as it appeared copied from "The Edinburgh Philosophical Journal" into "The Farmer's Magazine" for the month of May. In order to justify myself for so doing, I may state that the general observations by the learned doctor are precisely similar to those I had made some time previous to the appearance of his paper, which will be found to be the case on reference to a paper of mine on the subject of lime, which appeared in "The Journal of Agriculture" for October, 1844; in addition to which, Dr. Davy has made some analytical investigations, which I have not, under present circumstances, a convenient opportunity of entering into. As, however, his paper perfectly coincides with the opinions I have formerly held on the subject, and the analytical investigations being in their results agreeable to what I have long suspected, is the reason I now incorporate his paper with this in such a wholesale manner. I have thus copiously alluded to the papers above named, as I shall have more or less occasion to recur to them hereafter. The remedies which I intend to propose for some of the evils complained of with respect to the general management of manure-heaps, I am sorry to say, are not as yet of so satisfactory a nature as I could wish. I have no doubt, however, but the difficulties which I shall point out are not of an insurmountable nature. Dr. Davy states—

"The farm-steadings here (Westmoreland) are commonly on declivities; the dung-heap is usually placed on a declivity, often by the road-side, and, in consequence, after every shower of rain, the water that runs off, precolating through the manure, robs it of some of its most valuable ingredients, especially its soluble salts and soluble animal and vegetable matter, tending to starve the fields and pollute the roads. I have had the curiosity to collect portions of such drainage, and subject them to examination; and I now propose to give the results, as they show in a very marked manner the injurious effect, and how great is the loss to the farmer in consequence. The first portion collected was from a heap of stable dung, fresh from the stable, just before a heavy fall of rain, the accompaniment of a thunder-storm, nearly an inch falling in three hours. The water which ran from the dung-heap was of the colour of a weak infusion of coffee, of specific gravity 1002 to pure water, or 1000. With the peculiar smell of stable-dung, it had just a perceptible smell of ammonia, which was rendered more distinct by the addition of lime. Under the microscope, it was found to contain, beside a fine granular matter, and many minute fibres and scales, particles resembling grains of pollen, and two or three different kinds of animalcules. Evaporated to dryness, it yielded 2·6 per 1000 of brown matter, which deliquesced on exposure to a moist atmosphere; emitted a very faint smell of ammonia when mixed with lime, indicating that, in the process of evaporation, most of the ammoniacal salt had been expelled, and was therefore carbonate of ammonia; and, when incinerated, afforded as much as 51·6 per cent. of grey ash—48·4 per cent. of the extract having been destroyed by the fire, which may be considered as animal and vegetable matter. The ash was found to contain the sulphuric, phosphoric, and carbonic acids, and chlorine, with potash, soda, lime, and magnesia, chiefly in the form, it may be inferred, of carbonate of potash, phosphate of lime, sulphate of lime, sulphate of magnesia,* and common salt.

"The proportion of the sulphate of lime was large, as was also that of the fixed alkaline salts, whilst that of the phosphate of lime and the magnesian salt was small. The next specimen examined was from a much larger and older dung-heap, after a fall of 1·12 inches of rain in about twelve hours. The fluid was of a darker brown than the preceding, very similar in its appearance under the microscope, of higher specific gravity, viz., 1008, and yet less rich in ammoniacal salt; for, when mixed with lime, it gave only a very faint smell of ammonia; and its extract obtained by evaporation, when mixed with lime, had no smell of the volatile alkali.

"It yielded, on evaporation, 10·4 per 1000 solid matter, similar generally to that obtained from the first portion in its qualities—abounding, in like manner, in salts, and those of the same description. The third specimen collected for examination was from the same dung-heap, after a fall of 2·79 inches of rain in twenty-four hours. It differed so little from the preceding, that it is not necessary to describe it particularly. As might have been expected, it was more dilute, its specific gravity being 1004. The last specimen I shall notice was one procured from the same dung-heap, after four days of dry weather following the heavy rain last mentioned. It was oozing out slowly in small quantity—was of a dark brown hue, nearly transparent, and almost destitute of smell. Under the microscope it exhibited a few particles and fibres, a very few minute crystals, without any animalcules. I had expected to have found it a concentrated infusion of the dung-heap, and, as such, of high specific gravity.

* Query, would not the magnesia be found as a phosphate or ammonia phosphate ?—T. R.

But it was otherwise. It specific gravity exceeded very little that of the preceding, and was less than that of the second portion, being only 1005, leading to the conclusion that the manure was nearly exhausted of its soluble matter. The weather during the four days, without rain, was comparatively cold for the season (it was September), with a northerly wind, the thermometer, even by day, below 58 degrees, and at night once or twice approaching the freezing point. This low temperature must have checked or put a stop to fermentation, which, in its turn, might have prevented the further formation of soluble matter. The infusion mixed with lime indicated the presence of ammoniacal salts; it emitted a pretty strong smell of ammonia; and, judging from the effects of other re-agents, its composition was very similar to that of the preceding portions. It probably contained a larger proportion of vegetable matter, humus and humic acids, than the earlier drainings; it gave a very copious precipitate with the acetate of lead.* The bearing and application of these results hardly require to be pointed out. As the drainage of the dung-heap exposed to rain contains some of the best, the chief ingredients of active manure (excepting always the insoluble phosphates), it follows that the more the dung is exposed—the more it is subjected to the washing and percolation of rain-water—the greater must be its loss, the poorer and more exhausted it must become; and that shelter from rain is essential as a preventive—such a shelter as only can be well secured by a shed."

The rational objects to be obtained in preparing manures in a proper manner are, in the first place, to preserve and collect all matters containing either the organic or inorganic constituents of the crops which we are about to raise; and, 2ndly, if the matters so collected are in such a state as not to be immediately available as food for plants, to render them so by artificial means. The course usually pursued for the first object is to collect all the excreta (usually mixed with straw) voided by the animals in the cattle-sheds, sties, stables, and straw-yards, throwing the whole into a heap, and leaving it in that state until carted into the field. Generally speaking, little care is taken to preserve the urine voided by the cattle, &c., except that which is absorbed by the straw. Much has been written with respect to the second object, such as turning over the heaps periodically, in order to promote a greater and more equal fermentation. This plan has had both strenuous advocates and adversaries. Amongst the latter is Boussingault, who states—"From what has now been said, it will be understood how destructive to good manure is the custom which obtains in certain countries of turning dung-heaps frequently—of airing them, as it were, in order to hasten their decomposition. Treated in this way, stable litter, &c., does, in fact, decompose much more rapidly; but it does so, and I own I do not myself clearly perceive the object proposed by it, at the expense of the quality; for it is very evident that the volatile principles must be dissipated and lost in the same proportion as their points of contact with the air are multiplied." I am inclined to doubt that so serious a dissipation of the volatile principles (ammonia) of manure takes place in consequence of the turning over of manure-heaps as is here described, and am more inclined to agree with the advocates of old fermented manure, that the loss sustained mainly consists of carbonic acid and water; in fact, Boussingault admits, on the authority of Thaer, that air, collected from the surface of a dung-heap undergoing moderate fermentation, does not contain much more carbonic acid than that which is taken from the mass of the atmosphere. Neither does a vessel containing nitric acid, when placed upon the fermenting mass, produce those dense white vapours which are a certain indication of the presence of ammonia. The decay of vegetable fibre in prepreparing manure is of great consequence, for two reasons, viz., it prepares the straw, so that it can be easily broken by the fork or cut by the spade, and is easier to work into the ground by the plough, whilst at the same time the inorganic constituents of the straw, &c., are set free. The due fermentation, therefore, of the whole mass constituting a dung-heap is of primary importance. In accomplishing this, some circumspection is required; for if allowed to acquire too high a temperature, the mass becomes what is commonly termed fire-fanged, or sometimes even catches fire; in either case, only the inorganic constituents remain. I may here remark that this circumstance of firefanging is conclusive evidence against the truth of the theory, that we have *only* to place upon our fields the inorganic constituent of the crops which we draw from them, in order to produce perpetual fertility; otherwise firefanging our dung-heaps would be a benefit rather than an injury; but all practical farmers know that the contrary is the case. The opposite circumstance, the non-production of sufficient heat, is attended with the disadvantage of leaving the straw in a tough state, so as not to be easily workable.

I shall only at present briefly notice what appears to be the general opinion—it is borne out by the authority of the most able writers, and which perfectly agrees with my own experience—viz., that in the preparation of the manure-heap, too great care cannot be taken to most intimately mix together the produce of stables, cattle-sheds, sties, &c., as this mixture is always found to produce that slow but perfect fermentation most advantageous to the objects of the farmer. This might well be expected, as horse manure is well known to be prone, especially in hot weather, to become exceedingly hot, and frequently, if particular care is not taken, firefanged; whilst the dung from the the cattle-sheds, on the contrary, is noted as being *cold;* in other words, not prone to ferment. I strongly suspect that the reason of this difference arises from the circumstance that the fluid and solid excrements of the horse contain a much larger amount of nitrogenous compounds than those of

* This might be supposed to indicate the presence of chlorine, which probably does exist in minute proportion; but, as I have already shown in my article on lime, when a solution of lead is poured into a solution of humate of potash, a copious precipitate is yielded, leaving a colourless solution, although no chlorine be present.—T. R.

horned cattle, and from their more complex composition, give rise to a more rapid and intense decomposition. Although the volatile alkali (ammonia) abounds more in the excrements of the horse, the mineral and vegetable alkalies (soda and potash) are found in greater abundance in those of horned cattle. I wish this circumstance to be remembered, as it is of some importance to the consideration of the subject. I quite agree with Dr. Davy that sheds are indispensable for the due preparation of farm-yard manure, as they would be the means of keeping off the intense heats of summer and the rains of all parts of the year. It cannot be a matter of slight consequence that the surface of a dung-heap should be kept at 90° in the shade, or 120° in the sun for days together; and, with respect to rain, I think I shall clearly shew that every drop which falls, and afterwards exudes from a dung-heap, robs it of some of its fertilizing ingredients. Experiments made by myself shew clearly that the first oozings from a dung-heap contain the largest amount of its inorganic constituents and the greatest quantity of ammonia. I allude to the liquid running from a heap in its fresh and unfermented state. I may, however, remark that a considerable portion of the salts appear always in this state to be in the state of carbonates, as, on the introduction of a little acid, a tolerably copious disengagement of gas takes place, which I have no doubt, though I did not test it for the purpose, is the carbonic acid gas. The same liquid allowed to stand a few days ceased to effervesce, and sulphuretted hydrogen was evolved pretty freely, evincing that the decomposition of the sulphates was taking place. Lime-water and the salts of lime only slightly discoloured it, precipitating a small amount of dirty-coloured sediment. The drainings from a manure-heap, especially if it consists wholly or principally of horse dung, when fermented for a few days, and collected after a shower of rain, possess a dark brown appearance, similar to that described by Dr. Davy, and if allowed some time to settle, will become tolerably and sometimes perfectly clear; when such is the case, and it takes place in the *course* of the fermentation of *all* manure-heaps, it is an indication that, in the process of decay, humic acid has been formed, which, combining with the ammonia or fixed alkalies, exude in the state of brown-coloured humates. I may venture to affirm that one-third of the value of our manure-heaps is lost in this manner. If we investigate the phenomenon attendant on the fermentation of a manure-heap, we will find that humic acid must be produced during the decay of woody fibre, with the simultaneous formation of carbonic acid and water, and the disengagement of the mineral alkalies, which immediately combine with the humic acid, forming humates. The latter, being exceedingly soluble, are carried off by the first shower of rain which falls. As this process is being continually repeated, it follows, as a matter of course, that the greater portion of the most valuable parts of the manure-heap is entirely lost to the farmer. It may be said, if such is the case, a manure-heap so exposed to the weather must, during the course of a winter's rain, be robbed of the whole of its most valuable contents. Such would undoubtedly be the fact were it not for one counteracting circumstance, viz., the insoluble humates; and some combinations of carbon with hydrogen and oxygen,* which do not combine with alkalies to form soluble salts, have the property of retaining a greater portion of other salts and various gases.† Were it not for this circumstance, our manure-heaps, as ordinarily prepared, would become destitute of all their fertilizing ingredients, with the exception of the almost insoluble phosphates of lime, magnesia, and the sulphate of lime. It is quite true that the fermentation of manure-heaps cannot proceed without the aid of moisture, but ordinary formed farm-yard manure contains sufficient moisture of itself, when taken out of the offices, adequate to the fermentation which is desirable, provided it is not so exposed to the action of the sun and atmosphere as to cause too great an evaporation. A shed would remedy this evil. Moisture is, however, not the only circumstance required to the due fermentation of a manure-heap: oxygen must also be present, which can only be derived from the atmosphere. If a manure-heap were surrounded by an atmosphere of carbonic acid gas, no fermentation would take place whatever degree of moisture was present, oxygen being equally important with moisture and heat. It follows that, if we can devise any means of limiting the admission of the atmosphere, we shall in some degree obtain a control over the fermentation of the heap; and the evil arising from the presence of humic acid, which is *certain to be formed*, can easily be remedied. The fermentation of manure-heaps depending upon the presence of heat, moisture, and the atmosphere, the skilful farmer will avail himself of the means in his power to promote or retard fermentation, by dispensing with, or admitting, one or other of these agents as the case may require. This can be done in several ways, to enumerate and explain which would, however, require more space than the compass of this paper will admit. I shall therefore confine my remarks to some general rules, and to modes of proceeding which will fall within the capacity of the humblest cottager.

The free admission of the atmosphere is one of the principal causes of excess of fermentation, and Boussingault, although he does not state this to be the *cause*, admits that "it is of much importance that the heap be pretty solid, in order to prevent too great a rise of temperature, and too rapid a fermentation, which is always injurious. At Buhelbronn, our dung-heap is so firmly trodden down in the course of its accumulation, by the feet of the workmen, that a loaded waggon drawn by four horses can be taken across it without very great difficulty." Notwithstanding what has just been stated, many able writers on this matter have asserted that tramping down manure is injurious. It is obvious that each party is right according to circumstances. If

* Frequently called coal of humus, but the prime constituent of which I cannot determine at present. It is certainly insoluble in acids and alkalies.

† I am strongly induced to believe that the humate of lime has the property of retaining many volumes of gases, and a great proportion of the various salts.

a manure-heap is required for almost immediate use, nothing is more certain than that a free admission of the atmosphere is necessary, in order to promote free and rapid fermentation; but this is done at the expense of a considerable escape of its volatile contents. On the other hand, if intended to lie for some months (as is frequently the case), pressure and consequent absence of a great portion of atmospheric air is advantageous, fermentation being by this means retarded, and generally proceeds more equally throughout the mass.

It is a matter of considerable importance to the farmer, at some periods of the year, that he should have the means of preparing his fresh into well fermented manure. In all cases, I most strenuously advocate that moisture of every description should be kept from a manure-heap, with the exception of the drainings of the offices, which ought to be conveyed to the heap or pit by tunnels (there are tiles manufactured for the purpose), and no water should be permitted to enter, unless it be thrown on for some special purpose by the proprietor. By restricting the admission of the air, we have a direct command over the fermentation of the manure-heap, and this can only be accomplished by placing the manure in pits. If they have a rough covering, so much the better. The usual shape of a manure-heap is that of a cube or parallelopipedon, each being a figure of six sides, five of which are exposed to the influence of the atmosphere, the bottom only not being surrounded by it. By the use of pits we shall completely reverse this order, one side (the top) only being exposed to the atmosphere, and that also the side, from the altered circumstances of the heap, by which the atmosphere will have the greatest difficulty in penetrating. In fact, from the absence of draught, fresh volumes of the atmosphere will only penetrate by means of pressure—in other words, to fill up the vacuum caused by the formation of carbonic acid and water, instead of, as according to the ordinary practice, freely permeating the whole mass, and by this means causing the disengagement of additional caloric, which reacting on the mass, a more rapid fermentation ensues, and fire-fanging is the frequent consequence.

The mode in which manure-heaps are usually formed is that exactly the best adapted to dissipate its most fertilizing contents—the soluble, but non-volatile, contents being carried away through the effects of rain, whilst a tolerably free draught of air exists throughout the mass, as the atmosphere undoubtedly penetrates it through the sides, in consequence of the slight superior pressure there, and also through the circumstance that the carbonic acid, water, &c., invariably escaping through the top, causes an ascending current unfavourable to the admission of the atmosphere at the top, but decidedly favourable to a current passing in through the sides, thus causing a draught constantly going forward from the sides through the top, or precisely that mode most favourable for the dissipation of its valuable volatile contents; whereas, if we place the manure in pits, all access of air is prevented, except such as will be required by the formation of the vacuum previously described. I never carried the plan I now propose into execution, having followed the usual course; but I have observed in this town (Liverpool), where, on account of the high price of land, the greatest economy of superficial space is required in forming the manure-heaps of the large horse and cattle proprietors, the general practice is to form a square pit about ten or eleven feet deep, to deposit the manure in, of exactly that form which will contain the largest superficies with the smallest circumference. No form could be desired better for the purpose of containing the greatest bulk in the smallest compass, and at the same time presenting so small a surface for escape of the caloric evolved during fermentation; yet an instance of fire-fanging is never known *in these pits*. It sometimes, however, happens that, from the absence of a demand for manure, or other causes, these pits become filled above the top,* sometimes to the height of eight or ten feet. On such occasions I have ascertained that it is sometimes requisite to obtain an immediate removal of the upper portion, or turn it over at considerable trouble, in order to prevent firing. It is worthy of particular observation also, that where the manure is heaped up above the level of the pits, and consequently one or more sides are exposed to the influence of the atmosphere; in such cases, the manure so accumulated never has the same appearance as old fermented manure. This cannot be owing to the shorter period that has elapsed from the formation of the superior portion exposed to the atmosphere, as I have been careful to observe and mark the time requisite to produce the certain appearance of well-fermented manure placed in pits, and such as are raised above them, and more subject to the influence of the atmosphere.

The best formed manure, in the shortest period, that I ever witnessed, was that of the pit belonging to an extensive cart proprietor. In the stable I now allude to there were usually about thirty horses; the pit was formed in the yard, and covered over by thick planks, part of which was covered with earth, and paved; only a few boards remaining loose for the convenience of removing the manure, with a trap for the purpose of putting the manure into the pit: the yard was roofed in, so that no extraneous moisture could be admitted. So circumstanced, I ascertained that, in summer, the whole of this mass, except the accumulations of the last few days, was converted into a well-fermented workable state in the course of ten days to a fortnight; in winter it took about three weeks to accomplish the same. It might be supposed, from the above description, that serious annoyance would be felt at the escape of ammonia, and that a most extraordinary heat would be generated; but such was not the case. I have been present when a pit so circumstanced was being removed, but the heat was not near so intense as that which is frequently observed in ordinary farm-yard dung-heaps; but, unlike the latter, it

* They are generally walled, the walls raised about three feet above the level of the yard, and usually placed in some corner, or other place the least incommodious. In some places, however, the whole yard is excavated and boarded over; it was in one of the latter places that I saw the best fermented manure I ever witnessed.

was not entirely confined to the centre, whilst the sides were comparatively cool, but it pervaded the whole mass in an equal degree; no perceptible smell of ammonia was perceived, but a very copious amount of aqueous vapour was evolved in the course of its removal; so much so, that you could not, at times, see the workmen in the pit who were in the act of removing the manure. These facts are strongly confirmatory of the correctness of my opinion that the mismanagement of the fermentation of our manure-heaps arises from the unlimited access of the atmosphere, and strikingly illustrate the advantages to be derived by casting the exuvia, &c., of farm offices into pits, instead of throwing it into heaps in the ordinary manner. Another advantage to be derived by using pits is, that, in winter, the caloric arising from the fermentation of the heap would not be dissipated so speedily as it is under the present system, when surrounded by a cold, perhaps frosty, atmosphere. It is so well known that manure-heaps formed in winter do not ferment equally, or scarcely at all, that it has given rise to the axiom that one load of manure formed in summer is worth two formed in winter. I need not enter into any details as to the mode of forming such pits; every sensible farmer, if convinced of the correctness of the theory, will easily select the fittest place, and invent the best mode, under his own peculiar circumstances, for constructing them. As a general rule, they ought to be impervious; if the soil will permit it, so much the better; if not, they ought to be made so. A rough covering would be an improvement, for the reasons previously stated. Pits formed in the manner described would convert the average mixture of horse and cattle manure into excellent fermented manure in the course of three weeks or a month in summer, and in winter in the course of six or eight weeks—advantages which must be most palpable to every scientific farmer; and this will be accomplished without any loss worth mentioning of its volatile fertilizing contents.

The careful farmer will always be mindful that every matter which can be collected about his farm, such as weeds, twitch, or squitch, &c., are collected and added to his manure-heap. Such will find that the mode proposed has decided advantages over the ordinary method; whilst on this subject, I may remark that, a few years ago, whilst fallowing a field overrun with weeds, twitch, &c., I had the weeds, after being well harrowed, carted to the yard, and placed between two layers of fresh horse manure. As it was my intention to apply the whole as manure to potatoes, I thought it would be advantageous to throw a little nitrate of soda on the weeds, &c. This was done, and a strong fermentation took place, and the whole of the weeds were converted, within ten days, into a rich black mass. All of the work people attributed this to the saltpetre, as they called it, being used. I am inclined to think that the heat generated by the horse manure caused the weeds rapidly to decompose; and as matters in a state of decay have the property of absorbing oxygen from all other matters with which they come in contact, it is probable that a portion of the nitric acid of the nitrate of soda was decomposed. A very heavy shower of rain fell between the time of mixing the weeds, &c., and the period of removing them to the fields, and I never remarked such a quantity of deep-coloured fluid to exude from so small a mass of manure, evincing that a great quantity of humic acid was formed, which was probably combined with the soda of the nitrate and ammonia of the decomposed horse manure, and not improbably ammonia formed by the decomposition of the nitric acid. I now merely state the facts as I observed them, and shall be happy if they can in any way be serviceable to others; this much is quite certain, the weeds were speedily converted into an apparantly good manure, the value of which I did not attempt to determine at the time, and I have not since repeated the experiment. On a large farm, in some years, no inconsiderable amount of dead animals are inconsiderately thrown aside or given to the dogs, which, if cut into pieces, and placed in pits such as described, would form a valuable addition to our manure-heaps; and, from observation, I am convinced that, if so placed, would occasion much less annoyance than is felt by their putrefying in the open air. However we may cause the manure of our farms to be prepared, under all circumstances a large amount of humic acid will be formed. I will not now enter into a disquisition as to the reason how the humic acid—which forms a soluble salt with several of the alkalies—becomes, in the course of a lengthened fermentation, converted into a black substance, insoluble in either alkalies or acids. The result of my observations amount to this, that in heaps as usually formed, with free access of the atmosphere, a larger amount of humic acid soluble in alkalies is formed, than when the manure is placed in pits, and access of the atmosphere is limited. In the latter case, some humic acid is formed; in both cases the humic acid is in the same state as that which is found in barren peat mosses, as I have determined by repeated experiments. As I have shewn in my article on lime, humic acid has a strong affinity to combine with the alkalies, potash, soda, and ammonia, which combination in manure-heaps forms the brown-coloured solution which is observed running from them after rain. It is perfectly obvious, therefore, that every drop of this brown-coloured liquid which oozes from a manure-heap contains in combination one or other of the above-named alkalies, two of which—potash and ammonia—are of so much importance as fertilizers. The mode I have suggested—viz., placing the manure in pits—may be said to remedy this evil, as, at all events, it will prevent the liquid from running away. It is of no importance, however, preserving the liquid of manure-heaps in the state described, as I have repeatedly found that no beneficial effects are derived from the use of it. Lime and its salts, however, have the property of combining the former with humic acid, and setting the previously combined alkali free; the latter, by double decomposition, forms insoluble humate of lime, and the soluble muriate or sulphate of the alkali, as the case may be. Lime-water, or milk of lime, if poured on a fermenting heap of manure, will combine with the humic acid; but there are two circumstances which prevent this operation being so perfectly beneficial to the farmer as it might be supposed: in the first place, the lime is apt to combine with the carbonic acid gas evolved during the fermentation of the heap, and form the carbonate which is insoluble, and only slightly so where an excess of carbonic acid is present. This condition is found in fermenting manure; but as it is so sparingly so—viz., one part of bicarbonate of lime in 1,500 parts of water—its beneficial action in neutralizing the injurious action of humic acid is much deteriorated. Were, however, the power of lime-water to destroy the obnoxious effects of free humic acid in dung-heaps as complete as though no carbonic acid was present to retard its influence, another cause operates to prevent the remedy being so desirable as it otherwise might be; when humic acid, combined with ammonia, is decomposed by lime, ammonia is immediately set free, which is speedily converted into the carbonate. Both of these being volatile substances, there is danger of this important nitrogenous matter being dissipated by evaporation. In experiments made with humate of ammonia decomposed by lime-water, I have not discovered the well-known smell of ammonia; which I attribute to the fact that humate of lime has the power of absorbing ammonia in a remarkable degree.

I state these circumstances now by way of caution. It occurred to me that dissolved bones in muriatic acid would be the fittest mode of counteracting the injurious effects arising from the presence of free humic acid, or the soluble humates which exist *in all* manure-heaps. I found, however, one counteracting circumstance, viz., that the mixture was extremely apt to gelatinize. If, therefore, an economical mode could be discovered (and I see no difficulty in the way) of extracting the fat and gelatine from bones previously to mixing them with muriatic acid, and also converting the gelatine to a profitable use,* this would be the best mode of fixing ammonia and rendering humic acid innoxious.

Experiments made with special manures seem to prove that the sulphate of ammonia has greater fertilizing qualities than the muriate; and gypsum might be deemed for this service more economical and serviceable; but gypsum is very insoluble, and when placed in contact with a soluble humate, becomes immediately surrounded with a thin circumference of humate of lime, which prevents all further action. I therefore recommend on all occasions to use the muriate of lime, or bones dissolved in muriatic acid. Whenever we wish to neutralize the effect of humic acid, the latter would be preferable to any other substance were its gelatinizing effects preventible; and I think this may be accomplished. Free sulphuric acid and muriatic acid have each been recommended to fix the ammonia in manures; but in either case a quantity of humic acid is always set free, which prevents, when it is placed on the field, the beneficial effects which would otherwise be derived from the ammonia which descends from the atmosphere in rain. Sulphate of iron has also been recommended, and I am inclined to think that a portion, when gypsum or other sulphates cannot be obtained in sufficient quantity, would act very beneficially. The iron of the sulphate of iron undoubtedly forms an insoluble humate of iron, as I have repeatedly seen.

By some or more of the preceding methods we are enabled to prevent the escape of the whole of the volatile and fixed salts which form the most valuable components of our manure-heaps — by keeping the same in pits we prevent the excess of moisture, which frequently contains the richest ingredients (though not in a state adapted to promote the growth of plants) from escaping.

When cattle are fed on green food, a considerable quantity of urine is voided by them, which it is of much importance to the farmer should not be wasted. Urine, on the average, contains 95 per cent. of water, but the remaining 5 per cent. contains more nitrogen than 100 parts of ordinary farm-yard manure, the remainder consisting of the phosphates and sulphates of lime, magnesia, potash, and soda. I have recommended, in a previous part of this paper, that *all* the urine from the offices should be conveyed to the dung-pits through tunnels, and no extra moisture should be admitted where cattle fed on green food greatly preponderate in proportional numbers. In house and other fed cattle, it is probable that so large a quantity of moisture being present in the pit will have an injurious tendency. When such is the case, it would be easy to sink a small tank or well adjacent to the dung-pit, and connected by a tunnel, the tank of course being somewhat below the level of the bottom of the dung-pit. In this mode the liquid may be allowed to putrefy, in which state it is always found more efficacious, and would, at the same time, serve to moisten the dung-pit, if such should at any time be deemed necessary. Were dissolved bones used, as I have previously described, to neutralize the humic acid and humates, it could not fail to render the liquid oozing from such pits most valuable. These are merely suggestions thrown out for practical persons to avail themselves of; for, if such are convinced of the correctness of the general principle, they will easily, with only a slight exercise of ingenuity, devise means of carrying out the plan in a practical manner.

To those who have not the conveniences for collecting or distributing liquid manures, I beg leave to offer the following suggestions:—Whenever peat earth is available, let a quantity of this be made into compost with lime, about twenty loads of peat to one of lime, and throw this compost into the bottom of the pits until it is about one or two feet thick, as may be thought most judicious; in the absence of peat, ditch scrapings might be used. In the agriculture of this county, liquid manure is best applied to grass lands, or young corn, immediately after it has been rolled, and ought, if possible, to be applied in dropping or dull weather. In conclusion, I may observe that I cordially agree with C. W. Johnson, Esq., that "the watery matters, to which in England the name of liquid manures is very often erroneously applied, consist of hardly anything else but a little discoloured water." The remark is true, and is doubtless the

* Gelatine is used for calico manufacture, and is an excellent glue; but I know of no method which has been described which would, economically to the farmer, make this available, or of easy transport.

reason why liquid manures have so little reputation in this country.

I cannot conclude this paper without adverting to the fact that no writer has ever investigated the reasons why, under certain circumstances, humic acid is formed, as in peat mosses, whilst on fertile lands, which yield considerably greater amounts of vegetable matters on equal spaces annually, vegetable matter or humic acid does not accumulate. Whilst investigating the action of alkalies with humic acid, I was rather struck with some changes that took place, which I think will throw some light on the subject, and which I intended to reserve for an article on the formation of soils.

A paragraph has gone the round of the papers, to the effect that Liebig has discovered a mineral substance which, mixed with guano, will produce the most surprising fertility; and it states farther, that a company has been formed, with upwards of £100,000 capital, to carry the invention into effect. I know of no mineral, in the present state of chemical knowledge, which is likely to produce such powerful effects as described, unless it be one containing potash in abundance. Fuch has stated that he has obtained as much as 18 or 20 per cent. of potash from the potash felspars. If some of the felspars, which are much mixed with pyrites and pyritous shales, were burned, and then slaked, very probably decomposition might take place — sulphate of potash, potash, and oxide of iron being produced. The shales of our coal measures are said to contain considerable quantities of potash. Free potash, or its carbonate, applied to a dung-pit, formed as I have stated, and the humic acid of which should be neutralized by the use of bones dissolved in muriatic acid, would produce fertilizing effects in the most surprising degree. It is the constant waste of the potash from our fields that they to so great a degree owe their exhausted nature. I should feel obliged if any one of the readers of this journal could conveniently forward me a few specimens of felspathic potash minerals from places where these are produced in abundance. If an economical mode could be discovered of extracting the potash, or converting these minerals into such compounds as might be available to the farmer, it would be one of the greatest boons that could be conferred on the British agriculturist.*

Since the preceding remarks were forwarded for publication, a small pamphlet has been published by Messrs. Muspratt and Co., of Liverpool, entitled "An Address to the Agriculturists of Great Britain, explaining the Principles and Use of his Artificial Manure; by Professor Justus Liebig." In Muspratt and Co.'s preface to the aboved-named pamphlet it is stated—"This emiment chemist, whose name is attached to the succeeding address, has discovered certain compounds, &c., which are of such a nature, that different states of moisture in the atmosphere, or different localities, will not diminish their efficacy." In Liebig's pamphlet it is stated—"I have found means to give to every *soluble ingredient* of manure, by its combinations with others, any degree of solubility without altering its effect on vegetation. I give, for instance, the alkalies in such a state as not to be more soluble than gypsum." "The mixture of the manures has been adapted to the mean quantity of rain in this country. The manure which is used in summer *has* a greater degree of solubility than that used in winter."

On a subject which I have both privately and publicly endeavoured to impress the importance on the agricultural interest, viz., the economy of matters containing potash, he (Liebig) states—"During my excursions in England, I have repeatedly directed the attention of the agriculturists, as Messrs Pusey and Miles will perhaps recollect, to the necessity of supplying the alkalies, and not merely the phosphates," &c. On this point he judiciously observes—taking the importation of bones for the last ten years at 1,000,000 of tons, in which phosphoric acid is supplied in sufficient quantity for 25,000,000 tons of wheat—to have increased the fertility of the fields in the right proportion, 800,000 tons of potash ought to have been added to the 1,000,000 of tons of bones in a suitable form. No new principle appears to be developed in the pamphlet, except it be that of rendering the alkaline carbonates to a certain extent insoluble. I have previously stated my suspicion that it is probable some of the insoluble humates tend in some degree to render the soluble alkaline carbonates insoluble. Whatever the principles may be (and they are stated to be secured by patent), it is evident, from the pamphlet alluded to, that such principles can be applied to the prevention of the enormous waste of potash and ammonia which annually takes place from our ordinary formed manure-heaps. For a supply of potash allusion is made in the pamphlet to the felspathic minerals.

The writer of this conceives that the main features of this patent manure consist in judicious combinations of the principles set forth in this paper and in his previous one on lime.

* To enable any of our readers to meet this request, we may mention that Mr. Rowlandson's address is—No. 59, St. Anne's-street, Liverpool.—EDITOR.

AIR CHURN.—The Bishop of Derry has invented an atmospheric churn. Instead of the present unscientific mode of making butter by churning, his Lordship accomplishes this measure by the singular manner of forcing a full current of atmospheric air through the cream, by means of an exceedingly well devised forcing-pump. The air passes through a glass tube connected with the air-pump, descending nearly to the bottom of the churn. The churn is of tin, and it fits into another tin cylinder provided with a funnel and stop-cock, so as to heat the cream to the necessary temperature. The pump is worked by means of a winch, which is not so laborious as the usual churn. Independently of the happy application of science to this important department of domestic economy, in a practical point of view, it is extremely valuable. The milk is not moved by a dasher, as in the common churn: but the oxygen of the atmosphere is brought into close contact with the cream, so as to effect a full combination of the butyraceous part, and to convert it all into butter. On one occasion the churning was carried on for the space of one hour and forty-five minntes, and eleven gallons of cream produced twenty-six pounds of butter.

EXPERIMENTS ON THICK AND THIN SOWING.—ON THE BEST METHOD OF FEEDING SHEEP.—ON THE POTATO CROP.

TO THE EDITOR OF THE MARK LANE EXPRESS.

SIR,—Believing it to be the duty of every man to contribute to the common stock of information whatever his experience may have placed in his power deemed to be of importance, or his position in society has enabled him to collect from the experience of others, I request the insertion in your useful paper, of the following articles on subjects of stirring import at this time, hoping they may be received by your readers in the same spirit and feeling as they have been communicated to, and are now contributed by me, and then, I am sure, great good will result every way.

The subjects which I propose bringing under the notice of your readers are—

Experiments on thick and thin sowing, by broadcast, drilling, and dibbling.

On the best method of feeding the largest number of sheep in the shortest time, and at the least expense, taking into the account the value of the manure, and of the succeeding cereal crops.

On the potato crop; the causes of failure to so large an extent in the present year, with suggestions towards preventing a recurrence of the evil.

EXPERIMENTS ON THICK AND THIN SOWING,

Communicated by a member of the Society of Friends, residing in Essex :—

" I remember that last year thou took an interest in some experiments I made to ascertain the produce of wheat from different quantities of seed. I believe I told thee that I intended to pursue the matter a little further: I have done so; and now enclose thee a statement of the result, thinking thou mayest wish to see it. I was quite convinced, from the issue of last year's trial, that the smaller quantity of seed then used (viz., four pecks per acre) was insufficient, and therefore did not try that quantity again, but limited myself to a comparison of the produce between six, seven, and eight pecks of seed per acre. A perusal of the accompanying statement will show a similar result to that of last year, viz., that the greater quantity of seed produced the largest amount of corn, and that the produce decreased in a larger proportion as the quantity of seed was lessened. Thus—

	qrs.	bush.	pks.	qts.
No. 3. Having eight pecks of seed to the acre, produced	2	2	3	5¾
No. 4. Having seven pecks of seed to the acre, produced	2	2	1	5½
Difference	0	0	2	0¼
Equal to one bush. per acre.				
No. 4. Having seven pecks of seed to the acre, produced	2	2	1	5½
No. 5. Having six pecks of seed to the acre, produced	2	1	2	0¾
Difference	0	0	3	4¾
Equal to 1 bush. 3 pks. 1½ qt. per acre.				

" I consider the autumn of 1844 was a very favourable one for the planting of wheat, I might say unusually so for the description of heavy stiff land which I farm; and, therefore, the trial was made under circumstances propitious to a small quantity of seed; and I, accordingly, sowed less by one peck per acre than I generally do: the working out of the above results is, therefore, such as satisfies me that less than eight pecks should not be sown. I, however, by no means intend to say that a greater quantity may not often be beneficial; I have long entertained the opinion that different soils and different seasons require a difference in the quantity of seed. I think to follow this matter no further, but will just add that, having just before harvest had an opportunity of looking over the crops of J. J. Mechi, who, perhaps thou art aware, has obtained some notoriety by his agricultural projects at Tiptree Hall, I there saw specimens of thin sowing, viz., four pecks to the acre, side by side with eight pecks to the acre. A large party of agriculturists who were present were unanimous in estimating the thin sown as far below that which had a more liberal quantity of seed.

" From the accompanying paper thou wilt see that I took the opportunity also of making a comparison between the produce of wheat sown by hand or broadcast, and that sown by the drill; the quantities of land as well as of seed being equal, the result shows in favour of the former as compared with drilling in rows six inches apart, but against it as compared with drilling in rows nine inches apart. The difference of produce between Nos. 2 and 3 has surprised me, having previously held an opinion that the plants could not be too equally distributed over the surface; and, therefore, that smaller intervals between the rows was best. With the view of trying if this was occasioned by any accidental circumstances, I propose to repeat the experiments of Nos. 1, 2, and 3.

" If thou thinkest the statement at all likely to interest any of thy friends, I wish thee to use thy liberty in showing it.

" Account of Produce from equal Quantities of Land (about half an acre) sown with different Quantities of Wheat, or in different Manners.

	qrs.	bush.	pks.	qts.
No. 1.—Sown broadcast, at the rate of eight pecks per acre.				
Wheat, best	2	1	2	7
tail	0	0	2	5
Total	2	2	1	4
No. 2.—Drilled in rows, six inches apart, at eight pecks per acre.				
Wheat, best	2	1	2	0½
tail	0	0	2	4¾
Total	2	2	0	5
No. 3.—Drilled in rows nine inches apart, at eight pecks per acre.				
Wheat, best	2	2	0	7¼
tail	0	0	2	6½
Total	2	2	3	5¾
No. 4.—Drilled in rows nine inches apart, at seven pecks per acre.				
Wheat, best	2	1	3	0¼
tail	0	0	2	5¼
Total	2	2	1	5½
No. 5.—Drilled in rows nine inches apart, at six pecks per acre.				
Wheat, best	2	0	2	4¼
tail	0	0	3	4½
Total	2	1	2	0¾"

" N.B.—The comparison between Nos. 1 and 2 is in favour of broadcast sowing over the narrow drilling.

Between 1 and 2 is in favour of wide drilling over the broadcast.
2 and 3 is in favour of that drilled at greater distance.
3, 4, and 5 is in favour of the greatest quantity of seed.

"That dibbling should be preferable to drilling experience has long shown, could the difficulty be overcome of irregularity in the quantity of grains deposited; whoever shall discover an instrument that will produce that regularity will be a benefactor to his country, and would no doubt be well rewarded by the Royal Agricultural Society, as at least two pecks per acre of seed might be saved with benefit to the crop."

On the Best Method of Feeding Sheep, Communicated by a first-rate farmer resident in Buckinghamshire:—

"I last year folded 400 sheep upon turnips, part Swedes, part Norfolks, and part Tancreds, the crop, averaging about 20 tons per acre. To each sheep I gave daily half a pint of tick (horse) beans and half a pound of oilcake (English). The sheep did well. I never lost so few before. The binding quality of the beans seemed to be neutralized by the aperient quality of the cake. The sheep got fat surprisingly fast, and the return greater than I had ever before experienced. I sowed the same land this year with barley, and although a thin, rather hungry soil, my crop averages six quarters per acre of prime quality. The land is what is considered 18s. per acre land, incapable of any other improvement than is attainable by manure and judicious cropping. On the same land in former courses, giving the sheep corn only, I sometimes lost from two to four in a score. The manure from the keep was comparatively poor, and the succeeding crop of barley seldom exceeded three quarters and a half to the acre; my sheep being also of less value by several shillings a head than they are this year, after allowing for the difference in prices now and last year. In both cases my expences were nearly the same."

On the Potato Crop.

Having for several years had the management of a considerable number of field-gardens in this parish, let to the labouring classes, and potatoes being cultivated in this and the adjoining parishes extensively for sale, my attention has been drawn to the mode of growing and preserving them for use in the winter season, and lately, more especially so, from the unusual degree of injury which the crop has suffered from the cold wet weather experienced at the early part of the season, and the extreme cold of the last week of July and early part of August; to which circumstances alone I attribute the present defective state of the crop of some kinds of potatoes, that is, the older kinds, as Goldfinders, Shaws, Champions, and others; whilst the seedling kinds have, comparatively, received but little injury.

It is, I conceive, with potatoes as with some of the fruits, such as the golden pippen, styer, &c., and the breeding in and in of animals, as well of the two-legged as of the four-legged kinds; that each succeeding generation becomes weaker and weaker, and are more subject to disease than those resulting from good seed and good crosses. The crops, and fruits, and animals have stronger constitutions, and are capable of resisting attacks of disease which poverty of blood from the causes referred to never fails to engender: hence every encouragement should be given to the raising of potatoes from seed, rather than from worn out tubers; and hence I am of opinion, that the Royal Agricultural Society would do well to offer premiums for the best seedling potatoes to be exhibited at their country shows in succeeding years.

The proximate cause of the disease this year was, I conceive, the pulpy state of the tubers and of the haulm, caused by the wet season and the cold, bordering upon, if not actual frost, at the end of July. By checking the free flow of the sap juices to the tubers, the haulm became black, and died away; and the tubers, having been deprived of their necessary food to ensure the requisite degree of perfection, became subject to disease; and in proportion as the constitutional strength prevailed, in a greater or less degree was the degree of destruction that ensued.

Various modes have been suggested for the preservation of what remains: the housing of the tolerably sound ones as dry as possible, and sprinkling them over with plaster of Paris (gypsum), in the proportion of half a peck to a sack of potatoes, placed in layers, is the safest way, The gypsum absorbs the ammonia of the diseased parts, improves the atmosphere around the potatoes, and hence prevents the possibility of fever among those engaged in sorting and occasionally turning of them, which should not be neglected whilst the weather continues open. There is this further advantage, that, if the gypsum so used be strewed over the sets before planting next year, it will stop their weeping, and materially aid in producing a more abundant crop. I know that to be so, from experience; my own crops last year having been so managed were abundant, and of excellent quality.

It is desirable also that larger quantities should not be purchased at any one time by the wealthy than will serve their respective families for a month or so; there would then be a supply for the poor always in the market, at moderate prices. Nor should societies buy up largely to give away: it is always better to risk an increase of price rather than, by buying largely, produce the evil which such large purchases are intended to prevent. The securing of potatoes to plant in the ensuing year is another point of great importance to be attended to. Seedling potatoes should, if possible, be procured, and the land that has been planted this year should, on no account, be planted with potatoes in the next year; but, whatever crops may be planted upon that land, gypsum should form a considerable item in the compost or manure. James Dean.

Tottenham, Nov. 8.

[The originals, of which the above are copies, were laid before the Council of the Royal Agricultural Society of England on Wednesday, Nov. 5.]

IMPORTANT TO LEASEHOLDERS.—By a decision of the Court of Queen's Bench, in the case of Doe Muston *v.* Gladstone, reported in the *Jurist* of the 25th of June, 1845, it is apprehended that about 80 out of every 100 of the leases throughout the United Kingdom may be declared legally void; and the unhappy persons who have laid out their money on the lands of others, may be disinherited at the free will and pleasure of the ground landlords. This is another of the late Lord Egremont's cases of such notoriety, and clearly points out the gross and iniquitous manner in which the judges (with the law as it is) are *necessitated* to administer the laws of one of the greatest kingdoms of the earth. Leaseholders should take care that their *covenants* to *insure in the joint names of themselves and their landlords are complied with*, or they may ousted, as in the above cited case, at the pleasure of their landlords—*Western Times.*

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

The Council resumed their sittings at the house of the Society in Hanover-square, on Wednesday, the 5th of November; present, the Right Hon. Lord Portman, President, in the chair; T. Alcock, Esq.; Col. Austen, M.P.; T. R. Barker, Esq.; S. Bennet, Esq.; H. Blanshard, Esq.; J. Browne, Esq.; W. R. Browne, Esq.; F. Burke, Esq.; Col. Challoner; F. C. Cherry, Esq.; J. W. Childers, Esq., M.P.; H. Gibbs, Esq.; B. T. B. Gibbs, Esq.; W. Fisher Hobbs, Esq.; J. Kinder, Esq.; Col. Le Couteur; P. Pusey, Esq., M.P.; J. A. Ransome, Esq.; Professor Sewell; J. V. Shelley, Esq.; G. Turner, Esq.; and T. Turner, Esq.

The Right Hon. Earl Spencer, of Harleston Park, Northampton, was elected a Governor; and the following gentlemen Members of the Society:—

Armytage, Colonel, Broomhill Bank, Tonbridge Wells
Finch, Col., the Hon. John, Berkhampstead, Herts.
Grey, Sir George, Bart., Hallowden, Northumberland
Hall, Benjamin Edward, Greville House, Paddington Green
Powell, William, Tickford Abbey, Newport-Pagnel
Thickens, Rev. William, Kersley House, Coventry.

The names of 24 candidates for election at the next meeting were then read.

Finances.—Mr. Raymond Barker, Chairman of the Finance Committee, presented to the Council the report of the state of the accounts of the Society at the end of the previous month; from which it appeared, that the funded property amounted to 8,200*l.* stock, and the current cash-balance in the hands of the bankers to 742*l.* This report, and that of the House Committee presented by Mr. Brown, Chairman, were respectively adopted by the Council.

Patent—Infringement.—Mr. Pusey, M.P., laid before the Council the report of the committee appointed in August last to take into consideration the protest of Mr. Etheredge in reference to infringements alleged by him to have been made on his own patent rights by several of the exhibitors of tile-machines at the Shrewsbury meeting. On the adoption of this report, the Council appointed the following committee to examine and report on the precautionary measures to be adopted in future in reference to such disputed points amongst the exhibitors whose implements may be selected by the judges for trial—namely, Mr. Pusey, M.P., Mr. Shelley, Mr. Ransome, Mr. H. Gibbs, and Col. Le Couteur, assisted by the legal advisers of the Society.

Trial of Implements.—Mr. B. T. B. Gibbs, director of the show at the Shrewsbury meeting, presented to the Council the following Report of the results of the subsequent trial of ploughs, drills, and tile machines, made at Pusey, in Berkshire, under the direction of the stewards and judges of that meeting, namely—

"We, being the judges appointed to decide upon the merits of the implements exhibited at the Royal Agricultural Society's show at Shrewsbury, the deferred trial of which implements has taken place at Mr. Pusey's, M.P., on the 23rd and 24th days of October, 1845, do adjudge as follows, viz.—

1. That the prize of 10 sovereigns for the plough best adapted for heavy land be withheld, in consequence of want of sufficient merit.
   (N.B. The plough which gained the prize at Southampton having been tried with those selected this year, was also found deficient on the heavy clay land upon which these trials were made).
2. That the prize of 10 sovs. for the plough best adapted to light land be adjudged to Stand No. 51, Article No. 1. [Mr. John Howard's "Patent Iron plough, with two wheels, invented and manufactured by Howard and Co., Bedford."]
   (N.B. The plough which gained the prize at Southampton having been tried with those elected this year, the one to which the prize is now awarded was found to be superior.)
3. That the prize of 15 sovereigns for the best drill for general purposes, &c., be adjudged to Stand No. 46, Article No. 6. [Mr. Richard Hornsby's "Ten-coulter Drill, for corn and general purposes; invented, improved, and manufactured by himself, at Spittlegate, near Grantham."]
   (N.B. The drill which gained the prize at Southampton having been tried with the above, was found deficient.
4. That the prize of 10 sovereigns for the best Turnip-drill on the flat, &c., be adjudged to Stand No. 46, Article No. 4. [Mr. Richard Hornsby's "Six-row Turnip-drill for flat work; invented, improved, and manufactured by himself, at Spittlegate near Grantham."]
5. That the prize of 10 sovereigns for the best Turnip-drill on the ridge, &c., be adjudged to Stand No. 46, Article No. 2. [Mr. Richard Hornsby's "Two-row Ridge Drill; invented, improved, and manufactured by himself, at Spittlegate, near Grantham."]
6. That the prize of 20 sovereigns for the best machine for making draining-tiles, &c., be adjudged to Stand No. 70, Article No. 1. [Mr. Thomas Scragg's "Machine for making Draining Tiles and Pipes for agricultural purposes; invented by Mr. Scragg, and manufactured by Mr. James Hewett, of Calveley, near Tarporley, Cheshire."]

"In conclusion, the judges beg to state that they are confirmed in the opinion they expressed in their award at Shrewsbury, viz., that their decision could have been formed as satisfactorily on the spot, without any deferred trial.

(Signed) THOMAS P. OUTHWAITE,
CHARLES BURNES,
WILLIAM HESELTINE,
ALBERT EDMONDS,
JOSIAH PARKES,
WILLIAM BENNETT,
WILLIAM SHAW, Jun."

This Report having been read and adopted, it was moved by Mr. H. Gibbs, and carried unanimously, "That the thanks of the Council be given to Mr. Pusey, M.P., for the great facilities he had so kindly afforded to the director, stewards, and judges, for carrying out the deferred trial of implements."

Judges.—On the motion of Mr. Shelley, the following Committee was appointed to consider the payment of expences and accommodation of the judges at the Annual Country Meetings of the Society, namely, Mr. Barker, Mr. Shelley, Mr. Bennett, Col. Challoner, Mr. Hobbs, and Mr. H. Gibbs.

Earl Spencer.—On the motion of Mr. Pusey, M.P., seconded by Mr. Shelley, the following resolutions were carried unanimously, namely:

"That this Council, deeply sensible of the great loss sustained by the Royal Agricultural Society of England, in the lamented death of John Charles Earl Spencer, feels it to be a duty to record its deep sense of his unvarying perseverance in promoting the establishment and advancement of the Society; its sincere estimation of his humility, combined with manliness, of his uniform candour and urbanity; and its cordial sympathy with his family on the visitation with which it has pleased Almighty God to afflict them.

"As a proof of our gratitude and respect towards our late colleague, we elect Frederick Earl Spencer to fill the vacancy in the number of the Trustees of the Royal Agricultural Society of England, caused by the event which we all so deeply deplore."

Mr. John Grey, of Dilston, Northumberland, was then duly elected a General Member of the Council, in the place of Earl Spencer, transferred to the list of Trustees.

Potato Disease.—The President having laid before the Council a correspondence on the potato disease, and having called attention to the proceedings in Scotland and Ireland on the same subject, it was resolved by the Council :—

1. That all papers now delivered, and all further information on that subject, should be referred to the Journal Committee; with a request tnat all information which can tend to assist in the preservation of seed for the next year's crop may be, from time to time, by them made known to the public.

2. That it is important to ascertain the commencement, cause, and progress of the disease; and the effect of the various plans that may be tried for the adaptation of the potato for food, for the preservation of seed, and especially to know the progress of the growth of the seed that may be planted for the next year's crop; and, therefore, that it is expedient to give the sum of 100*l.* (placed at the disposal of the Royal Agricultural Society of England by His Grace the Duke of Northumberland) in three prizes for Essays on the subject, namely :—

50*l.* for the best Essay on the Remedy for the Potato Disease; and on its Treatment in the various stages of its Planting, Growth, and Preservation.

20*l.* for the second best Essay on the same subject.

30*l.* for the best History of the Disease, at the present time, affecting the Potato; involving a condensed detail of Facts developed by Experiments.

3. That the Journal Committee be requested to frame the conditions of Prize Essays, to be read at the General Meeting of the Society, to be held next year at Newcastle-upon-Tyne.

4. That the Members of the Royal Agricultural Society of Englaad be requested to send to the Journal Committee from time to time a statement of such facts relative to the disease in potatoes as may come under their observation.

Mr. E. Tattersall, accompanied by Mr. H. Reece, submitted to the members present various specimens of potatoes, more or less diseased, on which the effects of chlorine gas had been tried; for which attention, the Council returned to those gentlemen their best thanks.

Notices of Motion.—1. Mr. Raymond Barker gave notice that at the Monthly Council in December, he should move :—

(1). "That the power of compounding as Life-Governors be reduced to the sum of 30*l.*, every governor having previously paid the sum of 5*l.* for his year of admission."

(2). "That henceforward the Prize-sheet for the Country Meeting be finally settled at the Monthly Council in December in each year, and forthwith printed and distributed as heretofore."

Mr. Humphrey Gibbs gave notice that he should move at the Monthly Council in December :—

(1). "That the Auctioneer or his Clerk shall be in attendance in an office in the Show-yard, from 10 o'clock A.M., until 4 o'clock P.M., on the Thursday of the Show week, for the purpose of receiving instructions from such exhibiters as may have properly entered Stock or Implements for sale at the auction."

(2.) "That the Auctioneer shall receive all the forfeit money for the withdrawal of stock or implements from the auction, and give the exhibiters the necessary countersigned order for the removal of such stock or implements from the yard."

(3.) "That the Auctioneer shall take charge of and sell the catalogues of the sale; and that he shall deliver over to the director for the Society's use the money arising from the forfeits and the sale of catalogues."

(4.) "That the Consulting-Engineer shall not act as one of the Judges of implements, but only act as mechanical referee, in case the judges may deem it necessary to call in his aid."

(5.) "That the Consulting-Engineer shall be in attendance in the yard, and during the trials, to examine the implements; and that he shall draw up specifications as far as practicable, of all implements to which a prize is given or award made, so as to enable the Judges to compare them with those exhibited on any future occasions."

Presents.—Among the numerous presents made to the Society during the recess, were the large original painting of "Sheep-shearing," by Singleton, R.A., from M. F. Tupper, Esq., on the part of the family of Martin Tupper, Esq., F.R.S.; and an engraved Portrait (framed in carved Oak) of Thomas Chapman, Esq., of Warwickshire.

Colonel Le Couteur favoured the Council with specimens of the result obtained in applying a solution of one-part of guano and eighteen of water to Grasses of inferior quality; and Mr. Thomas Alcock, with fine specimens of Peas, Turnips, and Hopetoun Oats, grown on his estate at Kingwood, in Surrey.

Smithfield Club.—Mr. B. T. B. Gibbs took that opportunity (as the date for entry would expire on the 15th inst.) of laying copies of the official prize sheet of the Club before such of the Members as intended to become exhibiters at the ensuing Show.

Numerous communications on various subjects were received by the Council, and referred to the Journal Committee. The Council ordered a further reprint of 3,000 copies of Mr. Main's tract on "Cottage Gardening," published in the Journal.—The Council then adjourned to Wednesday, the 3rd of December.

REPORT OF THE COMMISSION OF AGRICULTURE OF THE PROVINCE OF GRONINGEN ON THE DISEASE AFFECTING THE POTATO IN THE NETHERLANDS.

1. CAUSES AND NATURE OF THE DISEASE.

The Agricultural Commission is of opinion that the disease is not occasioned by any direct cause, but rather that various circumstances have combined to give the disease this year an extraordinary impulse, it being in the opinion of many scientific persons not a new scourge.

The primary cause may be attributed to the extremely wet summer of 1845, and to the heavy rains which fell at the moment of the formation of the tubers. It is probably owing to this circumstance that many plants did not germinate. In the second place, the commission is of opinion that the growers do not sufficiently attend to the preservation of the potatoes used as plants, so as to keep them from all damp. It is also very probable that the intense cold in the month of March much injured the tubers.

The more direct causes are probably as follows :—

1. The too rapid development of the plants this year. It is well known that those plants which spring up too quickly, and the grain sown on an over-manured soil, are subject to such diseases as ergot for rye and other

cereal grains, and rust for wheat, and the presence of cryptogamous plants.

2. The intense heat in the early part of the summer of 1845, and which amounted on the 13th of June to 87 Fahrenheit, on the 3rd of July to $87\frac{1}{2}$, and on the 7th of July to $91\frac{1}{2}$, necessarily had the effect of drying up the ground excessively; and the rain which fell at intervals during the continuance of the hot weather, and was soaked in, had the effect of scorching, as it were, those plants and potatoes which, not being very deeply planted, were exposed to the action of the heated water.

3. This intense heat was succeeded by cold and rainy weather, which lasted from the 15th of July to the end of the month of August. This damp weather, and the total absence of the vivifying rays of the sun, caused a kind of rottenness among the pithy plants, and especially developed the cryptogamous plants.

4. On the 21st and 22nd of July, an extraordinary fog was perceived in many places, which spread a disgusting smell. Soon afterwards, on the 28th of July, the first symptoms of the disease were discovered in the provinces of Groningen and North Brabant; and it is more than probable that this fog, which was epidemical, was intimately connected with the disease.

According to all the experiments and descriptions made of the disease, it appears that it commences on the upper part, and then attacks successively the leaf, the stalk, and the tuber. This is fully confirmed by an experiment made at Groningen. As it is the upper part of the stalk which is generally first attacked, it is probable that the disease originates in the leaves, descends the stalk by means of the peel, and then communicates with the part below the ground.

5. On the leaves spots have been perceived, and also a kind of fungus described in the work of MM. Maleschott and Baumhauer, and classed by M. de Martins among the *fusisporium salani*. These fungi are similar in every respect to those drawn by the above gentlemen.

It is very probable, then, that the above-enumerated circumstances have been the simultaneous causes of the plant rotting, and of the fungi which are observed thereon. It unfortunately happens that these fungi, which are extremely minute, are quickly propagated to an inconceivable extent, favoured by the dampness of the atmosphere.

But the principal cause, or rather the character of the disease, is a kind of gangrene or mouldiness in the leaf, which occasions a very hurtful and even mortal decay to the plant. The dangerous influence of the cryptogamous plants has long since been shown by the example of the rust *(uredo rubigo)* in corn.

As soon as the rust spot develops itself on the leaf of the wheat or oak plant, it is observed that the leaf turns yellow, and withers at the spot where the rust shows itself.

No traces of the fungi have been found in the interior of the stalk or in the tuber. The commission, therefore, considers that the disease of these parts results from that of the leaf.

It is very probable that the disease has long existed in this country, but it has never hitherto sufficiently developed itself to attract serious attention. Having been fed for two years by a moist temperature, it has increased this year to a frightful extent, and become a real calamity. The commission is, however, of opinion that the disease, as now known to us, has never been treated of by naturalists. At any rate, it is far from resembling the cancer described by De Martins, or the scurf of potatoes, as these two diseases arise in the tuber, and not in the leaves.

2. REMEDIES FOR THE DISEASE.

The disease itself, its character, and causes, having now been sufficiently considered, it is necessary to consider the remedies for the disease, of which the commission points out three different kinds:—

1st.—A means which, unfortunately, it is not in our power to adopt at pleasure—that is, a drier atmosphere; for if it be damp that has caused the mouldiness of the leaves, and has propagated it among the plants, it follows that dry weather would put a stop to the ravages of the disease, and even result in entirely destroying it.

This observation applies to the measures which science may propose, now that the disease has probably reached its period.

2nd.—To prevent the return of the disease, it is necessary to take the following precautions:—

1. To leave the potatoes in the ground until very dry weather occurs. Experiments having shown that their decay is accelerated by being taken up, it is advisable to leave them in the ground at first, in order to get dried, and afterwards to lay them out over the field. This would have the double advantage of rendering the vegetable more wholesome, and of preserving it.

2. The following applies especially to those potatoes to be used as seed for next year. It is necessary to beware of planting those plants which have been attacked by the disease. They must be carefully chosen from those whose stalks have not been attacked, and placed in a situation free from the slightest damp. As the disease has been less severe in gravelly than in clayey soils, the tubers should be chosen from those gravelly soils where the disease has not penetrated.

3. The withered leaves of diseased potatoes, which are of no value, should be immediately burnt; the same should be done with the rotten potatoes, which cannot be of any use. Nothing should remain of them.

4. It is necessary to avoid as much as possible planting potatoes in the same spots where they have been planted this year, for it is most probable that seeds of the fungi have remained in these places, and there would be great risk of the ensuing crop being similarly attacked. It is also necessary to manure the land with lime after the potatoes have been taken up, and then to clear it; and if the land be employed for produce which need not be planted before winter, it is better not to harrow it, and so allow the air and cold to penetrate it. In the spring the lime manure should be renewed as much as possible, and the land may be watered with diluted sulphuric acid, one part of sulphur to 100 of water.

5. Next year the potatoes should be planted in dry land, all damp places should be avoided, even places shaded by houses or trees. It is once more repeated that great care should be used in selecting the tubers, and they should be planted at a little distance from each other, so that the earth round each plant may be raised, that the air may penetrate everywhere.

6. The commission does not agree with those naturalists who think that the origin of the disease may be attributed to the race of potatoes having gradually deteriorated, owing to their being seldom reproduced in fresh soil. The report mentions that in the commune of the Marum (province of Groningen), among other instances, is to be seen a field of potatoes, the produce of only three years' culture, equally attacked by the disease; and an infinite number of similar cases prove incontestibly that the potato has not degenerated. However, the commission recommends that fresh seed should be employed this year; for it will then, at any rate, be certain that it has not been attacked by this scourge.

3rd.—If, notwithstanding every effort, the disease should again break out next year, the moment the first symptoms of it are perceived, the first leaves that turn yellow should be taken off and burnt, or the entire field should be watered towards evening with lime water, or, still better, with diluted sulphuric acid, so as to destroy the seeds of the cryptogamous fungi; sulphuric acid, moreover, prevents rotting, and when prepared as above directed, can do no injury to the plants themselves.

3. USE TO BE MADE OF THE DISEASED POTATOES.

Those potatoes which have been attacked by the disease appear not to be prejudicial to health, when taken in moderate quantities. The commission has consulted veterinary surgeons as to whether the potatoes can be employed, without danger, to feed cattle. Their reply was in the affirmative. It has been proved, moreover, that pigs have eaten the diseased potatoes without death ensuing. The commission is, however, of opinion that they should be cooked beforehand.

Man may likewise make use of the diseased potatoes, but must carefully remove the brown spots which caused the disease. It has also been shown by experiments that potatoes which have remained untainted on the same plant where there are spoiled tubers may be eaten without hesitation. It is almost useless to remark that potatoes which are completely rotten are hurtful not only to man but to cattle, and too frequent use of spoiled potatoes is equally dangerous to those who make their sole food of them. Dr. Westerhoff remarked, that in the commune of Warffum (province of Groningen), those persons who made use of spoiled potatoes experienced pains in the stomach and nausea, followed by vomiting, after eating them.

It has also been perceived that sheep have been made severely ill by eating attacked potatoes, though they were soon cured by a change of food.

As to the means to be employed to prevent the baneful influence that may be exerted on the health of man by eating the diseased potatoes, the commission proposes to make this the subject of another inquiry. In the mean time, it advises that as much use as possible should be made of the fecula of potatoes.

LYTHAM AGRICULTURAL SOCIETY.

INSPECTORS' REPORT.

The Inspectors of the Lytham Agricultural Society beg leave to lay before the meeting the ninth report since its establishment. In doing so they feel great satisfaction in having to report extensive and extended improvements which have come under their notice in the present year. These improvements come before them not only in very extensive amounts of systematic draining, reclaiming waste lands, grubbing up old and superfluous fences, and substituting new ones in their places, but they are happy to add that they have met with ample and propitious crops of corn and roots, with the exception of wheat, whose yield from the sheaf is well known to be deficient.

Class 1. Farm culture.—For the farm in the most approved state of cultivation above 150 statute acres. In drawing attention to the first and chief premium on the list, they bear willing testimony to the merits of Mr. Begbie, of Plumpton, on a farm of 436 acres. His spirited outlays, and systematic arrangement of his farm and crops, are worthy of especial notice. The amount of draining since last year's meeting of the society amounts to 72,776 yards, or upwards of 41 miles. In addition, he has growing on the estate 54 acres of turnips, 20 acres of beans in drills, and other drill crops to the amount of 76 acres—all of which are highly creditable to his management; and from their thorough clean and healthy state, every success may be calculated upon for future crops. Nor can we pass unnoticed the young grass seeds on this estate, the draining, ample manuring, and perfect cleanliness of the land, exhibit in them a fertility which every one who lays down land in a proper manner ought to endeavour to attain. We cannot pass over the next competitor, Mr. Scott, of Clifton, without high encomiums on his very extensive improvements in this class of farms.

The second class farms above 60 and under 150 statute acres.—The successful competitor in this class is Mr. John Cartmel, of Westby, on a farm of 105 statute acres. This farm consists of a moss or carre soil, which he has chiefly marled or set over with a rich loamy substance of great fertility, found in the locality. He has also drained near 22 acres, and has also levelled up old ditches, and made new ones to the amount of near 3000 yards; this, added to his proper arrangement of the closes, and large amount of well cultivated green crop, entitle him very eminently to the first premium in this class. We would also wish to bring to the notice of the meeting the very handsome competition of Mr. William Sudell, of Salwick, in this class of farms.

Third class farms, not exceeding 60, but above 20 statute acres.—The successful competitor in this class is Mr. Thomas Nickson, of Westby, on a farm of 33 acres. This farm also consists of a moss or carre soil, which by draining and the application of marl and loamy sand, is brought to a proper consistence for cropping. These, added to well cultivated green crops, have brought his farm crops and roots to more than ordinary character, and which they have very seldom seen surpassed. A second competitor, Mr. Thomas Cookson, of North Houses, Lytham, they wish to notice, for his judicious cultivation of 20 acres of moss land.

The Inspectors wish to observe that in no year since the commencement of the society has draining and turnip growing been carried out so extensively and effectually. The draining on the estate since the last meeting amounts to from 180 to 200 miles, and the quantity of turnips now growing is about 600 acres; but on the sandy soils in particular, and also on the moss and carre, there is yet room for extension; and the application of well cultivated green crops are the only means of restoring such lands to a proper degree of cultivation for corn or grass. They wish the more to impress it on the farmers from their knowledge of the successful use of guano, and the facilities it affords for their further extension—far different to the expenses of such crops before its introduction. The extension, therefore, seems desirable, not only for the feeding and well keeping of cattle, but for success in the rotation of crops, which is sure to be the case on those soils if attended to in a proper manner. We are happy to report the very excellent competition, on the first class farms, for turnips; the merits of each were very considerable. We beg the kind consideration of the competitors to the task we have in hand when such is the case, and the merits of each so near allied. They also cannot omit the cottage competition that has come before them on this occasion. The neatness of the cottages, and ample productions of the gardens, are truly laudable, and worthy of imitation from others in their situation.

ON FATTENING CATTLE.

By George Dobito.

(PRIZE ESSAY.)

Presuming that the object of the Council of the Royal Agricultural Society of England, in offering prizes for Essays on various subjects, is that the farmers themselves may be induced to commit their practice and experience to paper, I trust that my humble attempt to describe what I have found to be the best method of fattening bullocks, if considered unworthy of a prize, may at least be criticised with lenity, as it is the *bonâ fide* production of a practical farmer.

The first point I wish to impress upon my readers is to have a good sort of bullock to begin upon; not that I wish to recommend one particular breed, to the depeciation of all others, for I am sure that different localities require different descriptions of animals, but to caution them that it is right to select the characteristic marks of the breed they intend purchasing—to warn them particularly never to buy a coarse, ill-made, bad-bred animal, because they may fancy it cheap. A man has never got so bad a bargain as when he has, as the saying is, "got too much for money."

The first criterion for judging of the disposition of the beast to fatten quickly, in my opinion, is that peculiar soft, supple feel of the skin which is commonly called "handling well;" this is generally accompanied by a hair of a soft, fine quality, in great plenty; the eye should be full and clear, and the head well-formed, the shoulders not upright, but lying well back, the chest full, the ribs deep and well arched out, the flanks well down, the hips nearly level with the backbone, and in proportion to the rest of the carcass as to width, the rumps wide, and not too low down, appearing as if when fat the tail and rumps' ends would be level (but this the butchers in my neighbourhood are in the habit of calling "the fool's point"), the purse should be of a full size, and soft to the touch (this I consider a material point), the twist good, and the legs short and small in proportion to the carcass, as the offal will be light in proportion to the leg-bone.

Next observe the temper of the animal. In selecting from a considerable drove you will often find beasts possessing many of these good points, yet in lower condition than some of the animals of a worse appearance; consider well whether this may not arise from the masterful disposition of the ill-made one, and whether, when put to fatten where every beast may eat his share of food without disturbance, the good-bred one will not soon surpass his more masterful neighbour. If you observe a beast that is constantly watching an opportunity of goring any other that comes in his way, leave him behind, even if he is much heavier than those you select; he may be a great trouble to you; and although the jobber may think you have selected them badly, he will sell them according to what they are worth at the time, and the present weight is the great point with him. For this reason always select the animals before purchasing, rather than agree to give a certain price per head to pick where you like from the drove.

I think the quality of an animal is of more consequence than his form, for common fattening purposes; but have both good if you can. But if you are thinking of fattening an animal to show for a prize, be sure to have his form as perfect as possible; for all the flesh you may lay on him will not hide any great defect in his form: also ascertain, if possible, how the animal is descended—ten to one but the progeny becomes similar to the progenitor. But this is generally a most unprofitable affair, and I strongly recommend all young farmers to leave it in the hands or those gentry who can afford the loss, many of whom there are in the country, and they deserve our best thanks for their patriotism, for it certainly shows the capabilities of different breeds, and thereby enables the observing farmer to profit by the experience of others. Never buy any animals that are *excessively* poor; they will consume a great deal of food before they are got into health enough to fatten.

I fear I have been rather prolix in these remarks, but have thought it necessary; for depend upon it, unless your animals are well bought, fatting cattle will never pay enough to leave the manure clear profit, which it ought to do, although I fear, with the majority of farmers it is far otherwise.

I shall say but little with respect to summer-grazing, as the wording of the Society's advertisement appears to apply more particularly to winter fattening; merely remarking that the fences should be kept good, a weak place being strengthened before it becomes a gap, prevention in this case, as in many others, being better than cure; that the bullocks should be well supplied with water, and have plenty of shade; never allow them to be frightened by dogs, &c.; treat them kindly, and they will soon cease to fear your presence; do not let a day pass, if you can help it, without seeing them. There is an old saying, which ought to be impressed on every farmer's memory—it has been of great service to me in the course of my life—it is "The master's eye grazeth the ox." A friend of mine has lately adopted a plan which, under the same circumstances, I should strongly recommend; it is that of giving a small quantity of oil-cake to animals grazing, for the sake of improving an ordinary pasture, and its effects are astonishing. The pastures I allude to are small, and one or two bullocks more than they are calculated to carry are put into each; the lot are then allowed 4 lbs. of cake per day per head; this at a cost of about 2s. per head per week—which, I believe, the stock well paid for—has entirely altered the face of pastures from what they were three years ago, when the plan was first adopted by him; and, I believe, without any loss to himself.

I now come to the point of winter feeding. First, as to the places in which they are kept, I unhesitatingly give my opinion in favour of stall-feeding, for all the common purposes of grazing; but not for young beasts that are to be summered again, or for prime oxen. The former should have small well-sheltered yards, with good sheds (if the fences are so high that they cannot see over, it is much better); and the latter, loose boxes with plenty of room for them to walk about, because they have to be kept up for such a long period, that if no exercise were taken, the health might suffer. It is the abuse of stall-feeding that has got it into disrepute with some people, and the not treading down straw enough with others. This last I hold to be an advantage, instead of a disadvantage; for, depend upon it, it is not the size of the dunghill, but the quality of the manure, that causes the farmer's stack-yard to be well filled. If managed well, I contend that there is no plan so good as stall-feeding. The fattening-house may be of any size or shape, but it is necessary that there should be under-ground drains, with gratings, to carry off the urine into the liquid-manure tank; shutters behind the bullocks, to regulate the heat, and a wide passage at their heads, to feed them and clean their mangers. The advantages I conceive to be the quantity of litter required being smaller, therefore the muck being made better; the temperature being more easily regulated, and every bullock being allowed to eat his share in peace. The disadvantage of the animal not being able to rub himself so well, I consider fully done away with by the rough brush which you will observe I recommend using; and although theorists may fancy the health of the animal likely to suffer, I have never found it so in practice.

Now, with respect to their food, so much does this vary (from the plan pursued by some people with an ox intended to be shown at Smithfield, in a class restricted from corn, cake, pulse, &c. &c., *which has the cream from several cows given him*, by way of compensation, to that by the man who endeavours to fatten his animals on turnips and barley-straw), that it would take up far too much of the Society's valuable Journal even to enumerate them; I shall therefore simply give the plan I recommend, leaving my readers to follow it if they like, and improve upon it whenever they can.

I think, in many instances, stall-feeding is not commenced early enough in the autumn. As soon as the weather becomes damp, and the days shorten much—say some time in October—the grass in my neighbourhood loses its feeding properties, and then the sooner your bullocks are put up the better; for this purpose I recommend having some of the large, forward descriptions of turnips provided, perhaps the "red tankard," although watery, and soon becoming of little value, are at this very early season the best of any, from their early maturity; these are sown in April, at the rate of an acre to every eight bullocks, which will last them three or four weeks, according to the crop, and leave a light fold to begin the sheep upon; at the end of which time the forward Swedes are ready to begin. During this period I give them little or no oil-cake, if they are only in moderate condition; but they have half a stone of pollard a day, mixed with an equal quantity of hay or straw-chaff. Some persons may fancy this food is of too loosening a nature; but I can assure them, from several years' experience, that although pollard is loosening in itself, yet it has the effect of preventing the watery white turnips from purging too much. Although the bullocks do not gain much in weight during this time, yet I am satisfied they go on faster afterwards; the reason of which, I suspect, is that their bodies are more prepared for the artificial state they have to live in for the next few months. Early in November the food must be changed to Swedes, cake, &c.; the quantities of each must vary according to circumstances. The following I consider a good allowance where Swedes are not scarce; if they are, more oil-cake must be given instead of a part of them; or, if very plentiful, they may be allowed even more. The morning's bait, 1 bushel of Swedes, well cleaned from dirt and cut small, given a few at a time (I always use Gardner's *sheep turnip-cutter* in preference to any other); then, the refuse pieces being well cleaned out, a dry bait, consisting of 2 lbs. of oil-cake, 3 lbs. of pollard, and a little hay-chaff. While they are feeding, the manure and wet litter must be well cleared away, and any which may be on the bullocks taken off, the floor swept clean, and plenty of fresh litter put in; then have every bullock well brushed with what is called a dandy-brush (being a brush made with whalebone, for taking the rough dirt off horses). Let not any slovenly farmer fancy this to be a whim of mine; depend upon it the bullocks are kept in much better health and greater comfort for it. They must now be left quiet; they will soon lie down and rest, and chew the cud till after dinner, when another bushel of Swedes is given as before, in small quantities, followed by a similar dry bait of cake, pollard, and hay-chaff, but with the addition of 3 lbs. of bean-meal; this is left with them at night. Be careful that the shutters are opened or closed according to the weather, so as to maintain an even warm temperature, but not hot enough to make them perspire, if it can be avoided. Be also careful that the mangers are well cleaned out between every bait. I have mine cleaned at the commencement of the season, and as often afterwards as I think necessary, with scalding water and the scrubbing-brush.

After a month or so the cake may be increased; and, if it is thought more convenient, the Swedes may be changed for mangold-wurzel. Many persons object to using mangold until the spring; they certainly are more valuable than Swedes in the spring, and therefore should always be used last. Never change from mangold-wurzel to Swedes after you have begun them, or the bullocks will not go on so fast; but if, from having a bad crop of Swedes, or from any other cause, you want to begin mangold early, you have only to lay them exposed to the air for a week or two to wither, and they may be used as early in the season as is required.

It will be observed that cleanliness, warmth, and quiet are the great points I insist upon; of course coupled with good feeding; but very many tons of oil-cake are annually wasted, because the comfort of the animals is not more attended to. It will also be observed that I have introduced a cheap article of food, which I think does the beasts more good, in proportion to its cost, than anything I have given them: I allude to pollard, or millers' offal, as some call it. This I can generally purchase at £4 15s. a ton. I have used it extensively for some years, and like it much; some of my neighbours are now following my example.

Before I conclude I wish to give these recommendations respecting selling the bullocks when fat: Do not determine upon parting with them exactly at any given time; but if a butcher wants to buy a part of them, a few weeks before you think them ready, calculate how they are paying for what they have eaten; and, if you feel satisfied on that head, do not run the hazard of getting a bad sale by refusing a good offer, or perchance the opportunity may not return. Sell them to butchers at home, if you can. Always estimate the weight and value of your bullocks the day before any one is coming to buy them; and, after letting the butcher handle and examine them well, let them out into a yard for him to see; they will always show better than when tied up.—*Journal of the Royal Agricultural Society.*

DRAINAGE OF LARGE TOWNS—METROPOLITAN SEWAGE COMPANY.

It too frequently happens with nations and classes, as with individuals, that they do not exercise forethought in providing against probable contingencies; if, however, having once paid the penalty of their want of precaution, they profit by that best of all instructors, experience, it is well. Whatever advantages some persons may anticipate from the admission of foreign corn into this country, duty free, we believe that the most enthusiastic free-traders will not deny the benefit which the country must derive from possessing within itself the means of supplying food for the people. Manure is to the plant what food is to man: to waste manure, therefore, is to waste food; and yet how profligate is the waste of manure throughout the whole kingdom! From notions of false delicacy, those materials which afford the most powerful means of reproducing food according to the beautiful system of nature, working in a circle of decomposition and reproduction, are dissipated as utterly worthless. Taking our farm-yards and the ordinary management of manure, we have no doubt but that one-third of the essence of the whole is wasted, and the means of producing grain and roots lessened to the same extent. Our large towns—the recipients of great quantities of food of every description—waste annually an amount of manure which would go far to reproduce that which they consume; independent of which, from the want of proper sewage, the materials, noxious to animal, although beneficial to vegetable life, spread contagion and disease amongst the inhabitants. The injury to public health has at length attracted serious attention, and accordingly we find that a Company has been formed, entitled the "Water Supply, Drainage, and Towns Improvement Company," in the management of which will be found the names of many influential individuals.

The operations of this Company will, we understand, be confined to the provinces; and, if carried out generally, will be enabled to supply an immense amount of manure. Some estimate may be formed of the vast quantity of manure wasted through the sewers of our towns generally, from the following statement, having reference to London only:—

"By carefully conducted experiments and very accurate gauging," observes Cuthbert Johnson, in his valuable work on the "Fertilisers," p. 223, "it has been ascertained that the principal London sewers convey daily into the Thames 115,608 tons of mixed drainage, consisting, on an average composition, of one part of solid, or mechanically suspended matters, and 25 parts absolutely fluid. But if we only allow one part in 30 of this immense mass to be composed of solid substances, then we have the large quantity of more than 3,800 tons of solid manure daily wasted in the river, from London alone! What might not the farmers of England effect if this mass of fertilizing matter was preserved at a reasonable rate for their use? Fifteen tons of this solid manure, nay, 10 tons, would render in some degree fertile an acre of the poorest cultivated or even common or heath land. But allow, for the sake of accuracy, that 20 tons were required, even then 3,800 tons :-20 give a daily allowance of manure sufficient for 190 acres of land; and if we give 300 days on which this manure was collected, that would afford an annual supply for 57,000 acres. Can I put this in a stronger light? Is it not lamentable that the fertilising matter for such a breadth of land should be annually lost to the country? And in this calculation I allow nothing for the absolutely fluid portion of the drainage—I am now speaking of its mechanically diffused matters; added to which, the farmer will readily allow that, when once these 57,000 acres are fertilised, and rendered productive, that some time elapses before even the most naturally barren soils require again replenishing with any other manure than that which their own crops supply, by the assistance of the live stock of the farm; so that, in fact, in each and every year 57,000 acres of land might be recovered from the waste, and brought into cultivation by the solid manure of the London drainage alone."

Many of our readers will be aware that several years ago a scheme of vast magnitude was projected by Mr. John Martin, for forming immense sewers on the banks of the Thames, thereby intercepting the sewage from flowing into the river, and polluting the water, and conveying it to a certain distance from the metropolis, where it might be rendered available for manure. A company was then formed under the title of the "Thames Improvement Company," in which the present Duke of Grafton, then Earl Euston, Mr. Cuthbert W. Johnson, Mr. John Martin (the projector), and others took great interest. The times, however, were not then ripe for such a gigantic project. Since that period both art and science have made such rapid and astounding advances as to bring any such undertaking within the compass of attainment. Upon reference to our advertizing columns, it will be seen that a Company entitled the "Metropolitan Sewage Company" has been formed for the purpose of rendering the sewage of the metropolis available for agricultural purposes, and seeing that the object is the same, although to be effected by different means, Mr. John Martin, whose name will be found in the list of the Committee, is zealously co-operating with a view to carry it out. This project is one in which all connected with agriculture must take an interest, and we trust will meet the support and encouragement of those landowners who are sincere and zealous in their desire to increase the produce of their native soil. Amidst the numerous schemes of the present day we know of none more legitimate. Since the formation of the "Metropolitan Sewage Company," another Company has been announced under the title of the London Sewage Company. Now, we should be the last in the world to object to honourable competition, believing it to afford a most wholesome stimulus to improvement in every department; but we cannot countenance any course of proceeding whereby an attempt is made, however ingeniously, to plagiarize the ideas of others. We know nothing whatever of the parties connected with the last-mentioned Company, but, to say the least, it is a singularly curious coincidence that the name of the Secretary of that Company should be Andrew Martin. We do not seek to impute motives to any one, but to prevent the confusion which may naturally arise from the confusion of names, we wish to point out particularly that the originator of the plan of rendering the London sewage available for manure is Mr. *John* Martin; and that it is the "Metropolitan Sewage Company" with which he is associated.—*Mark Lane Express.*

THE DISEASES OF THE POTATO, THEIR CAUSES AND REMEDIES CONSIDERED.

TO THE EDITOR OF THE MORNING HERALD.

Sir,—The great loss which has occurred in the potato crops, considered in its immediate and remote consequences, is a national calamity. And if the primary cause of an evil so widely spread can be demonstrated, and effectual measures suggested for the prevention of this and other maladies to which this crop has been latterly subject, such information cannot be too widely known. Impressed with a conviction that the views I entertain on this now all-important question are true, and afford the surest grounds for hope of a safe and successful cultivation of this plant in future, I beg, with much deference, to invite the attention of the Highland Agricultural Society, to a review of the past history of the potato, believing that we shall thereby only be enabled to see our way clearly, and determine satisfactorily what is best to be done for the future. One main conclusion that I have arrived at in this inquiry is, that a gradual and progressive degeneracy or diminution of vital power has taken place in the potato plant: I do not mean in varieties only, but in the plant considered in the mass or as a species; and that this is the primary cause, the real foundation, of the many failures of late years; and that the various diseases of the potato are not, therefore, of a transitory nature, but may be expected to occur more or less according to circumstances, so long as this primary predisposing cause of disease is suffered to continue.

The potato, as is generally known, has been in this country upwards of 200 years; and so far as I can learn, the crops do not appear to have been seriously affected by any particular disease until about the middle or towards the close of the last century. But from that time to the present they have been subject to three very distinct diseases—the curl, dry-rot, and murrain.

These diseases have appeared, too, at three successive periods, each being more injurious and rapidly fatal than that which preceded it. First was the curl, so called from the leaves of the young plants curling up and shrivelling, instead of expanding. That this disease was formerly unknown, and has appeared at a comparatively recent date, is evident by the remarks of two writers* on the curl about fifty years ago, who speak of conversing with men who remembered when curl first appeared. And Dr. Anderson† observed, "The only thing that seems to be positively certain with regard to curl is, that it was not known in the northern parts of the island till a very few years ago, and it was at that time much more frequent in the south than the north." In agricultural works published up to about 1830, in which so much is said and so many causes assigned for the curl, there is no mention of the second disease, dry-rot. In "Loudon's Encyclopædia of Agriculture," published 1825, it is said—"The only serious disease of the potato is the curl;" and Sir John Sinclair, in a work on the potato published in 1828, says—"There is no material distemper affecting the potato but what is known under the name of curl." Dry rot, then, evidently could not have existed up to that time; or, if it did, the instances of its perishing without vegetating must have been so rare, or to such a limited extent, as not to have excited notice. But from about 1832 to the present time this destructive disease has prevailed more or less—a fact too well known to all concerned to need any proof; and now we have a still more destructive disease—the murrain—which seems to threaten, if we have many repetitions of it, the entire loss of the plant in this country at no distant period. The earliness of the attack, as well as the fatality of the disease, has also been progressive. In the curl we see the diseased tubers vegetate, and the young plants struggle, as it were, for existence; in the dry rot the sets are destroyed before they have time to vegetate; and now the living plant is attacked, and the tubers destroyed in the ground before they have reached maturity. It seems hardly possible to arrive at any other conclusion from these facts than that there has been a gradual deterioration of the plant generally; that it has from some cause or other become less hardy and more susceptible of injury from adverse influences now than formerly.

Other agricultural plants have their diseases: wheat, for instance, has many; but the history of no other agricultural plant affords such proof of progressive deterioration, or has been subject to such a series of fatal diseases, as the potato. On the contrary, they have one and all had a tendency to improve rather than otherwise. What then can be the cause of this difference? The only fact which seems satisfactorily to account for the de-

* Rev. A. Campbell, "Farmer's Magazine," vol. 7, p. 136; Benjamin Price, "Bath Papers," 1796, vol. 8.

† "Bath Papers," 1792, vol. 4.

generacy is, that the potato is propagated in a very different manner to that of other agricultural plants. Herein I am persuaded lies the root of the evil. Grain, turnips, &c., are continued from year to year by means of seeds; but the potato is propagated by sections of the tuber, which is but the extension of an individual, and not a renewal or reproduction as by seed. A variety of wheat propagated from year to year by seeds only may, for aught that is known to the contrary, be with due care continued with all its excellencies to the end of time. Not so with varieties of plants propagated by extension, that is, by buds, cuttings, layers, or roots; they have a determinate existence; they evidently retain precisely the same qualities, constitution, and tendencies as the plant from which they originally sprung, and according to the suitableness of the food, &c., to which the progeny of an individual plant by extension is subject, it sooner or later degenerates, passes from the vigour of youth to the infirmities of age, becomes diseased and unproductive, and finally extinct. I believe it is to a want of a knowledge of or faith in the truth of this law, and to our consequent neglect of frequently raising new sorts from seeds of vigorous plants of healthy varieties, that the degeneracy of the potato, as a species or race of plants, is due. There is, indeed, no continued history of the origin of varieties whereby to prove that there has been this neglect; but that due attention has not been paid to the continuing of the species by a succession of healthy and vigorous seedlings, may be inferred from the fact that in a report on the dry-rot failures to the Highland Agricultural Society, so late as 1837, it is concluded that "the fact of deterioration seems not to be by any means conclusively ascertained;" and perhaps the reporter could not well have arrived at any other conclusion if he confined himself to the remarks on this point only. And when we further consider that raising varieties of potatoes from seed is attended with considerable trouble, and that comparatively few varieties deserving permanent culture can be obtained, even with the best management, and that there is no prospect of selling these for a high price, as in the case of new flowers, nor any great demand or apparent necessity for new varieties, till symptoms of declining vigour or disease are manifested in the old ones, I consider I am justified in assuming that it is highly probable that in the majority of cases it has been from the good old favourite declining varieties that seed has been saved when new varieties were wanted. Hence the gradual degeneracy and diminished hardiness of the whole.

Every farm labourer would readily conclude what would be the effect of breeding for two or three successive generations from animals with diseased or otherwise feeble constitutions. "Like will produce like," is a favourite maxim with the breeder of animals, and so far as constitutional vigour is concerned it is equally applicable to plants. We may as well expect that feeble or diseased parents will produce healthy and vigorous offspring in the one as in the other. "A corrupt tree will bring forth corrupt fruit."

Fifty years have now elapsed since the theory of the limited duration of varieties of plants propagated by extension was advanced in a paper read before the Royal Society by the late Mr. T. A. Knight, the distinguished president of the Horticultural Society. Like most new and important truths, it has had to pass through a searching ordeal of objections and criticisms, and not a little ridicule; but the truth of it is now generally admitted by those best qualified to judge, and there certainly seem to be so many facts in support of it as almost to make doubt ridiculous. Objections are, however, now and then urged against it even at the present day, which shows that the theory is not yet understood or believed in by some.

The latest testimony of Mr. Knight respecting the degeneracy and failures of varieties of potatoes may be of use to such as those who still doubt. Mr. Knight, as is well known, was in the habit of continuing and varying his experiments from year to year, in order to further prove and illustrate his physiological and other discoveries. In 1836, then with forty years' additional experience, he gives this very decided opinion when noticing a letter I had sent to the *Preston Pilot* on the cause of dry rot, &c. After stating that he coincided with my opinion that the primary cause of the failures was the old age and exhaustion of the varieties, he says, "That varieties of potatoes which have been long cultivated cease to be equally productive, is placed beyond the reach of controversy. I have in several instances tried to renovate the vigour of old and excellent newly extended varieties, by change of soil and mode of culture; but I never in any degree succeeded, and many of the tubers of these varieties perished without vegetating, and all became unproductive and worthless." I consider it needless, then, to enter into the history of various plants, in order to show the rise, progress, and decline of varieties. The truth and value of Mr. Knight's theory and proofs of degeneracy will be sufficiently manifest when I consider, as I now propose to do, as briefly as I can, what are the secondary causes which produce disease in the potato. By this we shall also learn what precautions should be taken to avoid these in the future cultivation of the plants; and I trust I may, without presumption, indulge in the hope that this may otherwise be of use, seeing that in the last number of the *Journal of the Royal Agricultural Society* thirteen pages are occupied, with a view to prove that over-ripening of the new tubers is the cause of curl and dry rot. That curled plants proceeded mostly from tubers which had been suffered to become perfectly ripe was long since proved by several; and Mr. Knight, forty years ago, concluded that it was owing to the too great thickness of the sap of the ripe tubers which prevented the free expansion of the first emitted leaves and shoots, which it was the peculiar office of the sap of the tuber to support. But there is, obviously, something beyond this. Curl was formerly unknown. "Time, or old age," it has been observed,* "never fails to bring on the curled or shrivelled disorder;" and again, "If continued too

* Mr. Sheriff, in Loudon's Encyclopædia of Agriculture.

long, they become liable to disease, as the curl, &c."* In the most authentic history of a variety I have seen† it is said that for the first ten years no symptoms of curl or any other disease was manifest: in the next five there was more or less of curl; then nearly the whole field became affected, and a diminution of the number of seed berries was noticed; ultimately, taint or rot in the seed tubers. Either the tubers, in this case, never ripened during the first ten years, or over-ripening alone is not sufficient to account for the disease. Curl appears to be the first symptom of declining energy in recent varieties, as well as in the plant considered as a species. Taking up the tubers for seed before they are quite ripe has been found a remedy for this disease for a time.

What is the immediate cause of dry rot is still a vexed question. It has not hitherto, I believe, been satisfactorily accounted for. It has been attributed to insects, to cutting the sets, to planting in sunshine, planting in dry weather, shallow planting, fermenting, bleeding, sprouting, the land, manure, frost, to the bruises which the seed stock receives by being generally brought from a distance, and to almost every other imaginable influence. But, as I asked in my letter in 1836, if any of these are sufficient to account for the failures, why did not the same cause produce the same effect in former times? and how was it that some varieties then cultivated, as the "cups",‡ for instance, never failed, although subject to precisely the same treatment? This last fact leads to the conclusion, that whatever may be the primary cause of failure by dry rot, it is a cause peculiar to and inherent in certain varieties for the time being. And when in our inquiries we further learn that many excellent varieties of potatoes formerly cultivated have disappeared, that those most liable to fail are generally those which have been longest in cultivation, and exhibit in the growth of their comparatively healthy plants observable signs of declining vigour,§ the conclusion to be arrived at seems inevitably—that there must be a predisposition to disease in these varieties, owing to a diminution of vital power consequent on the length of time they have been in cultivation. Again, I find that it has been repeatedly proved that if tubers of failing varieties are planted whole, they do not fail.‖ In other instances, the cut surface of the sets has been dusted with lime¶ or coated with thick lime wash,** or with puddle,†† previously to planting; and these sets did not fail, though others not so treated failed to a considerable extent. Cutting the tubers into sets in autumn, so that the cut surface might dry and heal up before the time of planting, has also been found useful.* These facts indicate that the secondary or immediate cause of failure by dry rot is communicated to the sets at the time, or after they are planted, and that the moist cut surface is the vulnerable point, and where the attack is made. To what influence, then, are the sets exposed at the time of planting, sufficient to effect their destruction? Four causes appear at first sight likely to account for this—namely, insects, drying up the sets, fungi, and fermentation. Insects have been considered the cause of failures, and they have been found occasionally feeding upon the sets; but there is no proof of the failing sets generally being much eaten, and nothing less than the destruction of the buds or nearly the whole substance of the tuber can be considered sufficient to account for the loss by this means. But it is dry rot we are considering; the name sufficiently indicates the appearance of the sets, and the fallacy of the notion that insects are a principal cause of the failures. Sets planted in dry days, on dry land, or during bright sunshine, or with hot fermenting manure, have been observed to fail considerably; whilst others planted in damp, cloudy weather, and with cold well-rotted manure, have succeeded. Hence driving up the sets has been considered a principal cause of dry rot. But the simple abstraction of the moisture or sap by dry air, earth, &c., it is submitted, is a mechanical force merely, which would be exercised on all varieties alike exposed to its influence, and in former times as well as now, unless indeed it can be shown that there is a difference in the structure or power of retaining the sap in the sets of these failing varieties. The tubers of some may be less solid. Mr. Knight had observed that the quality of some varieties, not all, disappeared with the vigour of the plant; but under-ripe seed tubers must be equally lax, soft, and watery; yet these grow stronger, and resist disease better, than the more solid and perfectly ripe tubers. It cannot well be admitted, then, that the mere drying-up of the sets is the cause of the failures by dry-rot.

I consider it is highly probable that parasitical fungi will prove to be a cause of the sets perishing when planted; but I cannot well prove this. The power of these minute plants is generally underrated or not suspected; they are almost universally considered a consequence, and not the cause, of death; hence their presence, or otherwise, is mostly over-looked, or considered as a matter of course, and other causes are assigned for the destruction which may have ensued. Some facts, however, seem to favour this supposition; for instance, it has been observed that if the drills, manure, or sets have been much exposed to the sun at the time of planting, failures were almost sure to occur.† Sets planted at mid-day, during bright sunshine, have been found to fail greatly, as compared with

* Sir John Sinclair on the Potato.—1828.

† Mr. Gorrie.—Quarterly Journal of Agriculture, 1837, p. 583.

‡ A. A.—"Farmer's Magazine," 1835, p. 179, and "Quarterly Journal of Agriculture," 1837, p. 505.

§ "Quarterly Journal of Agriculture," 1837, p. 583. Ibid, 504. Report on Dry Rot.

‖ "Farmer's Magazine," 1835, p. 275, and "Quarterly Journal of Agriculture," 1837, p. 501. "Journal of Royal Agricultural Society of England," vol. 1, p. 246.

¶ "Gardener's Chronicle," 1842, p. 254.—Extract from the Highland Society's Transactions.

** "Quarterly Journal of Agriculture," 1837, p. 500.

†† Arthur's "Potato Problem Solved."

* Arthur's "Potato Problem Solved."

† "Quarterly Journal of Agriculture," 1837, p. 483.

others planted during the moisture of the morning.* Another writer advises to avoid planting in the heat of a mid-day sun, but observes in damp weather this precaution is unnecessary.† It appears to me much more likely that the failing sets in these cases were destroyed by fungi rather than by drought. Although damp weather may be most favourable to the growth of fungi, dry sunny weather, as with other plants, will be most favourable for the dispersion of their seeds. Continued damp weather will cause the seeds of the more perfect plants to germinate and be destroyed, as grain in wet harvests; but the seeds of a plant like a fungus, so low in the scale of organisation, will be more akin in their structure to the grains of pollen of the anthers of flowers, and contact with moisture will cause these to explode and be non-efficient. It seems to be, therefore, not improbable that wet or damp weather will destroy these minute germs by premature germination: and if so, hence the comparative safety of planting in damp instead of in dry sunny weather. Coating the cut surface of the sets with limewash, &c., which is found to preserve them, would be an efficient protection against the attack of fungi. For the germ of a fungus must come into close contact with the matter it is to live upon, before it can grow into a plant; and there must obviously be something peculiar in the state of the matter or plant at the time to favour or admit of its development. These scavenger plants seem to have power only when there is unhealthy action or incipient decay; and their presence may always be considered a proof of the previous existence of one or the other in the matter or plant attacked. In an experiment, where tubers were cut into sets in autumn, the cut surface of four was observed at the time of planting to be covered with a blue mould, and these did not grow.‡ A fungus was evidently feeding upon the sets in this instance. Dr. Martins also, who has written a work on the diseases of the potato, especially dry rot, finds fungi on the diseased and decaying tubers; but, according to the extracts translated in the *Gardeners' Chronicle*, Sept. 27, 1845, "it was uncertain whether it depends upon the growth of the mould, or whether the mould is merely subsequent to the disease." In the absence, therefore, of a greater number of more precise facts, that fungi are a principal cause of the destruction of the sets can only be considered a probable conjecture, the truth or otherwise of which further and more accurate observations can alone determine.

When sets have been planted with fermenting manure, failures to a considerable extent have been frequently observed,§ and as fermenting manure absorbs moisture, the failure of the sets has generally been supposed to be owing to that cause, but it seems to admit of a very different explanation. In other instances sets of a failing variety planted without manure lived, while other sets planted

* "Quarterly Journal of Agriculture," 1837, p. 484.

† Ibid," 1837, p. 484.

‡ "Arthur's Problem Solved," p. 14.

§ "Quarterly Journal of Agriculture," 1837, p. 189, &c. "Farmer's Magazine," 1834, p. 268.

with manure failed.* Sets planted under the manure with the cut surface on the soil lived;† so did other sets placed upside down, with the skin next to the manure;‡ whilst many of others, planted with the cut surface on the manure, perished, and were found as it were glued to the manure. It is but justice to this writer (A. A.) to state that he supposed the manure continued to ferment in the ground, and that the fermentation is communicated to the cut surface of the set.

Contact of the cut surface with the manure was obviously the cause of the destruction of the sets in these cases; and it is one, if not the principal, cause of failure known as dry rot. Recently-made fermenting manure is, I believe, more frequently applied in the cultivation of the potato than in almost any other agricultural plant. Vegetable matter in an active state of fermentation has the power of inducing other vegetable matter to ferment likewise, if placed in contact with it, and this speedily, if the fresh matter has been previously deprived of life. But the matter constituting a living plant or animal is under the control of, and is peculiarly arranged and held together by the power of the vital principle, which, in proportion to its strength, resists the force of chemical action. If tubers are planted whole, they do not, or rather did not, perish; in consequence of the skin being entire, the small quantity of fermenting manure in the rows has no influence on them. But the section of a tuber has a surface destitute of skin, the natural protection against disturbing influences from without. Morbid matter, which, if placed on the fresh wound of an animal, would cause its death, if placed on the skin would be powerless for evil. Therefore, by cutting the tubers into sets, and by planting the sets with the cut surface on the manure, we evidently place them on the greatest possible disadvantage in the trial of strength which must ensue. If the vitality of the set is strong, it will be able to counteract the disturbing influence of the chemical action to which it is opposed, and live. But if, from any cause, there is a diminution of vitality in the set, then the force of chemical affinity may prove the stronger power, vitality is then destroyed, fermentation commences, putrefaction follows, and the set becomes reduced to a pulpy mass of disorganised matter, providing there is sufficient moisture present. This reminds me that farmers complain of sets perishing by wet rot as well as by dry rot; wet rot being observed in wet soils and seasons, dry rot in dry soils and seasons. Both are probably owing, in most cases, to the action of fermenting manure, the difference in the appearance of the sets being dependent on the quantity of moisture present; a certain amount being seemingly requisite to complete the putrefactive process. The fermenting of manure itself will illustrate this. If a hot-bed is well made and properly moistened with water when put together, it is found when fermentation has subsided, that the manure is reduced to a solid brown unctuous mass. But if the manure was not sufficiently moist when

* "Farmer's Mag.," 1835, p. 214.

† Ibid, 1834, p. 268.

‡ Ibid, 1835, p. 178.

put together, then putrefaction is, to some extent, arrested; the straw is imperfectly reduced, and the manure is found to be, in places, dry, dusty, and mouldy.

One of the immediate causes of dry rot is now, I believe, proved beyond a doubt, and it is at once a proof and a consequence of the degeneracy and want of vital power in the tubers of these latter days; for cut sets and fermenting manure were, doubtless, placed in contact formerly, as well as now.

If, then, the primary cause of this malady is the degeneracy and diminished vitality of the potato, it must follow that every adverse influence to which they may be exposed must contribute more or less to the injury or destruction of the tubers or plants. Thus heating in large masses in pits may destroy vitality now, which in former times would have been comparatively harmless, or it may cause the sets to be more readily acted upon and destroyed by the other causes when planted. Over-ripening of the seed tubers is found to be a predisposing cause of disease in failing varieties. The ripening process is the last step to decay; under-ripe tubers afford more vigorous plants, and apples and pears gathered before they are quite ripe keep longer and fresher than others which have been suffered to become perfectly ripe on the tree. Late planting is also considered dangerous; the vital power of the tuber, or set, will diminish in proportion to its age; useless sprouts are also produced by this needless delay, and if a tuber produces long sprouts, and these are broken off previously to planting, it is so much of the energy and substance of the tuber wasted, and the young plant may be expected to grow with less vigour in consequence, or the set be more easily destroyed. Hence late planting, over-ripening, and heating in pits have each been considered the cause of the failures by dry rot. They are accessories to the fact, if I may so speak, and at the same time so many additional witnesses in proof of debility.

As with animals, so it is with plants. When the constitution of an animal is impaired by disease or old age, it is more susceptible of injury from atmospheric influences and other causes than another animal of the same kind possessing a strong and vigorous constitution. If two such animals were placed in similar adverse trying situations, disease in the former would probably be developed, and prostration of strength or death would be the result; whilst the latter might pass the ordeal; comparatively speaking, uninjured; and the facts we have been considering justify the supposition that the closest analogy here subsists between plants and animals.

Now about the murrain. The only satisfactory explanation of the immediate cause of this malady which I have hitherto seen is that of the Rev. M. J. Berkeley,* who concludes, from extensive observations, that it is caused by a parasitical fungus. "In every case," he states, "he found the fungus preceding the work of destruction—that it appears while the leaves are yet green or yellowish green, and the parts attacked soon become brown and withered." Mr. Berkeley is one of our best authorities in these minute plants. Professor Morren, who followed the disease from field to field on the Continent, arrived at the same conclusion.* He says that the malady decidedly commences by the upper part of the leaves. This was also observed by M. Payen.† Several other scientific and practical men, well qualified to arrive at a sound conclusion, are also of opinion that a fungus is the immediate cause of the destruction. I believe it is a power perfectly adequate to accomplish the effect under certain conditions. One of our most eminent botanists, however, contends that there was partial decay of the stem and leaves first brought about by the action of cold and wet on very tender tissue, which thus prepared a field on which the fungus could establish itself. But I am much mistaken if these minute fungi cannot attack plants before there has been any visible appearance of decay, and destroy them effectually. All that is necessary, and what appears to be the great predisposing cause in ordinary cases is, that the vitality of the plant should be diminished by a sudden transition from warm weather, favourable to rapid growth, to weather which is cold and wet. Wheat is attacked by a mildew fungus under such circumstances, but never I believe to such a fatal extent. Since the murrain appeared I have had an opportunity of watching the progress of a parasite on a plant of the true maiden-hair fern, which I had planted under a glass shade. It was certainly attacked while the leaves were yet green, and to all appearance healthy; but when the plant was held up to the light, a something was seen to be creeping along the veins of some of the leaves, which before were of a light green and transparent, as compared with the tissue between, but appeared of a brown colour as this something progressed. Next the leaves attacked changed from bright green to dull yellow, and then shrivelled up as if scorched, and were covered with a white down, and this on the sixth day from planting. This was the fructification of the fungus—not the plant itself; but it is the only part generally noticed, and when the destruction of the leaf is complete. Hence it is a common notion that these minute plants are in all cases a consequence, and not the cause of death.

Never forgetting that truth is, in the end, always triumphant, we should ever be guided solely in inquiries like this by an earnest desire to discover what is true; and we should not only give satisfactory reasons for our belief, but should explain or refute all plausible objections to the conclusions at which we have arrived. It therefore appears to me requisite that, before we can reasonably subscribe to the opinion that "the disease is to be traced to atmospheric causes, and nothing else, that decay first commences by the action of cold and wet, and that the mischief produced by the mildew fungus is quite a secondary circumstance," it should be shown to us under what delusion these eminent men, quoted above, were labouring, when they concluded that the fungus attacked the leaves while yet green, and that it preceded the work of destruc-

* "Gardeners' Chronicle," Sept. 6th and 20th.

* "Gardeners' Chronicle," Sept 13th.

† "The Chemist," October.

tion. It should also be proved, if possible, that there has been something so peculiar in the atmospheric influences this year as never to have before occurred, and that this state of weather has been experienced in the different countries of Europe where the disease is known to prevail—in sunny Italy and Canada, as well as in England. It should also be explained why the crops in the best drained and driest soils have suffered as well as in those which were wet.* Some have observed that the plants in the driest situations were first attacked,† and why the plague was not stayed on the return of fine weather as was anticipated. "Notwithstanding the fineness of the weather," writes Mr. Berkeley, "the potato blight is making rapid progress."‡ Besides if the action of wet and cold on very tender tissue was the cause of the decay, then the stems of those varieties which had nearly reached maturity, and were consequently most perfectly organized, should have been best able to resist this influence; but the reverse of this is the case in some instances: the comparatively mature stems of early varieties were first seized upon and destroyed.§ In one instance two or three sets of a late variety had been introduced by the manure into a plot of an early variety, and the late plants were to be seen growing vigorously, as the writer says, in the midst of desolation, when the foliage of the early plants was destroyed and the tubers decaying.‖ Besides, if the malady was solely the effect of the weather, why was it not experienced all over the country nearly at the same time, like diseases of animals arising from a peculiar state of the atmosphere? This disease of the potato, on the contrary, resembles the epidemic diseases of animals, which are also supposed by some to be caused or propagated by the spores of fungi or atmospheric animalcules. It commenced at a certain point, and travelled. It first appeared in the Isle of Wight, early in August, and since then has proceeded with a deliberate wave-like progress throughout the length and breadth of the land.

There seems hardly any room to doubt that fungi are the immediate cause of the destruction; the unfavourable weather we have had was a predisposing cause, but the degeneracy of the plant is the foundation of the mischief, and which alone will explain why such a calamity was never before experienced. There are different opinions also as to the cause of the destruction of the tubers. The potatoes are just rotten, says one, same as commonly happens in damp cellars; cloudy skies and drenching rains have done it all. But many potatoes were planted last autumn, and though exposed to the cold wet soil throughout the winter, they lived and succeeded better than others planted at the usual time in spring. In one instance a few plants of a seedling were dug up this season by a gentleman for the purpose of showing the produce to a friend; and being anxious to preserve them for seed, he buried them in the rows where they grew, and he finds they are now sound—all the rest of the bed tainted.* Are wet and cold sufficient to explain this? This fact is also fatal to an opinion in an otherwise useful letter to G. F. Wilson, in the *Times* of the 25th of September, namely, "that the destructive changes at present taking place appears to be the unripeness of the tuber and the consequent imperfection of the elaboration of its juices." That the tubers of late varieties, especially, were not thoroughly ripe when the murrain first appeared, there can be no question; but early varieties, whose tubers must have been nearly if not quite ripe, have suffered also, and the largest and consequently most ripened tubers decay as well as the smallest and least ripened; and in order to have very early crops, as well as vigorous plants, I have purchased for seed the first potatoes brought to market of a tolerable size, whilst the tops were yet green and the tubers so immature as to shrivel like prunes before the time of planting. They nevertheless lived, and answered the purpose admirably; and if unripeness is the cause of decay now, why not then also? Besides, the disease is evidently communicated to the tubers by the stem (and this is a fact of great importance); for in experiments† where the stems were removed as soon as the destruction of the foliage had commenced, few unsound tubers were found, as compared with other plots of the same kind where the diseased stems were suffered to remain. It has also been observed that while the tubers next the stem have been destroyed, others more distant have been apparently freed from disease.‡ The destruction of the tubers would seem to be owing to one of two causes, possibly to both—namely, to putrid matter transmitted to the tubers from the diseased stems, or to the spawn of the fungus running down the stems and entering the tubers. If it was the effect of putrid sap only, as distinguished from gradual decay, it is difficult to see why all the tubers should not be inoculated alike, so long as any communication with the stem continued. But the spawn of a fungus would probably first reach and attack the tubers nearest to the stem. The same fungus, moreover, which destroys the stems and leaves has been observed on the decaying tubers also.§ A plant of the true maiden-hair fern, which I brought through the cold air of March from one of the hot damp houses of the Messrs. Loddiges, was quickly destroyed by a parasitical fungus; but knowing what I might expect with the plant of this fern

* "Gardeners' Chronicle," Aug. 30th, A. B.; Sept. 6th, Rev. M. J. Berkeley, A. Gall, W. E. H. Sept. 13th; J. Wigton.

† Ibid, Aug. 30th, Mr. Mickle; Sept. 6th, W. Marshall.

‡ Ibid, Sept. 20.

§ Ibid, Aug. 30th and Sept. 27th, Mr. Mickle; Sept. 13th, T. G.

‖ "Gardeners' Chronicle," Aug. 31, H. Bowers.

* "Gardeners' Chronicle," Oct. 25th; Mr. Girdwood.

† "Gardeners' Chronicle," Sept. 13th, Woodend; Sept. 27th, Canada Letter. "Times"—Irish Report, Oct. 16th or 17th.

‡ E. Payen—"Chemist," October.

§ Rev. M. J. Berkeley—"Gardeners' Chronicle," Sept. 6th. Professor Morren—Ibid, Sept. 13th, and "Evening Sun," Oct. 20th. M. Payen, in "The Chemist," October. See also November.

which I recently obtained, I was on the look out for the destroyer, and finding some of the upper leaves only were attacked, I cut off the stems below these, and thus saved my plant from the inevitable destruction that awaited it, and it now lives.

Now comes a grave question in regard to this disease also, whether the immediate cause be a fungus, or whether it be cold and wet; why, during the two hundred years the potato has been in cultivation, there should be no record of a similar visitation. There has certainly been the change of temperature, the cold and wet this season favourable to the attack and growth of fungi. But can we be satisfied that this is the only cause of the evil? that there has been something so peculiar in the state of the weather as never to have before occurred, and therefore "no fear need be entertained of the mischief appearing another year," as is said by a high authority? I cannot help thinking it is a fond delusion. Such notions seem to be disproved by the fact, that the murrain has appeared throughout the continent of Europe as well as in England, and in the United States and Canada also. Dry-rot appeared almost simultaneously in England, on the Continent, at St. Helena, and in America. The potato is propagated in all these countries alike by extension; and most of their varieties, it is probable, are descended from the stock first introduced here by Raleigh. The murrain has certainly been in Nova Scotia, the United States, and Canada for three or four successive years.* There is too much reason to fear that it has been in St. Helena also several years.† It was also observed in England last year by an intelligent nurseryman at Folkestone‡, but much later in the season, and in a modified form. There was, however, the premature withering of the stems; and notwithstanding the crop was carefully stowed away in narrow ridges, "yet by spring seventy-five sacks of every hundred were a mass of corruption;" and he adds, "many, very many others in Kent had theirs in the same condition." Another frequent contributer to the *Chronicle* is also of opinion that the same cause was in operation in this country previously to this year; he knew two instances in 1844 in which nearly the whole crop was worthless.§

It has also been observed that all varieties were not attacked at the same time by the murrain, though growing near to each other, but in proportion to the progress they had made towards maturity,|| as if a certain state of ripeness and diminished vigour of the stems were needed in conjunction with atmospheric influences before the fungus could enter upon its work of destruction. And, as was the case with curl and dry-rot, all varieties have not now suffered to the same injurious extent, but mostly in proportion to their age, or to the symptoms of debility which they had previously exhibited; whilst some varieties recently raised from seed in the United States, Prussia. and Scotland have not been affected by this disease. These seem to me facts of ominous import, especially when we consider what evidence there is of a progressive degeneracy of the plant having taken place down to the present time. There is little doubt it was formerly free from any serious disease, and the first symptom of degeneracy (curl) cannot be explained by the over-ripening of the seed tubers, without admitting the existence and influence of constitutional debility. The causes which destroy life in the second stage of disease (dry-rot) are themselves the best possible proofs of progressive deterioration. Sets of varieties, as the cups, which never failed for many years after dry-rot appeared, now perish by that disease.* The "one circumstance in which all experimenters are agreed, that potatoes planted whole never fail to spring,"† does not hold good; for entire tubers, as well as cut sets, have lately perished without vegetating.‡ Sets, moreover, of some varieties recently raised from seed have been found to fail by dry-rot as well as those of the oldest. And when we further consider in what different countries, soils, and climates this malady has been experienced; that it seems in all countries to have been preceded by the second stage of disease, dry-rot; and that it has appeared in North America and St. Helena, at least not in one year only, but in two or three successive years, and what certain proofs these parasites afford of feebleness and unhealthy action, and that there has been no such destruction this season in other green crops, but, on the contrary, "the crops of carrots are excellent, those of mangold wurzel and turnips never more generally abundant;"§ we seem to be almost forced to the conclusion that this can be no other than an aggravated continuation of the former maladies, curl and dry-rot, and that the real foundation, the primary predisposing cause of this evil, as of them, is the degeneracy or diminished vitality of the plant. And, as was wisely observed by Professor Johnston, at a discussion about the cause of dry-rot at a meeting of the Highland Agricultural Society, in 1844, "The fact of the disease being so general, and in so many countries, showed that some elementary principle was required to cure the evil." The most able chemists however, I fear, may search, and search, and search again; but simply as chemists they will never discover what is the elementary principle so much needed. Disease is manifested in virgin soils, and with all manures. It is the all-important, all-governing, inscrutable vital principle in which there is a deficiency. The truth is, however humiliating may be the confession, we have been

* "Economist," Sept. 6. "Gardeners' Chronicle," Sept. 27th—Canada letter.

† June 1, 1844, "Gardeners' Chronicle;" also Jan. 22nd, 1842.

‡ Mr. Mickle, "Gardeners' Chronicle," Aug. 30th, 1844.

§ "Gardeners' Chronicle," October 25th—P. P.

|| Ibid, Aug. 30th—Mr. Mickle.

* "Gardeners' Chronicle," Aug. 31st, 1844 Report of Highland Agricultural Society's Meeting.

† "Farmers' Magazine," 1835, p. 275.

‡ "Journal of Royal Agricultural Society," vol. vi., p. 162; and "Gardeners' Chronicle," Oct. 7th, 1843.

§ Cuthbert W. Johnson, "Standard," Oct. 27th.

acting in opposition to the laws of nature in the cultivation of this plant. We have tried over and over again, with a marvellous perverseness, to make that live for ever which nature intended should only live for a time; and then, from parents feeble and old, we have vainly expected offspring hardy and strong. And, as always happens in such cases, we are in the end convinced of our folly by the punishment we receive.

The principal, or rather the more immediate object of cultivators now will be, how best they can avoid these secondary causes of disease in the crops of next year. Those varieties, whatever may be their other qualities, ought to be selected for seed which have been found to offer the greatest resistance to disease this year; and it would be advisable in all cases, if possible, to plant on land where potatoes were not grown this year. Providing a man was certain that he had a quantity of tubers perfectly free from the disease, I consider it would be advisable to plant part of the crop immediately, instead of in spring, more especially in dry well-drained soils. There is less danger to be apprehended of destruction by frost or wet than by heating in pits or contact with tubers which may decay. That excellent practical farmer, Mr. John Grey, of Dilstone, has proved in the two last years that autumn planting answers perfectly, and that he has greater crops than from others planted at the usual time in spring. Several other instances of the benefit of autumn-planting, or of leaving the seed-tubers in the ground during winter, might be cited. In all seasons I consider potatoes should be grown specially for seed, not to be very highly manured, never suffered to blossom, and to be taken up before they are ripe. If not planted in autumn, when perfectly dry they should be pitted in small quantities, if something after the fashion of an ice-house is not a better contrivance; and dry earth mixed with slacked lime should be placed between the tubers, to prevent contact. The middle-sized tubers, which are best, if not planted whole should in all cases have the cut surface coated with thick limewash or puddle immediately on being cut, and they should be planted not later than the middle of March, and in damp weather. Mr. Knight found there was a loss in produce by planting later. All bruised tubers should be rejected, because if one of the causes of dry-rot is a fungus, these would be in danger of being destroyed, and for that reason also it would be advisable to dig up and burn all failing sets. The manure must be spread upon the land, and so ploughed in, and never placed in the rows with the tubers. I do attach some importance to this, for not only will you avoid risk of the sets perishing by contact with the manure, but the growth of the stems will be less rapid, and on that account they may possibly offer greater resistance to the fungus, if in years to come there may be the requisite atmospheric influences to favour its attack and growth. Besides, I am convinced by other reasons that placing manure in rows is a bad practice under any circumstances. If the murrain should appear again hereafter, as soon as it is known to be making progress the crops should be immediately and frequently seen to; and if there should be proofs of its being as destructive as in this season, as soon as ever any of the leaves show signs of being attacked pull up the stems at once and burn them. Pulling up the stems I consider will be much safer than mowing them. By this you will do all that can be done to prevent the evil from spreading, and in all probability preserve your crops of tubers uninjured. Small tubers are sometimes formed on the stems above ground, especially if they have been blown over, or partially broken; and I find in two or three instances that these have been planted, and were found to yield tubers which made better seed than other tubers raised in the ordinary way. They seemed to have superior vitality, and to resist disease better. It may be well, therefore, to collect these stem tubers whereever they can be found, keep them in sand, and plant in spring. These seem to me the most likely means of preventing the secondary causes of disease.

To do away with the primary cause of these evils, recourse must be had to new varieties. One of the botanical collectors for Kew, it appears to be desirable, should be sent to Peru at once, or wherever the potato is known to grow in a wild state, in order to obtain seeds and tubers of vigorous wild plants.

But in the absence of these we must use our best endeavours to reinvigorate the plant, by raising new varieties from seed of the best we have; not to be satisfied with the first or second year's seedlings; some of these may possibly be better than many commonly grown, as some experiments seem to indicate. But this will not do. It is only by improved culture, judicious selection, and several successive generations, that we can have any just grounds for hoping to restore the plant to its pristine vigour; if it ever can be accomplished by this means and with these plants. "What is everybody's business is nobody's business," is a trite saying. Our great national agricultural societies, English, Scotch, and Irish, ought to see to this. I would gladly hope that I have convinced them of the primary cause of these maladies, and of the necessity of adopting the measures I have ventured to suggest for its removal, for I do believe most earnestly that there is no hope for us—no perfect safety in the cultivation of this crop until these now feeble degenerate varieties are superseded by others possessing greater constitutional vigour.

FARMERS' FRIENDS."—The injuries arising from insect ravages, resulting from a scarcity of birds consequent on the destruction of hedge-rows has, if we recollect rightly, been experienced in England. "Travellers in the north of England," says Mr. E. P. Thomson, in his "Notebook of a Naturalist," "cannot but perceive the almost total absence of birds in that district. The country is open, and rarely broken by a hedgerow; and thus, shelter being denied them, they seek more favoured spots. The effect is as obvious as it is injurious; for there is no limit set to the ravages of the caterpillar, or the destruction of the grub. The small cabbage butterfly swarms to an extent which must be seen to be believed. I have seen many hundreds on the wing at one time. The cockchafer too, flies in myriads; and there are no rooks to follow the plough.—*Westminster Review*.

ON RECLAIMING HEATH LAND.

BY JOHN WATSON, JUN., LAND AGENT, KENDAL, WESTMORELAND.

(From the Journal of the Royal Agricultural Society.)

[Prize Essay.]

The subject of reclaiming "heath land," or, what is generally termed in the North of England "lingy land," has claimed the attention of our Society; and, when its importance has been considered in connexion with other branches of agricultural improvement, as well as being the first transition of the land from its primitive state, I think it will be at once admitted by all who are anxious for the advancement of our native agriculture to require especial care in the performance, in order to be done economically, and without temporary or permanent injury to the land.

It is true that immense tracts of heath land have been reclaimed within the last eighty or ninety years, a great quantity of which has been notoriously mismanaged, chiefly arising from an utter disregard to anything beyond an immediate profit; and that, in consequence, only a small proportion* of the land in this country remains in its original state; yet we still have in England and Wales upwards of seven millions of acres of unreclaimed wastes and heath-growing land, affording a poor and scanty supply of pasturage to numerous herds of dwarfish cattle and sheep, the growth and development of which are much stunted from the coarseness of their food in particular, and from various other causes incident to lands in a wild, barren, and unreclaimed state; and yet it is no uncommon thing to hear agriculturists scout the idea of reclaiming such lands, and point to some others for examples of the ill effects produced by such a course, overlooking, as such people mostly do, the glaring facts that have brought about such a state of permanent injury.

With reference to those which have yet to be reclaimed, it is to be hoped that greater attention will be paid to permanent benefit than to immediate profit. By the judicious and skilful reclaiming of such, with ordinary attention to after-cultivation, the evils already noticed may be controlled and avoided; the produce may be doubled and trebled both in quantity and quality; and, what is of the utmost importance to this country, a great additional breadth of land might be profitably cultivated for the growth of grain, in order to meet the demands of a rapidly augmenting† population, as well as to afford beneficial employment to the agricultural labourer.

Nor should the general and obvious improvements and advantages in various other respects, consequent on the reclaiming of waste lands and barren heaths, be overlooked; amongst which we may mention the removal, to a very great extent (by judicious and necessary drainage), of noxious vapours, caused by stagnant water on lands of this description, the frequent sources of malignant fevers and other local diseases in low situations—a fact well known to medical men. The additional warmth and shelter also afforded to man and beast, by the enclosure of commons and large tracts of waste land, from the erection of fences and growth of plantations, tend greatly to improve the climate and general aspect of the country; and, as such, may be viewed both as local and national benefits.

These advantages, which I have briefly noticed, being matters of undoubted fact, proved by every-day experience and observation, I beg to recommend them to the serious consideration of those wealthy landowners who cherish a noble and patriotic desire to extend and widen our alimental resources at home, as well as to improve and beautify their native land; who, although they might in some instances lose a few brace of grouse annually by the change, would reap other benefits of a much more substantial and permanent nature.

I will now proceed to state my opinion as to the best method of reclaiming heath or lingy land, always keeping in view its permanent improvement on safe and economical principles, with a profitable return for the investment of capital; pecuniary gain, immediate or prospective, being an ever-prevailing epidemic.

Imprimis, let me state that three things ought to be considered in reclaiming heath land; namely, 1st, its present value to its owner or occupier; 2nd, the probable cost of breaking it up and reclaiming it; and, 3rd, whether, after it is reclaimed, the improved value may be expected to remunerate the party for his outlay. These three things ought to be carefully weighed by a farmer especially, before he commences his operations. But it not unfrequently happens that the owners of heath land expend large sums in reclaiming it, more with a view of beautifying their estates with ornamental plantations, and the like, than of increasing their rent-roll. In such cases, economy, and an adequate return for the capital expended, are seldom taken into account; and, if they were, such operations could not be looked upon as fit examples to present to the general reader.

The system I advocate—namely, paring burning, and liming—has been adopted and extensively practised by most landholders in the north of England and borders of Scotland, who have reclaimed large tracts of heath land within the period I have alluded to. My father, who is an extensive farmer and landowner, living at Bolton Park, near Wigton, in Cumberland, whose corroborative testimony I have received in favour of this method in particular, has within the last thirty years, to my own knowledge, reclaimed and brought into a profitable state of cultivation upwards of 2,800 acres of various qualities, a great deal of which was not worth more than from 1s. to 3s. per acre to rent previous to its being reclaimed, and some of it even less than these sums. I speak within bounds when I state that the whole of these lands have amply repaid

---

* About one-fifth part.

† The rapid strides which agriculturists in general are making in the improvement of the land, and the steadily increasing amount of produce consequent thereon, give me every reason to suppose that the latter will keep pace with the augmenting population of the kingdom.

him for reclaiming them, and are more than quadrupled in value, although in many instances imperfectly drained. My father regularly gets from 5 to 8 quarters of oats per acre on his first course of cropping. Oats, in nine cases out of ten, I consider the most suitable as the first crop, and the most profitable also to the farmer, if the altitude of the situation does not forbid their growth. I will now suppose, for example, that I have got a piece of heath land (say 100 acres) to reclaim and divide into suitable enclosures; and, in order to proceed steadily with a little variety of crop, I will break up 10 acres yearly, until I have reclaimed the whole; taking care to begin with the farthest or most inaccessible lot first, so that I may have the benefit of occupying it from as many sides as possible, and over the unbroken ground—an advantage which is sometimes overlooked. This precaution is not always necessary in the vicinity of good roads, but nevertheless ought not to be unheeded. In the first place, after having selected the ground to be broken up, it is desirable to erect a good substantial stone wall or quickset sod fence around the proposed enclosure. If the former be considered more suitable, all stones that are visible upon the land should be grubbed up and carted or conveyed off in sledges; which is expedient for the double purpose of erecting the fence and removing them out of the way of the paring spade and plough. If a sod fence with thorn-quicks is more suitable, I should recommend it in like manner to be made previous to the breaking up of the land, in order that the quicks may be making progress as soon as possible. In either case I prefer having the fences put up, *wholly or in part*, before the plough is brought into operation, as the carting, &c., to the stone fence is much easier performed before the top sward is broken; and a similar remark will generally apply in the case of a sod fence, because the horses, when turning with the plough at the land-ends, break up and trample the top sward in such a manner as to materially injure it for sodding.

The next thing to be done is to drain the enclosure effectually, if the nature of the ground requires it, previous to paring. If there be a deficiency of stones, a part of the drains might be allowed to remain open or half-finished until after the paring and burning are accomplished, when more will make their appearance. Tile-draining may be resorted to where stones are not sufficiently abundant for the purpose. The ditches along the sod fence will be found serviceable for the purpose of drainage on wet land, and ought to be carefully disposed with that view, not having too much or too little descent; and, during the first course of cropping, all the water which runs down the furrows, or from off the land under tillage, ought, if possible, to be turned upon the contiguous grass lands, by way of irrigation. Great benefit is frequently derived by this course, in consequence of the water carrying off a considerable quantity of lime and ashes in solution. The reason for having the draining done as a preliminary step is to insure the more effectual burning of the parings; for, if the land be springy or generally wet, it is often very difficult to get them burnt, especially in a wet season—a loss that will be visible upon such parts for many years hence, as I shall hereafter notice.

The land having now been prepared for the operation of paring, this part of the work ought to be done, if possible, in the months of April and May, in order to have the benefit of the best and most favourable part of the year for getting the parings well dried for burning, which ought never to be neglected when they are dry enough for the purpose, for the longer they lie after being cut a month or six weeks, the worse they are to manage. They soon begin to unite with the ground, inbibing moisture with the young grass vegetating amongst them, which neutralizes the effects of sun and wind. Under such circumstances much extra labour and expense will be incurred; and, even with such, a failure is frequently the result.

The most effectual method of paring is by the "paring spade," or "pushing spade;" although we sometimes see it done by a light plough, properly rigged for the purpose, and drawn by one horse, in order to save a little time and expense. The latter system may sometimes be advantageously applied to land which has been under the plough; but I prefer the former most decidedly upon all land which has not been under cultivation previously; and I apprehend that I shall be borne out in my preference on this head, for the plough can only be made to supersede the spade upon land of a very even surface and free from stones, with little or no heath upon it—such, for instance, as fine loams or previously cultivated bog earth, where thick parings may be taken with impunity, and no difficulty ever experienced in burning them.

The cost of paring unreclaimed heath land by the spade ranges from 12s. to 16s. per acre; and the burning of the parings in small heaps (the less* the better) from 2s. 6d. to 3s. 6d. per acre. The burning, as before stated, requires to be carefully attended to, and regularly kept up as fast as the parings become dry enough. They can sometimes be done with very good effect if set fire to when lying, without having recourse to heaps. I have seen many acres done occasionally in this way in the course of a few hours; but it is a method which requires to be acted upon with caution, and should be only had recourse to on thin black-topped land, where the ashes are usually light and deficient in quantity. Upon such they are frequently so light that they are actually blown away with the wind, and every shower of rain takes a tithe out of them. By igniting them lying, they do not get so thoroughly consumed, but quite enough if the heath be entirely destroyed and the parings fully charred. The fire necessarily consumes the lingy side which is undermost, *and chars the surface of the soil, which will make ample amends for the deficiency of ashes.* In order to confine the burning by this method to the black-topped parts of the land, where alone it is advisable, a person should go all round them and throw off the parings to one side, for a clear space of five or six feet, to prevent the fire from extending its ravages beyond the prescribed limits,

* Not more than from half a perch to a perch of land ought to be cleared for each heap when the surface is all pared.

as I do not recommend it on stronger soils where we have a sufficiency of ashes: on such it cannot be advantageously used, the soil and parings being of a very different character; and if tried, the latter will only get singed, as it were, and deprived of the heath which is indispensable to burn them in proper sized heaps. Without it they cannot be effectually burnt nor adequately charred, owing to their more incombustible nature, without having recourse to large heaps and a strong fire—a fault frequently committed. By burning parings in large heaps, where there has been an admixture of clay in them, I have frequently seen lumps turned out of the ash-heaps baked as hard as fire-bricks, owing to the great body of heat required to burn them. Red ashes are produced by a strong fire, and black ashes by a slow combustion; the latter are invariably the best, and possess much higher fertilizing qualities, owing, I think, to the great quantity of carbon they contain.

The next step to paring and burning is the liming of the ground, in all ordinary cases where it is possible to obtain it at any thing like a reasonable cost, or within a moderate distance. I shall more particularly state my reasons for recommending the general use of lime in a subsequent part of this essay. The quantity per acre I must in some measure leave to the judgment and discretion of the party using it, which may be varied from about 150 to 250* bushels per acre, according to the nature of the soil. Strong heavy soils of a sour or rushy nature, containing much fibrous and inert vegetable substance, require more than those of a lighter description; being of a more sluggish and stubborn nature, they require a greater stimulus to arouse them. I have occasionally seen those of a light nature over excited for a grain crop by the too free application of lime, so that the grain was kept in a green and growing state too long, from a continued succession of shoots, thereby preventing its ripening in due season, and giving no return to the farmer save a quantity of green and bladed straw. However, where a green crop or permanent pasture is more an object of consideration than that of grain, we need apprehend no ultimate harm from a liberal use of it, but quite the reverse.

As soon as the burning of the parings has been accomplished, all stones that have been brought to light should be grubbed up and cleared off as before. These may be used to complete the drains and fences, the forming of roads, or for other purposes; after which the ashes are to be carefully spread over all the ground, taking especial care to clear out the bottoms of the heaps well, particularly the outer circle, where the land is usually charred by the fire—this being an important point to attend to—otherwise the grain will be too gross upon those parts whereon the ash-heaps have been burnt and lain for some time, and the crop will be patchy. Such parts are frequently lodged before the grain gets into ear, and where this occurs it is never well filled.

* A much heavier dressing is often given in the southern counties; but I consider the quantity as above mentioned a fair and liberal allowance, and as much as will be found beneficial as a first dressing if the limestone be good.

After the ashes have thus been carefully spread, with the exception of an occasional heap here and there, which may be left to spread upon the space occupied by the lime-heaps, the latter, having been sufficiently slaked, must now undergo the same operation; I would then recommend them to be ploughed in forthwith—in short, as fast as they are spread—so that none of their virtues may be lost by evaporation and exposure to atmospherical influences. If the land is patchy and of different qualities, a portion of the ashes may, with great propriety and good effect, be removed off the best parts and spread over the poorer ones, which will insure a more even crop. If it be stony ground, a person ought to follow the ploughman with a hack, and remove the stones out of his way as they arise or become partly disengaged; for it is very desirable to have the land effectually cleared for the first crop, and *well ploughed*—a task that should only be undertaken by an experienced ploughman.

Contemplating a spring crop, the land ought to be ploughed between Lammas and Martinmas, or as soon after as possible, and allowed to remain in that state over winter. In the spring it will be found well pulverized, from the effects of the frost; and the harrows will perform their work upon it with the very best effect. The additional richness imparted to it by the lime and ashes, and their partial fermentation with the fibrous roots of the heath and other vegetable substances, will render it (to use a homely phrase) "as mellow as a compost midden."

The stones ought to be carted off as they are turned up by the plough; at least, all those which are likely to interfere with the harrows. On cold wet soils the ridges ought to be small (say 6 or 7 times about, or double that number of furrows), observing to plough the land with the most favourable descent for water. On firm dry land they may be made double the size mentioned, or even larger, to suit the fancy or caprice of the farmer; and, if convenient, ought to run north and south, which is most favourable for obtaining an even effect of the sun's rays. If a wheat or other autumn crop is contemplated, the land ought to be ploughed in August, or earlier in most cases. But I apprehend we have not much unreclaimed heath land suitable for the growth of wheat, especially as a first crop. It is generally apt to get too much bladed straw when tried (except upon thin sterile clayey soils), and often gets lodged, which renders the grain very rough in sample, and frequently unsound. The difficulty also of getting the land properly cleared and ploughed in sufficient time, and of getting it to work kindly without the action of a winter's frost upon it, would induce me, in nine cases out of ten, to recommend a spring crop* in preference to an autumn one. I know frequent instances where the land has been pared and burnt early in the spring, and ploughed in time for a crop of oats; but these are isolated cases in favoured situations, principally on dry moss (peaty) earth or loams, where the parings are easily burnt; and such

* Spring-sown.

as cannot be held up as general examples, although in some few instances this method may be admitted as proper. The operations being too often performed in such cases in a loose and hurried manner, are seldom succeeded by any real advantage; which a patient, well-regulated, and more systematic course would not more than counterbalance. The liming, stoning, and draining are wholly or in a great measure omitted, the land insufficiently pulverized, and seldom more than half a crop is obtained, in comparison to what might reasonably be expected under the ordinary course of proceeding.

Having now reclaimed the 10-acre plot, so far as preparing it for the reception of the seed for a first crop, the same process may be applied to the reclaiming of the remaining 90 acres, or to any other extent of ground; observing always to pay attention to its access when selecting the next or any subsequent plot for reclaiming; and, if possible, so to dispose each field that all may have access to water. Some degree of attention must also be paid to the various qualities of the soil, particularly if the field is to be hereafter used for tillage land. In this case it is very desirable to select each successive break as nearly as may be of the same quality throughout. The inconvenience of having three or four different kinds of soil in the same field, requiring as many different kinds of treatment, both as to manuring and cropping, is so well known to the experienced farmer, that it requires no further comment; but to those who have not been in the habit of reclaiming heath land a hint may not be out of season.

I will now proceed to make out a statement of the cost of reclaiming and preparing for a first crop 10 acres of heath land, of an average description, according to the system recommended; and in so doing will adopt what I consider a fair medium, as regards the cost of lime and labour, as well as the nature of the ground:—

	£	s.	d.
Cost of fencing 65 rods of stone fence (7 yards to the rod) where stones can be conveniently obtained, including stone getting, cartage, &c.	26	0	0
Say 60 rods of drain (7 yards to the rod), either stone or tile-drain, cost of materials, cartage, &c.	5	10	0
Paring 10 acres, at 14s. per acre	7	0	0
Burning ditto, at 3s. per acre	1	10	0
180 imperial bushels of lime per acre, at 3d. per bushel	22	10	0
Cartage of ditto 2 miles, at 1d. per bushel	7	10	0
Spreading lime and ashes, at 4s. per acre	2	0	0
Ploughing 10 acres, at 10s. per acre	5	0	0
Grubbing stones after the plough, and clearing off ditto	2	0	0
New gate, posts, hanging, &c. &c., probably	1	0	0
	£80	0	0

It will appear from this statement that the total cost per acre is £8, which at first sight may to some appear rather heavy; but, when it is taken into account that the land is perfectly and thoroughly reclaimed, and rendered capable of producing two or three successive crops without any additional manure, I think the system recommended will bear a comparison with other methods, which at first sight may appear cheaper and more economical. Setting aside the straw to compensate for seed, harrowing, reaping, and marketing the grain, I have frequently known the first crop of grain do more than pay for the whole outlay, including rent and taxes, which I have omitted to take into the foregoing statement. These, however, are a mere trifle on unreclaimed heath land. If we estimate the average cost at £12* per acre, which is a high figure, and suppose that it required a couple of years instead of one to pay for reclaiming the land, surely the improved state of the land, to the extent of three or four times its previous value, ought to be a sufficient inducement for us, in the present state of things, to reclaim all our barren heaths which are capable of so great an amelioration. Some of the estimates given in the tabular statement may be questioned as to their being too low; but they are founded on an average of twenty years, and upwards of 2000 acres of reclaimed heath land. They are also made on the supposition that all the labour is performed by the piece, and not by the occupier of the land, who in most cases would not estimate his labour so high, particularly in reference to horses and carts. The costs of fencing and liming form two very considerable items in the account. By leaving out the former, which in some cases is not required, and in others a temporary fence put up at a light expense is sufficient for the purpose, the cost per acre would fall below £6. The liming appears to cost about £3 per acre. But, viewing this article as an indispensable requisite where it can be conveniently obtained, and one that will amply repay its cost, I shall not attempt any reduction in the average cost on that score. I have estimated the cost of fencing two sides of the enclosure, for it rarely happens that more is required, but frequently less. The cost of a stone wall, and that of a sod fence, quickset and railed, in most cases will amount to nearly the same. In some instances, however, the latter may be made at a lower rate where railing is cheap.

Taking into account the length of time required to rear a quickset or growing fence in some situations, and the labour and attention that must necessarily be bestowed upon it during its growth, I think stone fences are often cheaper in the long run; although the former, in point of appearance, are certainly entitled to the preference when fairly reared. I need scarcely add that, in high climates (say 1000 feet above the level of the sea), it is more than probable that a stone fence will have a decided preference.

The system I have advocated will probably not be found applicable, in all its bearings, to every acre of unreclaimed heath land in this country, which may fairly be considered worth reclaiming, for there are few general rules without some exceptions. I may mention deep boggy ground and peaty earth, which are nearly one and the same

* Land may occasionally cost £12 per acre to reclaim it effectually where an extensive and ramified course of drainage is required, but even in such cases the first two crops will frequently cover the outlay.

thing. These consist of an accumulation of vegetable substances holding water in excess, and sometimes much woody fibre, in various stages of decomposition. Such, I presume, will be included under the head of heath land. The first and most effectual step towards the reclaiming of this kind of land, is to drain effectually; and if the land does not collapse, but becomes sufficiently firm after drainage to bear the weight of horses and carts upon it, then to have recourse to repeated diggings,* by courses, in order to remove the superabundant bog earth. I have seen bog earth of considerable depth, which would not bear the weight of cattle upon it, reduced to within two or three feet of the substratum of clay by this method. When dug up, the pieces were thrown into oblong heaps or wind-rows, and set fire to as soon as they were dry enough to burn. Course after course was continued in this manner,—digging and burning, always changing the position of the wind-rows in each successive course, until a sufficient quantity of the superfluous bog earth was consumed. Much of Chat Moss, through which the Manchester and Liverpool Railway passes, I understand, has been reclaimed in this way. However, where peats are a saleable article, and the bog earth of that description, such land may be turned to a more profitable account. Peat bog in this neighbourhood is frequently sold at the rate of £30 or £40 per acre; and the land, when thus cleared of the superfluous bog earth, will realize as much more. Marl or clay, road scrapings, sand and gravel, are the best manures for this kind of land. The lighter descriptions of bog earth especially require a good dressing of clay or marl, in order to weight them and give them due consistence, as well as to regulate their powers of absorption of evaporation. I must make an exception on this kind of land in reference to the application of quicklime, which only tends to accelerate its too rapid decomposition, and to give it additional lightness—a property which it already possesses in too high a degree—and give my opinion in favour of good shell marl or clay in preference to any other manure; which, when judiciously and properly applied, forms a ready combination of the two extremes of soil, and contributes to its density. Quicklime is too powerful and barmy in its effects upon such lands; but mild lime, as marl, clay, and the like, tend greatly to improve the physical and chemical properties of the soil; and, when judiciously applied, render it the most productive of all soils.

The variations of cost in reclaiming land of this nature are of so wide a range, that it is impossible to fix any regular amount, as that must depend upon the extent of drainage required, and, if any, the depth of bog earth required to be removed, and the facilities afforded for procuring marl or clay: I may likewise add, the value to be attached to peats. It requires no remarks, on the other hand, to point out the method of cutting and getting peats, or disposing of them to the best advantage; as this must depend upon their quality, and the demand for them in the neighbourhood. I would, however, warn those who possess this kind of land against the too frequent practice of reducing the bog earth too low, and of leaving little for after cultivation, save a bare and unproductive substratum of poor clay, inducing the growth of toad-pipes and colts-foot. The quantity left will always diminish, after drainage, to a considerable extent, from the decay of vegetable matter of which it is composed, as well as from the shrinking of its fungous bulk, by the withdrawal of the water and subsequent condensation.

Some bog land, however, may be reclaimed by thorough-drainage, which will render it sufficiently firm to bear the weight of horses and carts, without having recourse to more than the ordinary method of paring and burning. Where we find a surface layer or "white moss," or as others term it "grey moss," it is indispensable to have it removed, before the land will become fertile.

Well condensed black earth, blended with and partly associated with loam, may be greatly improved by a dressing of quicklime on the surface, without paring, burning, or otherwise breaking the top sward, which will often destroy the heath most effectually, and raise up a luxuriant green herbage in its place; thereby rendering the use of the plough and paring spade quite unnecessary, where permanent pasturage is the object desired; as is frequently the case in high situations, unadapted for the growth of grain or general husbandry.

Having thus far extended my observations to that description and quality of heath land which, under our present scope of agricultural knowledge, may reasonably be deemed capable of amelioration to that extent which would justify us in reclaiming it, I shall briefly notice our scowling cliffs and lofty mountains. These embrace a large* portion of our unreclaimed heaths; and although we occasionally see improvements carried far up the slopes of mountain sides, yet, in this respect, there is still a wide field for extending our operations in very many localities, where improvements might be pushed with safety and profit far beyond their present sphere. Were these carried out to their fullest extent, we should still have many thousands of acres of cloud-capped hills, that set at defiance the art and energies of the British farmer. Even the sturdy yeoman of the north, whose daring spirit and brawny arm have shorn Nature of many of her savage features, is compelled to acknowledge her sovereign rule, and to allow her to reign on in undisturbed possession of these elevated hills in all their primitive wildness, without a probability of ever being called upon or compelled to dispute her authority. In this state they are likely to remain, except where, here and there, in some sheltered nook, a few acres may be nibbled out by some enterprising workman; who, by dint of hack and spade, will often surmount great obstacles.

That the act of reclaiming must have its limits in mountainous districts no one will attempt to dispute. Beyond this limit, which cannot be definitively fixed, the only improvement or good which can be effected appears to me to be that of surface drainage, and of rearing woods and plantations.

* A good dressing of clay will sometimes answer the purpose, without adopting this expensive method.

* Nearly one half.

These will thrive at several hundred feet higher than any crops of an agricultural character, if planted in sufficiently large tracts. I am persuaded that great benefit is derived from plantations, in high climates, by contiguous lands; from the warmth and shelter afforded during more than one half of the year, not only to cattle, but also to herbage. Shelter and warmth are as indispensable to neat cattle as to the human race.

I have no doubt my opinion will be questioned as to the propriety and prudence of paring and burning upon thin soils, and not without some show of reason; but I wish my readers to understand that, where I come upon soils of this description *with a green sward of thin texture*. I do not class them as "heath land." Such may be unreclaimed virgin soils, certainly, but ought not to be confounded with the former; although we frequently see them blended together in such a manner as to render their separation a matter of difficulty. Where the plough can be brought to work effectually upon such of this nature as possess a delicate and thin top sward, with little vegetable root and no heath upon them, I need scarcely add, that economy alone will point out the expedience of dispensing with the paring spade. As regards *heath-growing land* of this description the case, however, is very different; and paring and burning cannot be prudently dispensed with, for the purpose of getting rid of the heath; without which, it is impossible to get a crop worth having, or even to get the land half ploughed. I have seen such land *horse* pared* (without burning), limed and ploughed, and ploughed again and again for the first crop. Yes, I have repeatedly seen this method tried with the view of preserving all the vegetable mould, as I was informed; and the invariable result has been a return of little more than the seed sown for the first and second crops; and, in after years, I never could discover, where this mode had been acted upon, that the land was more productive than other fields of similar quality which had been pared and burnt. The ashes, scanty though they may be on such land, are of paramount importance for raising the first and second crops. Without their assistance little produce can be obtained; and the difficulty of ploughing down the heath, and getting rid of it, renders the system of paring and burning doubly advisable. The only objection worthy of consideration that I have ever heard raised against paring and burning the surface of the soil in reclaiming heath land is, that "it permanently reduces the stamina or constitution of thin soils." To this opinion I demur. I admit that to a trifling extent it reduces† the vegetable mould; but, in return for this reduction, we receive an active and enriching manure in the ashes. These ashes are of more value than the substance from which they were made. With them the finest crops may be procured on nearly all inferior soils, which would not for several years produce them without ashes, or some other substitute. These crops will enable the farmer to return a supply of good manure to the land from which it is derived; and if, in ten years afterwards, his land is not found in as good a state as his neighbour's, who has reclaimed his land without paring and burning, and if he has not also received a better return for his outlay, then I will succumb, provided they both do justice to their land in the intermediate time, and are upon equal footing as to the quality of the land. A quick and sure return for the outlay of capital is what the farmer must and will look to; and to this no reasonable landlord will object, provided it can be obtained without inflicting an injury either temporary or permanent upon the land. It should never be forgotten that the real incentive to improvements lies in the certainty of a quick and adequate return for the capital adventured. This is the "philosopher's stone," and the mainspring to all our exertions. Paring and burning heath land, with a proper dressing of lime, will give to the farmer as much produce in three years as any other method I have ever seen tried will give in four. "Hope deferred makes the heart sick;" and no sensible man will wait four years for that which he can get in three.

In addition to other benefits derived from paring and burning the surface, it exterminates the slugs and the eggs of insects, which abound in the turf; and destroys the seeds and roots of injurious plants.

Where the heath is very strong it is frequently set fire to and burnt previous to paring, from the difficulty experienced in disengaging it with the paring spade from the uncut sward, when lifting over the parings as they are cut. But this should only be allowed as an act of necessity, as it deprives the parings of their inflammable parts, and makes them difficult to burn afterwards. It is often accompanied with danger also, which it is prudent to avoid, and should only be applied to isolated patches.

On thin soils I recommend thin paring. Thick paring should only be resorted to on superabundant bog earth, or on sour rushy spongy lands, where we have a great amount of vegetable and fibrous root. I consider the ashes upon very thin soils, where many people would question the propriety of paring and burning, a positive benefit, instead of an ultimate injury, which is frequently apprehended. I have seen many convincing proofs to strengthen me in this opinion. Without being tedious, I trust I may take the liberty of giving one instance as an example.

About eighteen years ago, my father reclaimed a plot of thin cold-bottomed heath land, containing about twenty acres. The season was a wet and unfavourable one for burning parings; and in conse-

* Done with a light plough drawn by one horse.

† This reduction is only temporary, and is soon compensated by returning the whole of the produce to the land after being converted into manure. A similar reduction, although by a slower process, will be the result without paring and burning, if a compensating return is not made to the land. I submit, therefore, that paring and burning the surface is a method of reclaiming heath land at once safe, economical, and expeditious; and that the improvement or deterioration of the land depends altogether upon its subsequent management and prudent husbandry.

quence, a few patches in several parts of the field could not be burnt, or at least were not burnt—in all about four acres. An additional quantity of lime was put upon these patches, with the view of compensating for the want of ashes; the parings were turned down, and great pains taken in getting them well ploughed in. Two crops of oats were taken off the field in succession, and afterwards a crop of turnips, which were consumed on the land by sheep. In the following year the land was sown down in oats, with a good variety of grass and clover seeds. Amongst all these several crops of oats, turnips, and grass seeds, any person, on looking at the field, might have told to a yard the patches whereon the parings had not been burnt; the produce being so much inferior to the rest of the field, even with the additional quantity of lime, which did not supply the defect. The land was all of the same quality, so that the difference could not be attributed to that cause; but afforded a decisive proof that the ashes were of much more value than the unconverted substance from which they were made; and a still further proof was, that for several years afterwards, when the land was in pasturage, these dark, inert, and unproductive patches might still have been traced out. I could point out many other instances of a similar kind; some, where the parings were carted off into large heaps, and made into compost with a sufficiency of quicklime, and afterwards recarted to the parts in that state, with little better effect. Such proofs as these have convinced me of the extraordinary fertility of ashes made from turf; and also that the system of paring and burning the surface in reclaiming heath land may be safely adopted, not only without temporary or permanent injury to the land, but even to its permanent benefit; and both with immediate and ultimate advantage to the farmer. However, let it be distinctly understood that I should object to a repetition of the practice on all thin soils. On deep clay lands, or where we have an excess of vegetable substance, it might be repeated with safety and advantage. It renders the former more friable and porous, and relieves the latter of its superfluities.

The great advantage of having lime at a moderate cost need scarcely be alluded to. In this respect the formation of railways through all parts of the kingdom must prove highly beneficial to those who are convinced of its invaluable properties. Doctors, however, differ in their opinions, and so it must ever be with agriculturists, on some points. The opinions of the latter as to the properties of lime, and the benefit to be derived from its application, are very conflicting; and even the most eminent chemists are far from being agreed upon its value and effects. Every man, therefore, who has given it a fair trial may be justified in forming his own judgment on its merits; and, so far as my experience leads me to judge, I must confess that I consider it *invaluable as a first dressing in the reclaiming of heath land.* There are many inert properties in virgin soils which without its application might lie dormant for ages. "Fossil manures must produce their effect, either by becoming an elemental part of the plant, or by acting upon its necessary food, and rendering it more active and agreeable for the purposes of vegetable life." Such is good lime when judiciously applied. It acts as a powerful stimulant upon inert substances; and, being an antacid, decomposes and corrects the crude and acrid matter arising from the decay of organic bodies in virgin soils, assimilating their component parts, and thus calling into vigorous action the dormant powers of the soil; in short, I consider it of incalculable benefit on all virgin soils with which I am acquainted, immediately or ultimately, when judiciously applied, either in the mild or caustic state. Observation has convinced me in some instances that it will continue to operate for fifteen or twenty years, where there is an excess of inert vegetable matter in the soil. I know a plot of ground in this neighbourhood, containing 166 acres, which formerly grew little except heath. A good dressing of lime was applied on the top sward, which has more than doubled its value. This was done about fifteen years ago, and totally eradicated the heath. The lime to this day appears in full action, as its effects annually testify, from the richness and sweetness of the herbage, and the texture of which has been thoroughly changed by the application of the lime. The deep green hue and luxuriant appearance of this land in spring and autumn form a striking contrast with those adjoining, which are still unimproved. The soil is a thin moorish loam in a high climate, resting on the greywacke formation. I have seen much valuable produce lost from the omission of lime in the primary act of reclaiming heath land, one instance of which I give as an example :—A farmer well known to me, who had a large plot of unreclaimed heath land, and who had only three years of his lease unexpired, having received notice to quit at the end of his term, thought he would break up this piece by paring and burning. Liming, however, he thought must be dispensed with, as he calculated that in two crops he could not possibly get repaid for such an outlay. It so happened that in this large plot there were a few patches of impoverished land, from which nearly the whole of the vegetable turf had been cut and carried away by a former tenant. These parts were considered so much reduced that it would be impossible to raise a crop upon them without a small quantity of lime, in addition to the sprinkling of ashes, which was therefore applied as an act of necessity. The consequence was, that these very inferior patches produced double the quantity of grain and straw to any other portion of the field when in crop; and in after years the herbage was much more luxuriant and of finer texture. I am satisfied that, if in this case 150 or 200 bushels of lime per acre had been applied, the cost of which, including cartage, would not have exceeded so many groats, an adequate return at least would have been the result in the first crop.

The importance of thorough-draining, which is too little understood, and much less practised in many districts where great facilities are offered, is a subject I cannot pass over unnoticed. Thousands and tens of thousands of acres in this country are scarcely producing one-half of what they are capable of doing, owing to such neglect, and, in many cases, are to be found in a worse plight than when in an unreclaimed state. I cannot consider such lands reclaimed, although they have been made subservient to the plough, when this most important requisite has been omitted. I would, therefore, humbly but earnestly impress upon all the absolute necessity of thorough-draining, as a primary and most important act in the reclaiming of heath land; for, without its performance where required, the act of reclaiming will be a farce; the land will slowly but surely retrogade to its former state, or something worse (unless repeatedly and heavily manured, which will disappear almost as fast as applied), and all our boasted improvements will be visions of a brief and transitory nature.

Before I close this subject of inquiry in reference to the act of reclaiming, there is one description of heath land hitherto unnoticed which I ought not to pass over without a few remarks: I allude to broken and craggy ground, which in many parts of Westmoreland and Cumberland is of considerable extent. To effect a thorough reformation of such is in all cases very expensive when practicable, and in others utterly impracticable except by planting. It is impossible on such land to say that any fixed rules could be laid down beyond the simple fact that, where paring is impracticable, there appears only one way of assailing it, and that is by trenching. In other words, to hack, dig, trench, and hew away as well as you can, making use of the stones for fences, drains and roads, or otherwise stacking them up in corners, or upon the worst parts of the land, and nibbling out all and every patch which is considered worth the labour, up to the very teeth of the hardy and sturdy grey clints, which may be left to take care of themselves. The expense of reclaiming such land is often more than the value after its redemption. Many of the small landowners, living upon their paternal estates in the counties of Cumberland and Westmoreland, and the West Riding of Yorkshire, having large families, with little employment for them one half of the year, are in the habit of redeeming small patches of craggy ground from off their larger sheep walks. These are chiefly in the mountainous districts; and if you were to reason with them as to the cost, their answer would be, that "they might as well be improving their estates as sitting by the fire." In such cases they set down their labour at nothing, so long as there is nothing to pay. Apart from the method described, a dressing of lime upon such land is the only profitable way of improving it for pasturage by destroying the heath; but it will not, in many instances, effect a radical cure in that respect, although it seldom fails to improve the herbage. The highly popular and valuable manure guano appears to me to be just the sort of thing that is wanted in hilly and mountainous districts. What effect it would produce upon heath land I am not prepared to say, never having given it a trial. Its cheapness and portability certainly have strong claims upon our consideration, and I have little doubt but it would materially improve the herbage.

Having discussed the system of redeeming heath land so far as relates to its capabilities of amelioration, I will now proceed to offer a few observations *on the course of cropping* on such lands as are adapted for the growth of corn, and also on the *conversion into pasture of such as, from the steepness of the land or its elevation above the level of the sea, are unadapted for the culture of grain or general husbandry.*

The course of cropping, which comes next under notice, certainly offers a wide field for discussion, and I am fully convinced that any theoretic* rules which can be given in a book must fall far short of general application, and must always be taken with some degree of allowance. It would be no difficult task to lay down the best and most approved modes of culture for particular localities, possessing an uniformity of soil and climate; but when we consider for one moment that one of the first agriculturists of the present day (Mr. Morton) has classified thirty-six different varieties of soil in South Britain, admitting, as they must of necessity do, of various degrees of intermixtures and incongruities, the task can only be accomplished by going at once to generalities. The varieties of climate, soil and its properties, situation in reference to markets, and various other circumstances of a local character, must and will influence very materially the course of cropping in every district which possesses any peculiar feature dissimilar to that of others. Under the circumstances detailed, the prudent farmer will select that sort of crop and course of cropping which are most in accordance with his views of good husbandry, and likewise most profitable to himself. Albeit, taking a general view of the unreclaimed heath lands of this country capable of tillage husbandry or corn culture, we shall find that the greatest amount consists of cold, thin, and inferior soils in endless variety, chiefly in the vicinities of the mountain ranges, and partaking more or less of their nature and properties as regards their soil and the formations upon which they rest. The alternate system of cropping is now so universally admitted as the basis of good husbandry, that I shall recommend it as a standard rule to keep in view. By the alternate system, I mean a green crop between two white ones. Two white crops in succession may be admitted, or rather I ought to say tolerated, on virgin soils well limed, and of pretty fair quality; but one is safer, succeeded by a green crop. As I have before stated in reference to grain, in nine cases out of ten I consider a crop of oats† the safest to commence with, because there is frequently a great deal of rough straw as well as grain at first, and consequently great irregularity and unevenness

* Although many farmers are apt to look upon theoretic rules with suspicion and contempt, I think no person is sufficiently and properly qualified for the management of a farm who does not possess a theoretic knowledge of husbandry in addition to a practical one, notwithstanding the latter may be of greater import. There is nothing like system in all things, and sound theory is neither more nor less than well-regulated practice systematicallya rranged.

† A green crop when desired, and not allowed to seed, may be taken first; for it is never objectionable if the land be suitable. Peas and beans run too much to straw on new land *invariably.* However promising they may appear in their early stages, they seldom fail to disappoint the expectations of the farmer as to their yielding.

in the sample, which will be less objectionable in oats than in wheat or barley. In addition to which oat straw is more valuable; and, if cut rather fresh, as it ought to be in all cases, it makes excellent fodder with a proper allowance of turnips, much better than that of wheat or barley, which are seldom fit for anything but litter or thatch. Therefore, admitting the alternate system of cropping to be good both in theory and practice, the second crop ought to be turnips, cole, rye, clover, vetches, or other green crop. If the land be too rotten or wet to consume green crops upon it with sheep, it will be advisable to adopt such of the above as may be cut green for stalling. I would rather see two green crops taken in succession than two white ones; but how very few converts I shall make by this avowal! Potatoes should never be grown upon new land for the table; but for seed I should prefer them to any other, as they are invariably strong and healthy. For the third crop I should recommend barley or oats, and the land sown down to grass, which in the following season ought to be pastured, and not mown as hay, if we desire a good sward as the reward of our management. If the land be in high condition, the grain is apt to injure the grass seeds by getting lodged. To obviate this, instead of sowing the grass seeds with oats or barley, I should rather sow them with a crop of cole, to be eaten off with sheep. Many farmers would grumble at this, thinking that they were losing a good crop of corn; but I have seen the most luxuriant pasture obtained by this method; and I never saw a farmer who tried it, however reluctantly, that ever regretted having done so. So very much depends upon the nature of the soil, climate, and other circumstances, that I think it would only tend to weary the reader were I to pursue the inquiry further in reference to the course of cropping upon lands adapted for the culture of corn and grain, being convinced that it would be presumptuous to offer any determinate rule as a universal panacea.

All lands* which, by reason of their great elevation above the level of the sea or steepness, will not admit of corn culture, must and ever will present a formidable barrier to their amelioration in consequence, except what may be derived by drainage and the application of lime as a top-dressing. I have seen a great deal of land of this nature reclaimed, where, after paring, burning, and liming, the farmer has been tempted to risk a crop of oats; plenty of straw succeeded, and, *occasionally in a favourable season,* a moderate return of oats. All succulent plants, as turnips, cole, and vegetables in general, grow and thrive well in a humid climate, provided the land be dry and of fair quality, fresh and in good heart. But the great object in such situations is that they are generally too high, cold, exposed, for feeding off sheep in the autumn or depth of winter upon turnips or cole, and that sheep seldom come off any better than when they were put on. These obstacles, however, might be overcome by sowing the cole early in the spring, instead of waiting until the middle of summer or later, as is too often the case. Another method also may be tried, which I have seen answer very well, namely, a thin sowing of barley or rye, which may be stocked and eaten off with sheep, when about 5 or 6 inches high. Both these are excellent methods of sowing down to grass, the seeds being much less injured in this way than by a crop of corn. I am supposing that under the circumstances detailed the land is capable of being ploughed.

The best method I have ever seen adopted in laying down newly-redeemed heath land to permanent pasture is to sow the grass seeds and clover alone, without any other kind of crop; then we are sure of a good and luxuriant braid. This plan is far too seldom adopted, for fear of losing a crop of corn or cole. Whatever kind of crop or course of cropping may have preceded, it will make no difference as to this recommendation, provided the land is clean and well pulverized. It is seldom desirable to sow the land down to grass before the third year, which affords a better security against the re-vegetation of the heath than if sown down the second year. Where permanent pasturage is the grand object in view, there is no good policy in deep ploughing before the last course. The principal thing seems to be how to get a good braid of grass, and how to keep it from year to year. Supposing that the land has been pared and burned, and one, two, or three crops taken before sowing down, I should recommend shallow ploughing until the last course, which ought to be an inch or two deeper. This will raise to the surface all the lime and ashes or other manures which remain unexhausted in the land, as well as a small portion of fresh soil; the tendency of all manures not volatile being obviously to settle downwards. This will afford a rich store of food for the young grasses, their nutriment being derived principally within a few inches of the surface.

---

* All lands in England and Wales at an elevation of 1000 feet above the level of the sea, whatever may be their qualities in regard to the nature of the soil, are too high for arable culture. In some districts, however, we find as good crops produced, and the harvest as early at an elevation of 800 feet, as in others at 300 feet lower. Local circumstances have a great tendency to alter the climate, as well as the period of ripening of grain. Poor clay-soils on a cold-bottomed retentive subsoil, and northern aspect, are much later than those of a light, dry, sandy, gravelly, rubbly nature, on a rocky or porous subsoil, with a southern aspect and a good inclination, approaching to a right angle with the sun at midday. Lorge tracts of undrained land, unreclaimed heaths, forests, lakes, mountains, and morasses, all have a great tendency to attract moisture, and decrease the temperature of the district; whilst, on the other hand, a well-cultivated and well-drained district has the opposite effect. Moisture attracts moisture, and water attracts water. How much then might be done to improve the climate of this country, were a complete and thorough drainage effected of all the waste lands, in addition to what is steadily going on in cultivated districts! The effect of such a state of things may be readily imagined by those who have studied the laws of nature.

M. M.

In respect of those lands which by reason of their steepness cannot be ploughed, I have but few observations to offer. Draining, liming, or planting, appear to be the only recources which we can profitably employ for their amelioration. I have seen paring and burning, with a good application of lime, tried, but do not approve of it. The slippery state of the surface after paring, combined with its steepness, enables every shower of rain to wash away a considerable portion of the lime and ashes. Besides these objections, paring and burning will not always eradicate the heath without having recourse to the plough also.

In laying down heath land to permanent pasture, I would always suggest that a good selection and variety of clovers and grass seeds should be sown, more particularly of those natural grasses which are most congenial to the soil and climate.

It is a lamentable but a notorious fact, that much more harm is frequently done to redeemed heath land by over-cropping and over-stocking afterwards, than by any of the usual methods adopted in the primary act of reclaiming. Farmers in general are too apt to plough and rake away at the land so long as it is in high condition and produces a crop of any description, never looking beyond their immediate profit. They scour away at it as though it could never be exhausted; take two or three white crops in succession without returning back to the land the manures created by it. Sometimes a green crop, which is drawn, succeeds a host of white ones; then another white crop, and sometimes two. The land is at length sown down with grass seeds, which are mown the following year; and then, without allowing the land breathing time, the plough is again stuck in, and another scourging routine of cropping pursued similar to that detailed, until the virility of the land is so far exhausted as to be almost, if not quite, beyond recovery. Some of my readers may consider this an overdrawn picture; but I assure them I have not unfrequently witnessed such facts. It is too commonly done on inferior lands difficult of access, to which my observations are principally directed, and which constitute the great bulk of recently reclaimed heath land; good land possessing in itself a reactive and reproductive power; or, in other words, an intrinsic value, which requires little more than fair play and ordinary attention to keep it fertile. Too much ought never to be exacted from lands of a weak constitution. Whatever is taken from them in the shape of produce ought invariably to be returned in the shape of manure. To build up, and never to pull down, is a maxim that ought always to be kept steadily in view. Like a delicate constitutioned man or beast, they ought to be well fed and supported, and never overworked; exercised and taxed in moderation, seasonably and regularly, but never beyond their powers. Adhering to these principles, we may safely and surely hope for their progressive amelioration and permanent improvement.

The next and concluding observation I have to make is with regard to overstocking. It is a very common error, and one which at least one half of our farmers are in the habit of committing. In the winter season especially all newly-reclaimed heath land should be left with a good covering of grass upon it, in order to protect it from the influences of the weather. Deprived of the heath, its natural covering, it necessarily—to use a common expression—"gets starved," and requires a substitute if eaten too close in the autumn or commencement of winter. When this is the case, Nature steps in with her mantle of moss to supply the defect. In each succeeding year the same error is committed, the herbage degenerates both in quantity and quality; an annual unceasing contest is maintained between the moss and the grass, each struggling for the ascendancy; and man, from short-sighted views of economy, insensibly assists the former until nature gradually turns the balance, and thus completes the victory. Whereas, had an opposite and more sensible course been pursued, by keeping always a good coat of herbage upon the land, and thus protecting it through the inclemency of winter, the cattle, though *possibly* fewer in number, would have been better fed, the top sward would have been considerably thickened, and a vigorous braid of grass, at least a fortnight earlier in the spring, when it is most valuable, would have been the result.

I have now to apologise for having introduced anything into this treatise which the scientific or practical reader may consider extraneous to the subject, or for making any omissions of what would have thrown additional light upon it. My object has been to present the reader with as much practical information as I could well compress together in a short compass, leaving out chemical and geological remarks, with their technical phraseologies, which are little understood by the generality of farmers. The importance and value of this learning, however, I am bound to acknowledge, in order to arrive at a proper application of manures to soils of various compositions.

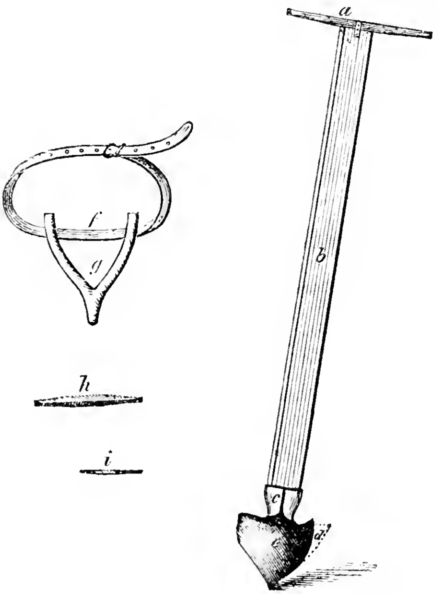
In advocating what I consider the best system or systems of reclaiming heath land, it has been my chief object to keep in view an efficient method combined with economy—a quick and adequate return for the outlay of capital, not only without inflicting either a temporary or permanent injury upon the land, but, on the contrary, by a steady, safe, and prudent course of management, to promote its progressive and permanent improvement; and I hope the time is not far distant when many of our barren heaths will be made fruitful by judicious and skilful management through the more extensive diffusion of agricultural science, which of late years has made such rapid progress under the stimulus afforded by agricultural societies, the competition for whose prizes has diffused a spirit of emulation unparalleled in our history.

The rapidity with which capital accumulates in this country necessarily suggests to its possessors a desire to invest it advantageously. In the improvement of the land there is ample scope. The produce and value might in thousands of instances be doubled and trebled if skill and capital were only applied even in land considered as already reclaimed, which, from want of thorough drainage and proper management, is almost worthless in its present state.

The great number of farmers and agricultura labourers who emigrate annually to seek a livelihood in foreign climes and far-distant colonies, driven through dire compulsion to rend asunder the strongest ties of affection, and abandon for ever their native land, cannot be viewed without feelings of regret by all right-thinking men: and yet how much of this might be obviated if our wealthy landowners would set about improving their estates by drainage and the reclaiming of extensive heaths (instead of squandering their time and capital on the continent), thereby enhancing the value of our country by increasing its produce and general fertility—providing additional supplies of home-grown food for the millions—diffusing peace and plenty around the cottage hearth by furthering and extending the happy means of employment here pointed out, and searching out the hidden treasures of the soil! Such objects as these are well worthy the highest ambition of every true patriot, who will ever regret to see those who on all occasions have been found as ready and well qualified to wield the sword in war as the ploughshare in peace, thus reluctantly estranged from the land of their birth.

February 22, 1845.

PARING SPADE AND TRAPPING.



SCALE.

1 0 1 2 3 4 5 6 7 8 9 10 feet.

12 in.

a. Handle of the spade, 2½ feet long, diameter 1½ in., made of wood.

b. Shaft do., 8 feet long, 6 in. wide, 1½ in. thick, made of wood.

c. Socket for the shaft, cut out of the spade plate and turned up.

d. Lug, or wing, cutting upwards similar to the coulter of a plough, turned up 5 in.

e. Spade, cutting horizontally, 15 in. by 13 in., well-tempered steel.

f. Strap to buckle round the body, and hold up the knocker in front of the thighs.

g. Knocker to push with, and protect the person from injury (forked piece of wood).

h. Rough whetstone for giving a rough edge.

i. Smooth do. for giving a fine edge.

ON STORING TURNIPS.

BY THOMAS SULLIVAN.

The turnip is universally allowed to be the most valuable of all our commonly cultivated roots as a general article of food for live stock; and its utility in this and other respects is sufficiently demonstrated by the great importance which is attached to it by every cultivator of the soil, and every feeder of cattle, throughout the kingdom. The culture of this valuable root has extended in proportion as its usefulness has become duly appreciated; and, generally speaking, the most judicious methods of cultivation are now well understood by most farmers. But notwithstanding the comparatively high degree of perfection which has already been attained in the culture of turnips, there are still a few particulars connected with the management of the crop, in reference to which some diversity of opinion continues to prevail among practical agriculturists. We find some practices which though long established in particular localities, are still either altogether unknown or imperfectly understood in others. Thus there exists much difference of opinion in regard to the propriety and practicability of storing turnips in any considerable quantity or for any lengthened period. Every farmer will be ready to acknowledge the advantage of drawing and storing a portion of the crop in dry weather, for the use of the stock at a time when, from various causes, it would be difficult, if not impossible, to supply them directly from the field; as also before the severity of the winter sets in, for spring consumption. Although this practice has been resorted to for a considerable time past in some parts of the kingdom, yet in many others it is, I believe, almost entirely unknown. It is generally allowed that the Swedish turnip, on account of its thick, tough rind, and the comparatively small proportion of water in its composition, may be taken up and stored for a few months without losing much of its nutritive properties; but there are many farmers, even in well cultivated districts, who deem it altogether impracticable to store either the white or the yellow sorts for any lengthened period, from an apprehension of the roots so treated becoming deteriorated as food. There are several others, however, who duly appreciating the many advantages of the practice, have tried it for one or two seasons; but finding a considerable number of the turnips, before being required for consumption, either rotted or sprouted to such a degree as to render them almost entirely valueless, have again discontinued the system of storing. Such unsuccessful attempts, arising undoubtedly in most cases from adopting an injudicious method, have led some farmers rather hastily to regard the storing of turnips as both unprofitable and impracticable; and induced them to relinquish and condemn a practice which they had improperly begun and unfairly tested. It is nevertheless indisputable, having been abundantly demonstrated by many years' successful experience, that not only Swedish, but also yellow turnips can be preserved in a store for several months during winter, without sustaining any material deterioration either in quality or quantity of nutritive matter, at least not nearly to the extent that is commonly supposed. The writer of this paper has had frequent opportunities, for some years past, of witnessing the storing of large quantities of turnips for the use of stock, both during the continuance of stormy or very wet weather, and in the early spring months, and in almost every instance with the most beneficial results. As the practice is unquestionably attended with several important advantages, it is hoped that a few remarks upon the subject may not prove unacceptable at this season to the readers of the *Farmer's Magazine*.

In the course of the following observations, I shall first endeavour to point out some of the most important of the advantages accruing from the practice; secondly, advert to a few of the most approved methods of storing turnips; and thirdly, show from the result of actual experiment that this valuable root can be preserved for several months in a properly formed store, without either becoming rotten, or losing any very material proportion of its nutritive juices.

In the first place, I may observe that, in most parts of the country, the usual manner of supplying cattle with turnips during the winter months is, to cart them directly from the field as they may be required for daily consumption. Occasionally, however, a quantity sufficient for a few days, or perhaps a week, is drawn and carted to the homestead at one time, particularly should an immediate occurrence of unpropitious weather be apprehended; but whether the turnips be removed from the field for daily or for weekly consumption, as circumstances may render most convenient, it is customary to place them in heaps contiguous to the doors of the cattle-houses, or to the entrances to the feeding yards, (as the case may be), in which state they are exposed to the action of the elements till consumed by the animals. Now, this very general practice of removing from the field to the homestead no more turnips at one time than will suffice for the daily, or, at the most, for the weekly consumption of the stock, involves many serious inconveniences and disadvantages; and its injurious consequences are aggravated in no slight degree by suffering the roots to lie exposed to all the vicissitudes of weather in the interval between drawing them and furnishing them to the cattle. Wherever any considerable number of animals are fed upon turnips during a part of the year, and the practice of storing a portion of the crop in the open air is not regularly or systematically pursued, one or two root-houses may be regarded as indispensable. These should be sufficiently capacious to contain at the least a week's supply of food, and, for the sake of convenience, situated contiguous to, as well as communicating with, the feeding-houses, byres, &c. A proper root or turnip-house is a great desideratum in the arrangement of most of the existing farm-steadings; and it is obvious that none can be considered as complete without including one or more, according to the extent of the establishment. The advantage of supplying all sorts of live-stock with dry, clean, and *fresh* turnips, instead of such as are dirty or frosted, is too apparent to require any illustration;

though this is a point which seldom receives adequate attention, it being greatly neglected by some farmers.

It is generally considered that turnips, and indeed most other roots, if not attacked by disease or injured by frost, are most palatable and nutritious when furnished to the animals fresh from the ground; and the ordinary mode of feeding from hand to mouth--to use a common expression--would perhaps be unobjectionable, if a continuance of fine weather could always be secured, or calculated upon for any length of time. I am decidedly of opinion, however, that turnips should not in any case be allowed to remain unpulled after the beginning of February; the reason of which shall presently be stated. But even in those parts of the kingdom whose climate is comparatively of the mildest character, unsuitable weather for taking up and carting from the field any considerable quantity of roots very frequently occurs in the course of most winters; and hence the importance of having on such occasions an adequate supply in store to maintain the stock until the weather again becomes propitious. Although turnips may be somewhat more palatable and nutritious as food when given directly from the field, at least during the early part of the season, yet any advantage that may be secured in this way is counterbalanced by the risk and inconveniences arising from having to resort daily to the field. During, or immediately subsequent to, a long continuance of wet weather, turnips may possibly be drawn; but unless the soil be of a very porous description, their necessary removal to the homestead would be most detrimental to the land, and most laborious on the animals of draught. The cattle must, however, be supplied, whether the ground be light or heavy, permeable to or retentive of rain water; and rather than curtail or diminish their accustomed allowance of turnips, the farmer is obliged to submit to have his land poached and injured by carting upon it while saturated with moisture. This disadvantage would obviously be prevented in a great degree by adopting the practice of storing. When a hard frost sets in, the difficulty of adequately supplying the stock with roots from the field is still farther increased. The soil being congealed about the bulbs, it requires no inconsiderable labour to get them up; they cannot be drawn by the hand in the usual manner, but must be forced up by means of a small pick. This is necessarily a tedious operation, and the turnips are often much broken, a portion of the bulb being sometimes unavoidably left in the ground; besides, it is well known that frosted turnips are injurious to cattle, producing a degree of looseness in the bowels, which, if suffered to continue, would soon reduce the animals in condition. They are rarely found to increase in weight or in fatness during frosty weather, except their food is always at hand and in good condition, which can be secured only by having at all times a due supply in store for such contingencies. The case is even still worse when a snow-storm occurs, and no turnips have been secured for the use of the stock during its continuance. The pulling and carting of them in such weather is necessarily attended with much disagreeable labour for both men and horses, and sometimes, in fact, it is altogether impossible to procure any, when enveloped beneath a mass of snow, or in consequence of the roads being rendered impassable.

These are by no means extreme or unusual cases, for they frequently occur in most parts of the country, to the loss and vexation of farmers and feeders of stock; and in the northern counties such instances of stormy weather are very common during the winter months. The recurrence of frost and snow is of course expected about the usual period, and the farmers there are in most cases prepared for the storm by having a sufficiency of turnips previously stored; though it must be admitted that many, in the districts referred to, are much too unmindful of their interest in this respect. It is very easy to conceive how badly circumstanced fattening cattle must be during a continuance of unpropitious weather, when the farmer is unable to furnish them with their ordinary allowance of roots; whereas by having always, after the beginning of winter, several weeks' supply secured in the turnip-house, or, which is much preferable, in a pile well protected with straw, the stock are rendered quite independent of the weather; they receive their food undiminished either in quantity or quality, it being clean and fresh at all times, and will be accumulating fat, while others differently circumstanced must be losing some of what they had previously acquired. The farmer can then "bide the pelting of the pitiless storm" with a comparatively tranquil mind, under the consciousness of all the animals dependent on him for food being amply provided for.

Potatoes and some other roots, which are invariably taken up and stored before winter, are no doubt accessible and generally used in such emergencies; but where a large number of cattle are to be maintained, it is obvious that all the potatoes usually raised on one farm would be thus speedily consumed; besides, a change from turnips to potatoes should, if possible, be avoided until spring, or until the animals are nearly ready for the butcher. It is almost needless to observe that, in order to maintain cattle in a progressively thriving condition, or, in other words, to fatten them off in the shortest possible period, it is absolutely essential to supply them regularly with abundance of turnips in proper condition, or with some other equally nutritious substitute; and to have at all times a sufficiency of turnips for this purpose, it is, of course, necessary to store a considerable quantity from time to time, as suitable opportunities occur, for the use of the stock when the weather becomes unfavourable for obtaining any from the field. There should be at least a month's consumption for the cattle secured at all times during winter, which in general cases will render it unnecessary to resort to the field in rainy or stormy weather, or while the land is saturated with moisture.

We have thus seen that the practice of storing turnips as suitable opportunities occur before and during winter, is of incalculable benefit in maintaining the fattening cattle in a thriving condition; but its utility does not consist merely in enabling the farmer to furnish his stock regularly with abundance of fresh and nutritious food, though this is of itself a most important advantage. The land is likewise materially benefited by the adoption of the practice, as being thereby exempt from cartage during wet weather; and the advantage of this is especially observable in the case of undrained and retentive soils. Every agriculturist must be sensible of the injury inflicted on his land by carting to any extent upon it in wet weather, or while it is saturated with moisture. In the latter state it is liable to be seriously damaged by being cut up and trampled by cartwheels and horses' feet, which, especially in clay soils, form receptacles for the retention of water for a considerable period, besides consolidating the surface to such a degree that subsequent drought in spring renders it almost impenetrable to the plough, and causes it to turn up in large obdurate clods, whose necessary pulverization involves no inconsiderable amount of labour. This is a result which every intelligent cultivator will be most anxious to avoid or prevent; but he can do so on such soils only by keeping at all times, during the winter months, a surplus quantity of turnips in store, so that, during a continuance of wet and unpropitious weather, he may be provided with a sufficiency of roots for his stock, without being under the disagreeable necessity of resorting to the field, until the land becomes so dry that no injury can be sustained by it from the necessary cartage.

The extension of thorough draining and subsoil ploughing, by rendering naturally wet and retentive lands dry and porous, has no doubt very materially contributed to diminish the liability of even strong clays to injury from this cause; but however well drained the soil may be, a heavy and long continued fall of rain requires some time in winter to penetrate the ground and escape. Hence the active soil generally remains more or less saturated for some time after much rain, and if carted upon to any extent while in this state, the surface would be consolidated to such a degree as to prevent in a great measure the descent of any rain-water that may subsequently fall. Although it is obvious that undrained retentive soils are those which are most liable to injury in this way; yet there is, in fact, scarcely any description of land so dry and porous, as not to be damaged in some degree by much cartage during or immediately after wet weather.

Again, every farmer must be aware of the powerful agency of the winter's frost, in meliorating and disintegrating the soil exposed to its influence; and this furnishes another weighty argument in support of the propriety of storing turnips before the severity of the season sets in. By removing the turnips off the field in sufficient time, the land may be ploughed up for wheat, which is now frequently taken after Swedes by many of our best agriculturists; or if barley is to succeed, as is most generally the case on the medium and lighter classes of soils, the ground becomes finely pulverized and prepared for the reception of the seed by being ploughed and exposed to the action of the weather during the winter and early spring months. It frequently happens in the management of soils of a medium degree of tenacity, where no advantage is taken of the meliorating influence of frost, in consequence of the turnips not being removed till after winter, that considerable difficulty is experienced, especially in droughty springs, in pulverizing the ground in a sufficient manner for the succeeding barley-crop. After a continuance of dry weather, and the increased consolidation of the surface caused by the removal of the turnips, land of this description is turned up by the plough in indurated masses, which require no inconsiderable number of harrowings and rollings, and not unfrequently even the application of Crosskill's clod-crusher, to reduce them to that fine tilth which, especially in droughty seasons, is so essential to the even germination of the seed, and the vigorous growth of the crop; whereas had the turnips been drawn and stored in the month of November or December, and the land immediately ploughed, it would be so pulverized by frost and other atmospheric influences, that its preparation at seed-time would be attended with little or no difficulty. It ought always to be borne in mind as a practical fact, that the winters' frosts, or rather the successive changes of temperature, are more effective in reducing stiff soils than any artificial mechanical means, however laborious and expensive. It would be needless as well as irrelevant to advert in this place to the importance of having the ground well pulverized for barley, which, along with clover and grass-seeds, generally succeeds turnips; but this desirable object is somewhat difficult to accomplish in droughty springs, when the ploughing of the land is deferred till seed-time. Uneven germination and growth, deficient produce, and an inferior quality of grain, together with a late harvest, are too frequently the results of imperfectly reduced turnip land as a seed-bed for barley.

But besides the damage necessarily sustained by the land from much cartage during or immediately after wet and stormy weather, and the opportunity of economically and effectively pulverising it, which is lost in consequence of its not being ploughed up to the action of the frost, the turnips themselves are liable to injury from various causes. It is well known that all sorts of turnips, particularly the softer and earlier varieties, are apt to become rotten on the ground towards the beginning of spring, arising chiefly from the effects of sudden alternations of frost and thaw at that period. Swedes, owing to their more hardy nature, and the thickness and close texture of the rind with which the bulbs are protected, are less liable than other sorts to injury from atmospheric influences; but even these seldom survive the winter with impunity, when not taken up and stored. It is generally allowed that Swedish turnips become more palatable to cattle after receiving a little frost, indeed they rarely attain full maturity until the beginning of winter; but they are also peculiarly grateful to rooks and hares in frosty and snowy weather, and in fact at all other times. The hares commence the attack by eating off the rind, and thus prepare the way for the rooks and frost, the latter soon completing the destruction of the bulbs perforated by the former. Even in the absence of frost, rain-water finds its way into the fleshy part of the bulb after the skin has been broken, and putrefaction is almost invariably the consequence. Many tons of valuable Swedish turnips are thus annually destroyed, by the combined attack of game, rooks, and atmospheric changes, which, with other casualties to which this crop is incident, might entirely be prevented by drawing and storing the roots before winter.

Even should the turnips which are suffered to remain in the field over winter receive no injury from the foregoing causes, there is yet another way in which they are apt to become deteriorated in value, in consequence of being pulled only as required for consumption. As soon as the weather becomes mild and warm towards the beginning of spring, the turnips then on the ground show symptoms of vegetation, and will soon after send forth their flower stems, which are produced at the joint expense of the bulbs and the soil. These shoots are often permitted to attain a considerable height before the turnips are wholly taken up; a most reprehensible practice, which, it is needless to say, cannot be too soon abandoned. The bulbs are thus deprived of most of their nutritive juices, which are expended in the production of shoots, and are in consequence rendered quite spongy or reedy, and almost valueless as an article of food for any description of stock. It is supposed in some districts that the consumption of turnips which have been allowed to send forth shoots in the early spring months is a cause or a predisponent of the disease among cows, called *red-water*. Without however, attaching any great importance to this conjecture, it is certain that such turnips can neither be palatable nor nutritious for cattle, whilst they must prove highly exhausting to the land, what ought to constitute a restorative crop being thus converted into one of an opposite character. It is obvious that this evil can be averted only by taking up and storing the bulbs before winter, or at the very farthest as soon as they exhibit the first appearance of vegetation.

We have thus seen the many important advantages accruing from the practice of storing turnips —in providing a sufficiency of dry, fresh, and wholesome food for the stock, during a continuance of stormy and unpropitious weather, when it would be difficult and disagreable, if not impracticable, to supply them directly from the field—in obviating the injury necessarily arising to the land, particularly if it be undrained and of a clayey description, from the removal of the turnips during or immediately after rain, and while the ground is saturated with moisture—in securing the benefit of the frost for meliorating the soil, if not directly sown with winter wheat—and as an effectual preventive against the attack of some diseases or casualties, the depredations of rooks and game, and the influence of sudden atmospheric changes, besides obviating the injury sustained both by the bulbs and the land in consequence of the former being allowed to send forth their flower shoots in early spring.

The most proper period for storing turnips must obviously depend on the state of the weather and the variety to be stored. Should there be much of either frost or rain about the beginning of the feeding season, no more turnips can be taken up at one time than will suffice for the daily, or at most a few days', consumption of the cattle; but at all times after the middle of November, when the weather is dry and mild, and the ground firm on the surface, the farmer should secure as large a quantity as time and other circumstances will permit, both as a resource for unpropitious weather, and to clear the land for other purposes. In the consumption of turnips by cattle, the different sorts are used in succession; thus the white varieties are consumed in the early part of the season, both because they come earliest to maturity, and are unable to withstand the severities of the winter. Owing to the thinness of their rind and the large proportion of water in their composition, they are unfit for storing for any length of time. Although we have seen globes keep very well for five or six weeks, yet the storing of white turnips cannot be recommended, except, indeed, in small quantities and for short periods, as they are apt very soon to sprout in the house or pile, and become, in consequence, spongy and unpalatable to the stock. The yellow sorts come into use after the white, and commonly last till the end of February; at which time they begin to lose their nutritive properties, whether they have been stored or allowed to remain in the field. All the yellow varieties, particularly the Aberdeenshire bullock and Dale's hybrid, are well adapted for storing, and if taken up in dry, fresh weather, and properly secured, will continue in good condition till the middle or the end of February. After the beginning of November, they may be drawn and stored as time permits, or opportunities of favourable weather occur. As already observed, there should always be sufficient turnips for several weeks' consumption at command, as a provision for stormy weather and other contingencies; and in no case should any be left in the field after the beginning of February: all that then remain unconsumed ought to be taken up, and stored, for the double purpose of preventing the bulbs from sending out shoots, and of getting the land properly prepared for the succeeding grain crop. As has been already remarked, Swedish turnips are often succeeded by wheat, either autumn or spring sown, according to the state of the weather and other circumstances. In the former case, the Swedes must be removed by the middle or before the end of November, at which time they generally attain complete maturity; at all events, any advantage that they may afterwards derive from the soil is compensated by the beneficial results of storing already adverted to. No favourable opportunity for getting home the crop should be neglected during the months of November and December; and if properly stored at this period, Swedish turnips will retain most of their nutritive juices till the middle, and sometimes even till the end of June.

Several methods are adopted in different districts for storing or otherwise preserving turnips during the winter months. When the object is merely to protect the bulbs from the action of the frost and the depredations of rooks and game, it will suffice to cover them in the beginning of winter in the drills or rows in which they have grown. This is effected by passing a double mould-board plough or even a common plough along the intervals, which raises the earth over the turnips. This operation will be found advantageous in all cases where Swedish turnips are allowed to remain in the field during winter, as the covering of earth affords a tolerably good defence against the effects of severe frosts, as well as the depredations of rooks and hares. This plan is, however, defective, inasmuch as it possesses most of the inconveniences which the practice of storing is so well calculated to remedy. The turnips so treated may possibly be preserved in a fresh state until required for use after the yellow sorts have been consumed; but in unpropitious weather, or during a continuance of hard frost, they are obviously as inaccessible as if they had not been covered at all. Still, however, this plan is frequently adopted with advantage, though evidently inferior in many respects to the practice of storing. When the turnips are required for the cattle, the drills are reversed by the plough, and the roots disengaged from the earth by one or two turns of the harrow.

There is another plan occasionally adopted in some localities, chiefly with the view of clearing the land in order to have it ploughed up for winter wheat. This consists in removing the turnips, at the proper period, to another field, where they are placed singly upon the ground, and as close to each other as possible. Sometimes they are arranged in rows, and covered with a furrow-slice of earth; other bulbs being placed in the successive trenches, and covered in the same manner by the plough. The turnips are thus made to occupy a much smaller space than before, and may also keep fresh for a considerable length of time; but in all other respects they are no better circumstanced than if allowed to remain in their original position. A modification of this plan is to remove the turnips, without divesting them of their leaves or tap-roots, from the field in which they have grown, to a suitable spot of lea-ground contiguous to the farm-buildings; where they are placed close to each other on the surface of the land, without, in most cases, any protection from the action of the elements, except that afforded by the leaves, which are uppermost and in contact. Now, although it is admitted that these latter expedients are effective enough in clearing the turnip-field, and in economising space, and also that the bulbs may be thus preserved in a fresh state for a considerable period, should severe frost not set in, they are nevertheless, objectionable on several grounds. As the weather becomes mild and warm towards the opening of spring, the roots so treated begin to vegetate, and send out shoots, which must diminish the nutritive matters of the turnip producing them, as no nourishment is derived from the lea ground on which they are placed—in one of the cases alluded to. Alternations of frost and moisture also cause the leaves to decay and rot, and their putrefaction is often succeeded by that of many of the bulbs themselves. Not only are the turnips which may be treated in this way exposed to all the vicissitudes of the weather, but the paramount advantage of storing, namely, the having at all times a sufficiency of roots at hand and in good condition for the use of the stock independent of the weather, especially during a continuance of frost or snow, or while the ground happens to be saturated with moisture, cannot be secured by merely removing them from one field to another, whether they be there covered with earth, or laid close to each other and singly on the ground. After the labour of pulling the turnips and of filling them into carts has been incurred, economy alone would obviously point out the propriety of removing them at once to a proper store either in the stack-yard or some other suitable place near the feeding-houses, where they would always be at hand, and in a fit state for the use of the stock.

Turnips cannot be preserved for any length of time in a sound state, in pits covered with earth, and partly sunk in the ground, as in the case of storing potatoes. The exclusion of atmospheric air, and the retention of the gases generated by the incipient fermentation of the roots, cause them to sprout and ultimately to rot in the pits so formed. Turnips are not unfrequently stored in a house or shed; but they are there little safer than those last referred to, as in all cases of house-storing they seldom fail to become, after some time, quite rotten at the bottom of the heap, while the bulbs on the top are forced into premature and luxuriant vegetation by the heat arising from the fermentation and putrefaction of those underneath. Such of the turnips as are not rotted in this way never fail to sprout to such a degree as to render them almost worthless as food for cattle. This crop is, moreover, a bulky commodity to store in any considerable quantity in a house, and for this and the reasons which have been already adduced, turnips should always be stored in the open air, when it is intended to preserve them for any length of time, and never covered with a coating of earth, as in the case of potatoes.

When turnips are stored for future use in the open air, the stack-yard is usually selected for the purpose, both on account of its proximity to the cattle houses and the convenience of procuring straw for the purpose of thatching the heaps; besides, the rick-yard is generally, as it ought invariably to be, dry and firm on the surface, and a dry spot is obviously essential to the preservation of the roots. Should sufficient room not, however, be found in the stack-yard for the purpose, as is often the case about the beginning of winter, the turnips may be stored with equal advantage on a suitable piece of grass land convenient to the homestead, the only precautions to be observed in the choice of a situation being proximity to the feeding houses, and the selection of dry ground, which is easy of access by carts or otherwise.

After what has been already said, it is perhaps unnecessary to observe here that dry fresh weather should always be chosen for the drawing and storing of turnips, for the double purpose of securing the roots in a clean state, and of averting the injury which the land would otherwise sustain in their removal. Turnips are taken up for storing, or for immediate consumption, either by the hand or with the plough, the former being the more common, and the latter the more expeditious method. We shall, of course, suppose the crop to be grown in drills or rows (though the broadcast system is still but too prevalent); and when the plough is not employed for the purpose, the turnips are drawn by women and boys, each person taking two adjoining rows. In the act of pulling each turnip a slight twisting motion is given to the hand, in order to disengage the earth, and the leaves and tap-roots are cut off with a curved knife adapted to the purpose, or with a fragment of a sickle, due care being observed not to wound the bulb with the instrument, as the juices exuding from the incision predispose in a great degree to the subsequent putrefaction of the turnips when stored. In the case of those varieties that possess small tap-roots, and which can readily be pulled without any portion of the earth adhering to the bulbs, the operation of tailing may be safely and advantageously omitted; at least only a small part need be removed. Swedes and some kinds of yellow turnips, on the other hand, send out several side shoots, which take a firm hold of the soil, and thus render the drawing of the bulbs more difficult. It is necessary also to pare off all the lateral shoots with any earth that may adhere to them, preparatory to their removal to the store. The tap-roots, side-shoots, and leaves must all be cut off in the most careful manner, and not too close to the bulbs, as, otherwise, the decay of the latter would be materially accelerated.

As the turnips are thus pulled and divested of their leaves and tap-roots, they are laid in the intervals between the rows, every two adjoining persons placing together in the hollow of the intervening drill, for the two-fold purpose of affording a clear passage for carts, and of facilitating the filling of them with the turnips. The dissevered tops or leaves are also thrown into small heaps by themselves, when it is intended to remove them either to the homestead or to another field to be consumed by the stock; otherwise they are scattered over the ground simultaneously with their separation from the bulbs, to be immediately ploughed under as manure. The most general practice, at least at the beginning of the feeding season, is to remove both bulbs and leaves from the field, the latter portion of the crop being supposed to contain a considerable amount of nutritive matter; but the propriety of using turnip-tops as an article of food for fattening cattle is somewhat questionable, as their feeding properties cannot be of much importance, though it is admitted they are consumed with avidity in the early part of the season, on account chiefly of their abounding in watery juices. But, however doubtful may be their value as food for stock, their action as a manure is unquestionable; their efficacy as such having been frequently manifested and observed in the surprising effect their decomposition in the soil has upon the succeeding grain crop. Turnip leaves are known to contain a considerable proportion of saline and earthy matter besides their purely organic constituents, which are also capable of affording nourishment to the succeeding crops. According to a recent analysis made by Professor Johnston, a ton of leaves contains ten pounds of phosphates, while a ton of bulbs contains only from three to six pounds, thus showing that the leaves abstract about twice as much phosphates from the soil as an equal weight of bulbs. This will readily account for the powerful action of leaves as a manure. We can confidently speak from experience as to the advantage of ploughing in green turnip-tops, having frequently witnessed their beneficial influence upon the succeeding wheat crop. In order to obtain the greatest benefit from their decomposition in the soil, they should be covered in with the plough as soon as possible after their separation from the bulbs. It is found necessary to have each plough attended by a young person provided with a fork, that all the leaves may be completely covered beneath the surface, and that the instrument may not be interrupted in its progress by their occasional accumulation between the coulter and the beam.

It has been already remarked that turnips may be taken up in a very expeditious manner by the common plough drawn by one horse. This method is resorted to with the greatest advantage in taking up Swedes in the early spring months, as owing to the leaves being then withered away by the winter's frost, the bulbs cannot be drawn by the hand without considerable labour and difficulty. In this case the plough is passed along one side of each drill or row, taking a light furrow-slice, and some care is necessary to guard against breaking or injuring the turnips with the instrument. As soon as the newly turned-up earth has become sufficiently dry, which at that period it generally does in the course of a few hours, it is well harrowed in different directions to disengage and expose the turnips on the surface. They are then collected into small heaps by women and boys, who, at the same time, cut off with a fragment of a reaping-hook or a bent knife the tap-roots, leaves, and any earth that may still adhere to the bulbs. In this way a very considerable extent of crop can be taken up in a comparatively short period, and at little expense.

Turnips should be removed from the field to the place of storing as soon as possible after they have been drawn, in order to guard against any injury that may arise from frost or other atmospheric changes. It is, in fact, a common practice in some localities to pull the turnips only as fast as they can be carted off; but, in order to insure despatch and to obviate the necessity of keeping the horses standing idly in the field for any length of time, a sufficient number of workers should be employed some time previously in pulling and cleaning the turnips, and it would also be useful to have one or two persons to assist the horsemen in filling the carts, so that no time may be lost. As already observed, a dry day must be selected for carting and storing turnips, and then all the available strength ought to be employed in order to get as much accomplished as possible.

Turnip stores are made of different shapes and sizes; but that which for various reasons I consider the best and the most easily formed, consists of a triangular pile (or one whose vertical section is a triangle), from seven to nine feet wide at the base, and as high as the turnips can conveniently be placed. The breadth at bottom, of course, regulates the height; thus, if the heap is nine feet wide at the base, the bulbs may be piled up to the height of four feet. It is obvious that Swedes can be preserved in somewhat wider stores, and in larger quantities than either the white or yellow sorts. Turnip heaps of this form may be extended to any length that circumstances may render most expedient. When the turnips are not placed against a wall (a practice which, though common, can in no case be recommended), it might be found of some advantage to enclose the foundation of the intended store, at both sides and the end at which a commencement is to be made, by a few stout sticks laid longitudinally upon the ground. In emptying the carts of their contents, care must be taken not to injure the turnips with the wheels; and all broken or damaged roots should be excluded from the heap.

Different materials are employed for covering turnip heaps, according to circumstances. Thin turf has been used for the purpose; but straw is a much more preferable article, as it allows the admission of air while preventing the access of frost to the turnips. The thatch which is taken off the roofs of the stacks on removing the corn to be threshed may be advantageously used in this way: it should first be drawn into small bunches, so as to make the straw of uniform length, and then carefully laid upon the turnips to the thickness of from four to six inches, according to the period of the season. The thatch is secured in its place by means of straw ropes arranged lozenge-ways, as on the roofs of corn stacks, and fastened either to short wooden pegs driven into the ground along the sides of the pile, or to the sticks already alluded to. The straw may likewise be secured by placing a few ropes longitudinally along the sides of the heap, with others laid transversely, and intersecting the former at right angles, the ends being fastened in either of the ways just referred to. I may mention here that the object sought to be attained by thatching the store is not so much to exclude rain as frost, the latter being the principal agent in producing or causing putrefaction. Atmospheric air and a slight degree of moisture are necessary to preserve turnips in a fresh condition, and hence the superior advantages of a covering of straw, which admits both. Should the ground on which the turnips are stored be flat and retentive of moisture, it might be useful to cut a shallow trench around the heap, and led off to some distance, in order to guard against the stagnation of water in its immediate vicinity. This precaution will be the more necessary when two or more turnip stores are formed in the vicinity of each other, as the rain-water falling from the roofs in wet weather is thus carried off and prevented from running under the piles. Swedish and yellow turnips secured in the manner now described will be preserved in good condition for a considerable length of time; but though certainly preferring the triangular-shaped store, I am aware that other modes are adopted with advantage in some districts. A plan of turnip store has been recommended, and I believe found to succeed, which is formed by driving into the ground two parallel lines of stakes about two-and-a-half feet high, and from six to nine feet apart. Other stakes are inserted at the end, and the whole are wattled together with brushwood, thus forming an enclosure, in the interior of which the turnips are placed, and piled up to a convenient height, and thatched with straw. The turnips are said to keep fresh in this store until the month of June; and as they thus occupy less space, and require less thatch than in the triangular-shaped pile, this plan may be adopted where room is limited in the rick-yard, and straw scarce; but unless stakes and brushwood can be easily procured, any advantage that may be gained by economizing space and thatch will be counterbalanced by the trouble and expense of procuring the requisite number of stakes, not to mention the labour of driving them into the ground, and of wattling them together.

I have already more than once in this essay stated, as the result of personal experience, that Swedish turnips taken up in dry weather during the months of November and December, and carefully stored in the manner described in these pages, will be preserved in good condition till the middle of June; and I feel confident that all who have fairly tried the practice for any length of time will be ready to confirm the truth of this statement. In further proof of the advantage of storing, and in corroboration of the fact that the turnips so treated are not deprived of so large a proportion of their nutritive juices as is commonly supposed, but are in reality equally if not more valuable as food for live stock than turnips taken from the field for daily or weekly consumption, I shall conclude these remarks by giving the result of an interesting experiment made in 1841-2 by Mr. Andrew Howden, one of the most intelligent agriculturists in East Lothian, which appears conclusive on the subject. This experiment was made in competition for a premium offered by the East Lothian Agricultural Society, for the most successful experiment betwixt the value of a given portion of Swedish turnips of not less than three acres, taken up and stored on or before the first week of December; and an equal portion to remain on the ground, and be lifted for the use of the stock in daily or weekly supplies till the second or third week of February, and then stored. In accordance with the rule prescribed, Mr. Howden laid off eight imperial acres of Swedish turnips, four acres of which were stored, and the other four lifted for the use of the cattle daily or weekly; after which, four drills were taken off and stored, while other four drills were alternately left standing for the daily or weekly consumption of the cattle. A committee appointed by the society attended, when the cattle were weighed previous to putting them up to feed, and also again on the 2nd April, when the live weight was ascertained, as in the subjoined table. "In an experiment upon such a subject," observes Mr. Howden in his report, "the result must depend very much upon the nature of the season; and as the winter now past (1841-2) has been comparatively mild, of course the effects of frost have been less hurtful upon the food supplied daily or weekly from the field, than it must have been had a severe and lasting frost characterized the season. Had the winter been of such a nature, very different must have been the result of what I have to report, consequent of the plan which I adopted, and which was simply to cut off both shaws (leaves) and roots from one half of four acres of turnips, and from the other half to cut away the shaws only." At the time of storing the turnips, Mr. Howden thought it might be useful to ascertain the loss of weight by keeping; and with this view he had a ton of turnips put under a shed, another ton placed in the open air and covered with rough turf, and a third ton also in the open air, but carefully covered with straw. The following was the result:—

	cwt.	st.
Loss of weight on one ton stored in the house - - - -	3	3
Ditto on one ton covered with turf -	2	3
Ditto on one ton covered with straw -	2	0

"When the committee made their inspection on the 2nd May," continues Mr. Howden, "there remained of the turnips stored in December 1 ton 3 cwt.; and of the four acres taken from the field daily or weekly, up to February, and then stored, the quantity unconsumed was found to weigh 4 tons 14 cwt.; then it was found by calculation the lot of cattle No. 1 had each animal consumed 192 lbs. of turnips daily, those of lot No. 2 each beast 205 lbs. To this must be added eight shillings a-head for meal lately given."

Subjoined is the tabular statement alluded to:—

Lot No. 1. Five Cattle on daily supply; live weight, 1st December.	cwt.	st.
No. 1 ..	9	4
2 ..	10	2
3 ..	10	0
4 ..	9	6
5 ..	9	7
	49	3

Lot No. 2. Five Cattle on stored turnips; live weight, 1st December.	cwt.	st.
No. 1 ..	10	0
2 ..	10	7
3 ..	10	1
4 ..	10	1
5 ..	8	7
	50	0

Lot No. 1. Five Cattle on daily supply; live weight, 2nd April.	cwt.	st.
No. 1 ..	10	1
2 ..	13	3
3 ..	12	3
4 ..	12	0
5 ..	12	0
	59	7
Deduct	49	3
Leaves increase on five	10	4
Ditto on four	9	7

Lot No. 2. Five Cattle on stored turnips; live weight, 2nd April.	cwt.	st.
No. 1 ..	11	6½
2 ..	13	2½
3 ..	12	7½
4 ..	13	0
5 ..	11	1
	62	1½
Deduct	50	0
Leaves increase on five	12	1½
Ditto on four	10	3

It will be seen by the above table that the animals fed on stored turnips gained considerably more weight in the same period of time than those that received their food taken in daily or weekly supplies from the field: and from this, and other testimonials to the same effect which might be produced, we must conclude with Mr. Howden, "that it is for the interest of the farmer to store his turnips in November; because, when the crop is removed he can have his land ploughed up and meliorated by the winter's frost, while the food for his cattle will always be comfortable and at command, if stored in oblong heaps, not more than eight or ten feet wide, and carefully covered with straw."

IMPROVEMENTS IN FARMING.

(FROM JOHNSON AND SHAW'S FARMERS' ALMANAC FOR 1846.)

The last five years have been remarkable for many important improvements; by the gradual employment of deeper and better modes of drainage; by the introduction of guano, and a sulphuric acid as a mixture with bones; by the more perfect understanding of the mode in which animals can be the most profitably fed; of the nature of that food; and, through these and other great improvements, by a steadily increasing productiveness of the soil. This long-continued quiet advancement in good farming, and in the consequent fertility of the land, are facts very little understood by those whose business it is to underrate the skill, the enterprise, the successful exertions, and the national importance of the invaluable farmers of England. Yet that these great, these unwearied efforts have nearly, if not quite, kept pace for a long succession of years with the demands of a steadily increasing population, a few facts will readily prove. Let us, to this end, only examine the increase of England's population, and the deficiency in the corn which it has produced, as shown by the quantity imported from foreign countries:—

Year.	Population of England and Wales.	Quarters of Wheat imported in that year.	Average price per qr. in that year. s.	d.
1700	5134516	5	35	6
1710	5066337	400	69	4
1720	5345351	—	32	10
1730	5687993	76	32	5
1740	5829705	5469	48	10
1750	6039684	—	28	10
1760	6479730	—	32	5
		Wheat entered for home consumption. Annual average of previous 10 years in quarters.		
1770	7227586	94089	43	6
1780	7814827	111372	35	8
1790	8540738	143292	53	2
1801	8872980	470342	115	11
1811	10150615	555959	92	5
1821	11978875	429076	54	5
1831	13897187	534762	66	4
1841	15911757	908118	64	5

It is evident, then (supposing the annual consumption of each person to be equal to about one quarter of wheat), that the farmers of England have, by improved modes of cultivation, been enabled to supply food for an increase (since the year 1700) of 10,000,000 of inhabitants! The average deficiency, be it remembered, in the ten years ending in 1841, being only equal to the consumption of 908,118 persons—and this, mark you, is all that Great Britain has needed from other soils than her own (an import, too, *already paid for, according to the Anti-Corn-Law phrase, in British manufactures)* is the measure, in fact, of all the foreign corn *required by England.* To profitably increase that amount of importation, therefore, you must either increase the number of mouths to eat it, or you must, by lowering the price of that corn, force out of corn cultivation all the poorer soils of England, and thus *reduce* instead of enlarge the number of the consumers of bread. If, then, the import of corn is increased beyond the present average import, who, we ask, is to *eat* the overplus?

That during the last four years the exertions of England's farmers have still kept pace with the large increase of her population, may be seen from the following table, which will not only show the quantity of wheat and flour entered for home consumption, and the duty paid on it, in the United Kingdom, from the passing of the Act 5 Vic., sess. 2, c. 14 (29th April, 1842), to 5th Jan. 1845, but will also be an answer to the intentionally cloudy statements which are incessantly made with regard to the largeness of that duty :—

Foreign.	Wheat. Qrs.	Flour. Cwts.
When the duty was 8s. per qr. ..	2105614	427580
9s. ,,	226881	27725
10s. ,,	28924	15246
11s. ,,	124319	19623
12s. ,,	92837	20012
13s. ,,	26877	13640
14s. ,,	740270	23324
15s. ,,	48020	4002
16s. ,,	75946	5365
17s. ,,	536297	6430
18s. ,,	137742	13345
19s. ,,	20860	2476
20s. ,,	80793	8038
damaged	274	—
Total	4245654	586877
British Colonial.		
1s. per qr.....	31858	534472
2s. ,,	61	1749
3s. ,,	97	26799
4s. ,,	1636	8610
5s. ,,	15957	184186
Total	49609	755816

THE SCIENCE OF AGRICULTURE.—At the Milnthorpe Agricultural Association's annual meeting, James Gandy, Esq., of Heaves Lodge, most correctly observed—and his remarks were deservedly received with great applause by a numerous and influential body of agriculturists—that, "they were all well aware the foundation of agriculture was the thorough draining of the land; that accomplished, the next point was to find out what was the best fertilizer of the soil at the easiest expence: the knowledge of this depended on chemistry, which was a science most comprehensive in its nature, and he was sure that if anything could bring up the agriculture of this country to that high standard to which it was desirable it should be brought, it was the study of this science. In the first place, they required a knowledge of the different soils; in the next place, they required to know the action of the atmosphere upon those soils; they then required to ascertain the plants suited to the various soils with which they had to do; and last of all, they required a knowledge, if he might use the term, of the nurses of the various plants." G. Wilson, Esq., of Dallam Tower, heartily concurred, he said, with the remarks of Mr. Gandy, and after indirectly alluding that the farmer's support in his struggles must be his skill, observed, "he was sorry to think that they had many false friends in the legislature, where they wanted fast and firm supporters."

THE CORN LAWS.

The subject which continues mainly to engross attention is the supply of food for the people, rendered important by the presumed material deficiency of the wheat harvest and the potato murrain. That the Government does not contemplate any immediate steps in reference to the introduction of foreign corn is now generally understood; but it is manifest that official inquiries are going on to enable them to judge how far the home supply will be sufficient. It is stated that Parliament will be prorogued on Thursday next to an early day in January, "for dispatch of business." The meeting earlier than usual may have reference to the corn question, or to the mass of railway business. Should the potato crop prove very deficient, still it is not probable that the want will be materially felt until after Christmas; and it may be the policy of the Government to let the pinch come before a remedy is applied. We do not, however, move one jot from our position: we say, Sir R. Peel and his free-trade associates will embrace the first opportunity of reducing the import duties on all articles of food. We therefore again repeat, that the leaders of the agricultural interest should come forward and make terms, rather than persevere in adhering to the present law, which every one who reasons upon the subject must perceive will be altered by the minister whenever he sees fit, without regard to the resolutions passed by three or four protection societies. Want of unity of action has always been the cause of the discomfiture of the farmers, and at the present moment will operate highly to prejudice their cause. Disinclination to move, evidences either extreme indifference to the subject, or want of business habits, which will lower them in the estimation of their opponents. The General Protection Society has caused forms to be printed and forwarded to the several local societies, requesting a return to be made of the comparative quantities of agricultural produce grown this season, in the following form :—

NAME OF AGRICULTURAL PROTECTION SOCIETY:—

IN THE COUNTY OF

NAMES OF OCCUPIERS.	Total Quantity of Land in Occupation.	Quantity in Pasture.	Quantity in Arable.	HAY AND CLOVER.	WHEAT.		BARLEY.		OATS.		BEANS OR PEAS.		TURNIPS, OR ROOTS.		POTATOES.		Nature of soil in Occupation.	REMARKS.
				Whether above, or below, an Average.	Whether above, or below, an Average.	How much.	Whether above, or below, an Average.	How much.	Whether above, or below, an Average.	How much.	Whether above, or below, an Average.	How much.	Whether above, or below, an Average.	How much.	Whether above, or below, an Average.	How much.		

We are glad to see the attention of the society directed to so important a subject. This country, in the advance of all others in almost every science and art, is behind in agricultural statistics. We long since urged the importance of this subject; but as usual, until the necessity is severely felt, no provision is made against it. We know not if the society is sanguine in obtaining returns either of such accuracy or extent as to be useful; but we have no hesitation in saying that they will not. The matter should be taken up by the government; the tithe office and the poor law machinery afford means for obtaining accurate statistical information. If a census of the people can be taken, and is necessary, surely the amount of the annual supply of food could or ought to be obtained.—*Mark Lane Express.*

THE BROMLEY REPORT—MR. HEWITT DAVIS'S CROPS.

TO THE EDITOR OF THE MAIDSTONE AND SOUTH EASTERN GAZETTE.

SIR,—We much regret that any part of our report on Mr. Hewitt Davis's farming should have caused even the slightest offence, and are desirous, in offering such apology as may be due from us, to assure you that we neither intended nor expected this to have been among its results; and from a critical review, we cannot persuade ourselves to acknowledge it fairly liable to such construction; at the same time, we forgive both yourself and Mr. Davis for what we consider a little unmerited severity of reply.

To the charge of ill-feeling we plead "not guilty," except it be an ill-feeling towards what we consider a mischievous fallacy in farming—that of sowing three pecks of wheat an acre; and we are willing to make allowance for Mr. Davis's displeasure at having his favourite theory called in question. We, like himself, have no wish to mislead; but we do wish to prevent others, who may not have the opportunity of seeing his crops, from being mislead. We give him credit for an endeavour to benefit the cause of agriculture, but we doubt the expediency of his thin-sowing theory; for recollect, Mr. Editor, this is our "text," and we intend to stick to our text, "*that sowing so small a quantity of seed corn as he recommends is a questionable and hazardous economy, and that his own crops are evidence to the truth of it.*" You say that ours is a "one-sided" statement of the question. Our object was to turn what we considered a one-sided statement round, and show how it looked on t'other side. Mr. Davis, by the publication of his system, had made it public property for censure or approval, and so with reports and estimates made and published upon it by others. The challenge has been fairly given to the agriculturists of the country; and we, as practical farmers, having claimed the common right to offer our opinions, are only anxious to do so, and be met in a spirit of fair discussion best calculated to elicit the truth.*

We cannot but thank you for referring us to the correspondent in *Bell's Messenger*, for a "confirmation" (as you are pleased to call it) of your remarks. We should not have felt ourselves bound to abide the decision of a single correspondent, especially one writing under an anonymous mask; but if the transcript be correct, we, and not yourself, might be well entitled to lay claim to confirmation, for such a confirmation might well provoke you to exclaim, "Oh! save me from my friends." In gratitude, however, and by way of reciprocating the favour, we beg to refer you to a correspondent who signs himself "A Kent Farmer," in the *Mark Lane Express* of the 25th ult., and who commends Mr. Davis's root culture, and advises him to double his quantity of seed corn.†

Mr. Davis says that no fair inference as regards thin sowing could be deduced from patches where the crop had been irregularly thinned by birds, insects, &c.; but we contend otherwise, unless he can accomplish the alternative of annihilating birds and insects. If only just enough be sown, any thinning is injurious and often fatal to the crop; while on the other hand, if a sufficient allowance were made, it might be thinned without injury. How often do we see it with the fly in turnips, or where crops are attacked by the wire-worm, or slug, or grub, that a thin-sown crop will be totally destroyed, while a thicker one will afford sufficient for the insect, and enough left for a crop! They may eat a part of two plants, but kill neither, and both recover.*

We readily plead guilty to the charge of prejudice against Mr. Davis's extreme of thin sowing, but it is a prejudice resulting from long experience and frequent trials as to the quantity of seed most advantageous to be sown. We are ourselves advocates for moderately (not extremely) thin-sowing, and have no hesitation in stating our opinions explicitly, that on well-tilled fallow land, 6 to 7 pecks of wheat, and 3 to 4 bushels of oats—and that on bean stubbles, clover leys, &c., $2\frac{1}{2}$ to 3 bushels of wheat, and 4 to 5 bushels of oats, are not too much, and that although a crop *may occasionally* be grown from a similar quantity of seed, it is not to be safely depended upon. In Sussex, and in parts of

---

* Nothing can be fairer than this statement of what the Bromley gentlemen *intended;* and their incapacity to do what they meant to do must be set down to the long account of the infirmities of human nature. Neither Mr. Davis, nor any one else, has shown any displeasure at fair discussion. But what did the Bromley gentlemen do? They began with the intention of giving Mr. Davis credit for an endeavour to benefit the cause of agriculture —for "no wish to mislead." They ended with accusing him of falsely representing the amount of seed he had sown, and the amount of profit he had made. Is this fair discussion? They began by giving the Maidstone deputation credit for being "practical and intelligent farmers," and concluded by accusing them of setting "a very considerable breadth of wheat, oats, and beans," at double their real quantity. Is this consistent, or credible? They plead "not guilty" to any ill-feeling, *except* ill-feeling against thin-sowing! which they considered a mischievous fallacy before they went. Is this impartial? They complain of unmerited severity. It is in the nature of man to view with philosophic calmness severity applied to other people, and to consider it "unmerited" the instant that it applies to himself. Alas, poor human nature!

† Some mistake must have been made here. We have referred to the above-mentioned letter, in which not a word is said about Mr. Davis's root-crops, or doubling his quantity of seed, and *nothing* commended, excepting the oats and barley (at Selsden), which are described as being "very good, as they are generally through the country." It is odd, too, that the "Kent Farmer" speaks of the very worst portion of Mr. Davis's wheat, at the top of the field, as not more than "*three sacks* per acre," that is twelve bushels. The Bromley gentlemen say that it will not return the seed sown, that is, *one* bushel! and quote the above "Kent Farmr" in confirmation! "A plague o' such backing" as this.

* We much wish that the Bromley report had consisted of such temperate reasoning as this last passage, which is really fair argument. We do not, however, think it sound. In thin sowing, the ground being more frequently disturbed by hoeing, it is less sought by insects as the depository for their young; instinct invariably directing them to those places which afford the best chance of bringing their young to maturity. As two-thirds of a thin-sown and horse-hoed crop may be looked on as fallow, there will probably be not half the number of insects. It is generally in the thick-sown districts that the most slovenly farming prevails, for there, under the broadcast system, the grub and the slug, and the wire-worm enjoy themselves during a large portion of the year, in a most happy state of security. This is the insect paradise; and if the object be to grow slug, and grub, and wire-worm in perfection, it is as philosophically carried out as the best mode of growing sheep, and cattle, and pigs. Where the object is to grow wheat, however, the slug, the grub, and the wire-worm *must* be rendered uncomfortable, a measure which they no doubt consider one of "unmerited severity." The illustration given of turnip growing is an unfortunate one. Mr. Davis informed us that his crops seldom suffer from the fly even in the slightest degree, doubtless this being the result of his frequent hoeings. But is the case of turnips analogous to wheat? If the Bromley gentlemen were to thin out their wheat, as we presume they do their turnips, so as to leave nowhere two plants on a space of land which is only sufficient for one, the case would be in point; as it is, in order to meet the contingency of the slug, the grub, and the wire-worm killing and eating up one-hundredth part of the plants, they cleverly manage to make one-half of the plants kill and eat the other half, after a desperate struggle, in which even the victors suffer *nearly* as much as the slain. It seems to us better to have one-tenth of the crop destroyed every five years than one-half every year, and that it matters little to the farmer by which means it is destroyed.

Scotland also, it is common to sow 6 bushels, and sometimes a quarter of oats per acre.*

With respect to the barley numbering 32 to 35 grains in the ear, we find it would require about eight ears of thick-sown to Mr. Davis's seven; but moderate sowing would give three ears to Mr. Davis's two, besides an increase of straw, which would bring the balance on the other side of the account, and often ensure a crop when a thin-sown one would fail.

We had nearly allowed ourselves to be out of temper at your unceremonious contradiction of our assertion, that "some of the worst crops had been ploughed up again," while we had seen with our own eyes the thin wheat ploughed up (and much more might as well have been ploughed up), and the buck-wheat sown; but this has been set at rest by the acknowledgement of Mr. Davis himself, and we are led to hope, Mr. Editor, that this will operate as a moderate caution in future admonitory observations, and that you will—

"When next you talk of what you view,
Think others see as well as you,
Nor wonder if you find that none
Prefer your eyesight to his own."†

You say that we went with the "intention to spy out the nakedness of the land." Whether we went with that intention or not, we could not avoid seeing it (notwithstanding the "enormous beam" which you say obscured our vision), because there was nothing on it to cover its nakedness.

Our "inexplicable" assertion that at Selsden, some part of our crops "will not produce the seed again," we will now explain. Being farmers, and not gardeners, we speak not of square yards or square rods, but of square acres; and another visit, since the harvest has commenced, has not only confirmed us in the correctness of our former assertion, but enabled us to go further, and state (not having before our eyes the fear of its being again denounced as "absurdly ridiculous") that at the upper part of the largest piece of wheat, on the side next the footpath by the wood, *there are two square acres which will not yield three pecks*, and much more where nakedness would be preferable; and this, too, on a model farm. Has your "recollection" any minute of this? if not, we recommend a revisit. Or were you content with the bottom of the field where the crop was best? We have reason to guess this to have been the case.*

The only point upon which Mr. Davis has any claim to originality is his extreme thin sowing. Neither draining, nor subsoiling, nor deep ploughing, nor drilling, nor sowing turnips among winter beans, and in rows and wide apart, are new, nor peculiar to himself. Why, don't you remember, Mr. Editor, that our old friend William Cobbett used to advocate and practice sowing Swedes in rows, four feet apart, for the convenience of ploughing between, by which he secured the amazing advantage of fallowing his land and cropping it at the same time; and a very pretty theory it was, and very well he explained it, and very well he farmed, too—upon paper; and paper (we know you will agree with us here) is a most convenient thing to farm upon, and he invited all the farmers in England to see his crops of Swedes and Indian corn. Well, we went and saw them on Barn Elms farm (we might have been somewhat sceptical then), and we found him so busily engaged with his Indian corn, that his Swedes appeared altogether to have escaped his notice, for they had neither been ploughed between nor hoed between ('twas late in August), nor would it have been practicable to have done either, until the weeds had been mowed, and there would have been an ample swathe: such a mass of rubbish was it, that it was very difficult to discern the rows at all.†

We hope to see included, in the promised detailed account of Selsden farm, the produce of the wood

---

* No doubt the sowers of the six bushels as stoutly contend for the "mischievous fallacy" of the Bromley three bushels, as the Bromley gentlemen do for that of the Spring Park seven pecks. It is evidently only a question of *time*. The Bromley gentlemen will shortly be "extreme" thin sowers, and the Sussex gentlemen will become "moderate;" till, at last, wheat in fields will come to be cultivated as rationally as cabbages in market gardens.

† There is much amiable simplicity in this good-natured caution. The Bromley gentlemen say "*some of the worst crops* had been ploughed up again in the spring." Mr. Davis in reply, says that, with the exception of *two* acres of an old osier bed, which was perfectly drained, "*not a yard of my wheat, oats, barley, beans, or peas, upon four farms, have been ploughed up.*" This the Bromley gentleman consider a confirmation; and read us a homily on moderation. Is not this, like the reference to the "Kent Farmer," evidence of a slight "beam" or defect of vision. They have not yet seen, it seems, either the turnips, or the mangel wurzel, or the clover.

* We guessed it might be two rods, and the Bromley gentlemen insist on their "two square acres." (It was quite unnecessary to tell us they were not gardeners). They deem these two acres, on a farm of 130 acres, sufficient to justify the broad assertion that "*some parts* of the wheat and beans will scarcely yield the seed again." Could any farmer imagine that by "some parts" they meant two square acres, close to a game-stocked wood? We wish them joy of their "two square acres:" we thought they meant two yards.

† Can the Bromley gentlemen deem this a parallel case with that of Mr. Davis? We had thought of erasing it, as having nothing to do with the disputed question; but it will serve to shew the Bromley style of argument. Mr. Davis has a fair claim to originality, in being the first man who has shown the practicability of combining *all* the improvements above-named with thin sowing; and it is neither fair, candid, nor creditable, to endeavour to deprive him of the honour of it. We think the Bromley gentlemen, by attempting to mend their originally bad case, and by having failed to do so, have placed themselves in a worse position than before.—*Ed. Gazette.*

land, &c., as the whole farm comprises about 360 acres. We remain, Sir, your obedient servants,

WILLIAM EDGERTON, Sen., Southend, Lewisham; JAMES SAUNDERS, Widmore, Bromley; GEORGE COLGATE, Brockley Green Farm, Lewisham.

(Three of the Committee of the West Kent Agricultural Association).

Bromley, September 4, 1845.

P.S.—We have been careful to give you this time our genuine signs manual, and not a copy; perhaps your type may be sufficiently lithographic or imitative to present your readers with a *fac simile* if required, to prevent any further apprehension of a "hoax."

THE COST OF GROWING WHEAT.

MR. BARNES *v.* MR. HEWITT DAVIS.

TO THE EDITOR.

SIR,—Mr. Hewitt Davis having stated that, with his management upon his soil, he could grow wheat at 35s. per quarter, I was induced to turn my attention to the cost of producing it on soils similar to that in my occupation, and the results are as near as possible as follows. Should you consider them worth a place in your columns, they are much at your service.

I believe that it will be admitted that the following rotation for cropping, in the Weald, will be considered tolerably good, namely—fallow, wheat, beans, oats, seeds; being a five years' shift or course, I have shaped my estimates accordingly.

I am quite aware many would be more competent to give the particulars inserted, and should feel most happy to find this effort of mine inducing many to take up the subject and enlighten their more ignorant brethren; at the same time I feel fully satisfied, however cheap they may be able to grow the staff of life, with me it is impossible to produce it at less expense.

COST OF AN ACRE OF WHEAT AFTER FALLOW.

	£	s.	d.
Rent, two years, 18s. per acre (inbound)	1	16	0
Poor, highway, and church-rates, 4s., two years	0	8	0
Tithe or rent-charge, 5s., two years	0	10	0
Ploughing four times, at 10s.	2	0	0
Rolling once, with four horses	0	2	0
Drag-harrowing once, with four horses	0	2	0
Seed, 2½ bushels, 8s., with preparation	1	0	0
Sowing season and furrowing	0	5	0
Rolling in spring	0	1	0
Weeding	0	2	0
Reaping	0	12	0
Carrying	0	3	0
Thatching, wood, &c.	0	2	0
Getting in stack	0	3	0
Thrashing four quarters, at 3s. 6d. per quarter	0	14	0
Commission for selling, 6d. per quarter	0	2	0
Carrying to market, 1s. 6d. per quarter	0	6	0
Use of sacks, machine, sieves and smalls	0	1	6
Proportion of manure for the year	£2	0	0
Interest of capital necessary	0	10	0
Tenant's living and attendance	1	16	0
	£12	15	6

Produce (say) four quarters, at 52s	10	8	0			
Straw and horsemeat	2	0	0			
Lamb-keep in gratten	0	3	0—	12	11	0
Loss				0	4	6

COST OF AN ACRE OF BEANS.

Rent (inbound measure)	0	18	0
Rates—poor, highway, and church	0	4	0
Tithe	0	5	0
Ploughing	0	12	0
Furrowing	0	1	0
Seed, three bushels, at 4s.	0	12	0
Sowing season and furrowing.	0	5	0
Rolling	0	1	0
Hoeing twice, 4s. and 2s. 6d.	0	6	6
Cutting and binding	0	7	6
Carrying and stacking	0	3	0
Thatching and wood	0	1	0
Getting in stack	0	2	6
Thrashing four quarters, at 1s. 6d.	0	6	0
Commission for selling, 6d.	0	2	0
Carrying to market, 1s. 6d.	0	6	0
Use of sacks, machine, sieves, and smalls	0	1	6
Proportion of manure	1	10	0
Interest of capital	0	7	0
Tenant's living and attendance	0	18	0
	7	9	0

Produce (say) four quarters, at 32s	6	8	0			
Straw and horsemeat	1	5	0—	7	13	0
Profit				0	4	0

COST OF AN ACRE OF OATS.

Rent (inbound measure)	0	18	0
Rates—poor, highway, and church	0	4	0
Tithe	0	5	0
Ploughing	0	12	0
Furrowing	0	1	0
Seed, four bushels, at 2s. 9d. per bushel	0	11	0
Sowing season and furrowing	0	5	0
Rolling	0	1	0
Weeding	0	2	0
Cutting and binding	0	9	0
Carrying and stacking	0	3	0
Thatching and wood	0	1	0
Getting in stack	0	2	6
Thrashing six quarters, at 1s. 6d.	0	9	0
Commission for selling, 6d.	0	3	0
Carrying to market, 1s.	0	6	0
Use of sacks, machine, sieves, and smalls	0	1	6
Proportion of manure	1	0	0
Interest of capital	0	7	0
Tenant's living and attendance	0	18	0
	6	19	0

Produce (say) six quarters, at 21s.	6	6	0			
Straw and horsemeat	1	10	0—	7	16	0
Profit				0	17	0

COST OF AN ACRE OF SEEDS.

Rent (inbound measure)		0	18	0
Rates—church, poor, and highway		0	4	0
Tithe		0	5	0
Seed—two gallons clover, half-bushel rye-grass		0	10	0
Sowing, rolling, &c.		0	1	6
Rolling in spring		0	0	9
Weeding		0	0	6
Proportion of manure		0	10	0
Cutting twice, 2s. and 1s. 6d.		0	3	6
Haying twice, carrying and stacking		1	0	0
Thatching, straw, and wood		0	4	6
Foddering and hay		0	4	0
Interest of capital		0	5	0
Tenant's living and attendance		0	18	0
		5	4	9
Produce, two cuts, 25 cwt. and 15 cwt. at 50s.	5 0 0			
Sheep-keep in winter	0 10 0—	5	10	0
Profit		0	5	3
Total profit	£1 6 3			
Deduct loss	0 4 6			
Profit in five years	£1 1 9			

In the above, sir, I am not aware that I have charged anything too much, or put the crops too little. Few will realize the crops I have put down, and few get their work done cheaper than above mentioned. I have charged for the corn being all stacked, considering that an equivalent for the repairs of buildings if put in the barn in part and not stacked. I shall be much obliged by being corrected by any of your correspondents if wrong; if I am right, wheat cannot be grown by me and my neighbours at 35s. per quarter.

I am, sir, yours most respectfully,

Staplehurst, Sept. 12, 1845. WM. BARNES.

In reply to the above letter of Mr. Barnes, we have received the following letter from Mr. Davis, and the subject will, doubtless, be the better discussed on comparing the two letters.

TO THE EDITOR.

SIR,—Mr. Barnes's debtor and creditor account, in his letter to your contemporary, has much interested me, for it is clearly the work of a clever partisan, who seeks, by figures, to support a particular view; but I think I can show you, in two ways, that his data do not bear out the inference he wishes others to draw from them.

In the first instance, by taking his figures and showing the profit he allows on his expenditure, I think I shall make clear that he allows more than a fair tradesman's profit, and that he grows his wheat at a cost of only 38s. per quarter.

There are few persons in business who will not agree with me that a profit of twenty per cent. on the expenditure should content the farmer, as a proper remuneration for his time and capital, especially when bearing in mind that, in addition, the farmer occupies his house free of rent and taxes, with other advantages not taken into calculation.

Now, according to Mr. Barnes's figures, the farmer's expenditure in five years, on every acre of land, is—

	£ s. d.	
First two year—		
Fallow and wheat	12 15 6	
Less interest and tenant's living (included by Mr. Barnes, but which are not expenditure)	2 6 0	
		10 9 6
Third year—		
Beans	7 9 0	
Less interest and tenant's living	1 5 0	
		6 4 0
Fourth year—		
Oats	6 19 0	
Less interest and tenant's living	1 5 0	
		5 14 0
Fifth year—		
Seeds	5 4 9	
Less interest and tenant's living	1 5 0	
		4 1 9

Total expenditure in five years, including rent . . . £26 9 3

Now, here, according to Mr. Barnes's our figures, he has shown that a farmer's expenditure, in five years, is only £26 9s. 3d., in raising a crop of wheat, beans, oats, and clover; and upon this expenditure I readily admit that, besides having his house-rent and taxes free, and the other advantages which accompany the occupation of a farm, he should have 20 per cent. remuneration; that is to say, in the five years' cultivation, each acre should yield a profit of £5 5s. 10d., or £1 1s. 2d. per annum, per acre, should be gained.

Let us now see, by Mr. Barnes's figures, whether or not so much or more is left surplus by his return over his expenditure.

Returns.	£	s.	d.
For the first two years, wheat, 4 qrs. at 52s., and straw	12	11	0
For the third year, beans, 4 qrs. at 32s., and straw	7	13	0
For the fourth year, oats, 6 qrs. at 21s., and straw	7	16	0
5th year, hay, 2 tons, at 50s.	5	10	0
	33	10	0
Deduct the cost	26	9	3
The actual profit is	£7	0	9

Or £1 8s. 2d. per acre per annum, or upwards of 26 per cent. profit on the actual outlay.

Without now going into the question whether or not there are charges on the debit side too high, and prices on the credit side too high, I consider I have shown, by Mr. Barnes's own figures, that when he sells his wheat at 52s. per quarter, he draws more than an average tradesman's profit, and that of the 52s., 27 per cent. or 14s. per quarter is surplus beyond cost; and therefore, by his own figures, he proves that he grows his wheat at a cost of only 38s. per quarter.

I have not time to go minutely into detail as to the correctness of the figures, further than to say that, having debited the accounts with manure as costing £5 per acre in five years, he should have credited the hay and straw at a market, and not a feeding price, or he should have added to the credit side the profit that accrues by feeding animals with hay, charged at only 50s. per ton, and straw at only about 12s. per load; for, certainly, having the hay and straw at these prices, the manure made therefrom, is far from costing £5 per acre. However, I think, after taking Mr. Barnes's figures, and showing, notwithstanding, that he grows his wheat at a cost of only 38s. per quarter, many of your readers will give me credit for having it in my power, without proving myself a better farmer than Mr. Barnes, whose reputation I shall be glad to attain, to grow wheat at only 35s. per quarter; more especially as I have no fallow, and in every five years my rotation gives me six crops, instead of four on Mr. Barnes's rotation.

These discussions will, doubtless, effect much good; but they are taking a turn where I do not wish to follow them further, the more so as I have not time to follow them out. Had not Mr. Barnes's name been attached to the statements now under review, it, with others, must have passed unreplied to by, in haste, your very obedient servant,

Hewitt Davis.

Spring-park, near Croydon, 19th Sept., 1845.

THE POTATO DISEASE.

TO THE EDITOR OF THE TIMES.

Sir,—It may be considered presumptuous in my giving an opinion in opposition to so many of your scientific correspondents respecting the potato blight, but I will endeavour to prove they are mistaken in supposing the potato's tubers have worn themselves out simultaneously throughout Great Britain and the Continent. Had they been all one sort, and planted continually on similar soils, it might have been so; but have there not been hundreds of new sorts raised from seed since they were first introduced into this country? and are there not continually new sorts being so raised every year? and yet all are affected, more or less, even those raised from seed this very season. A particular friend of mine has the whole of his also blighted. How is it that various bulbous roots that are raised from seed are affected with the same disease, although not to so serious an extent at present—I mean carrots, turnips, parsnips, onions, and cucumbers? Even the later cherries on the trees were so; the stalk took the blight, and before they were fit to pick, rotted; the late hops were also taken. The extraordinary effect it has had on the foliage of nearly all the trees for the last ten weeks cannot have escaped the notice of the horticulturist; all have suffered from the same cause.

I certainly thought by this time the subject would have been taken up by the Royal Agricultural Society of England, and that some scientific persons would have been appointed to consult with practical growers, and endeavoured to have given some decided opinion as to the real cause; but such not having taken place has tempted me to trouble you, hoping something may yet be done to satisfy the minds of the potato growers, that they may not be frightened from again planting, which the late expressed opinions have certainly not allayed.

Are your correspondents aware that there are many sorts that do not apple, consequently there is no seed from them; also that the seed from the apple does not produce the same sort, but various; and it is in that way that the late choice sorts have been raised, by carefully selecting the favourite, and planting the produce for several years, changing the soil alternately from light to heavy? Last year, thinking a change of seed necessary to plant in a district that was infected with the prevailing disease, I carefully selected the finest sorts I could find in Scotland, also from Long Sutton, in Lincolnshire, and, at a great expense, had them conveyed to Ash and Staple, in Kent; they are equally affected as others grown in the neighbourhood. The loss sustained by many by their rotting in the clamps was the want of knowledge how to treat them, having been misled by the various contradictory accounts in the newspapers. Had they been left in the ground, instead of taken up prematurely, as recommended by many, the disease would have shown itself, and the damaged easily picked out, and the sound saved; instead of which they were taken up and clamped with the disease in them; consequently fermentation took place, and the unsound destroyed the sound. The proper mode of treatment, in my opinion, was at the time of taking up to lay them on the surface in long ranges of a conical shape a yard wide, and to cover them with straw to keep the weather out, but no earth; they would be found to dry sufficiently, and the disease that had escaped observation at the time of taking up would in a fortnight begin to show themselves by spots of mildew; they should then be all looked over and laid in the same way for six or seven days, and then clamped with earth in the regular way, having straw chimneys every two yards, leaving both ends of the clamps open, but covering them with earth in severe weather, to secure them from frost. The recommendation of the present commissions in Ireland is very good to save seed potatoes, but will make them unfit for food. It is well known to all practical growers that the sun and air turn them green, and give them so disagreeable a flavour they cannot be eaten. The retailers in London are fully aware the Irish, in particular, object to what they call a sunny potato. I have seen many experiments tried to prevent the disease spreading whilst they were in a growing state, such as cutting off the haulm, pulling it up, and in many districts digging them up and laying them to dry in the open air; but not one remedy was of any service. If they are infected, nothing can save them. It is a singular fact, a party in Essex, who grows largely for the London market, dug up a field of potatoes in July; there was no appearance of disease then on the tops; they were sent to market, and sold; the ground was harrowed, and the stray potatoes picked up; the ground laid so until lately, when it was ploughed for wheat; the potatoes that were picked up after the plough were found to be diseased.

It may be interesting to your readers to know when it first made its appearance in this country. My crops in the lower part of Kent were perfectly safe on the 6th of September, 1844; the following Sunday (it will be remembered by most persons in the Isle of Thanet) it was very sultry in the afternoon; in the evening a very violent storm of thunder and lightning came on, more awful than I ever remember to have witnessed; it was one continual blaze of light for nearly three hours, unaccompanied by rain; about 10 o'clock it commenced raining in torrents, in many places washing the soil out of the field. Shortly after, I left for Scotland, and did not return for a fortnight. I then found the tops or haulm had died instantly after the storm, as if destroyed by frost; and the potatoes were rotting fast with the present disease. In no place in the kingdom have they suffered so severely as in Kent and Sussex. I am certain, except the very early sorts, we have lost nine-tenths; and what are saved are scarcely fit for seed. It is a singular coincidence: I was in Essex the 22nd of of July this year, and observed to my friend (it was then lightning very much, unaccompanied with rain) I hoped it would not have the same effect on the potato crops it had last year in Kent, for from that time the potatoes so diseased were called by many persons the "thunder and lightning potatoes." The next day one of my men came up from the lower part of Kent, and said the thunder and lightning had been terrific; and—singular to relate—one week after, the potatoes were found affected with the same disease. I do not mean to say that was the cause; it might be with others combined; and had some scientific persons been appointed to consult with practical growers, the haulm of the growing crops could have been examined, and some satisfactory cause assigned, but certainly not arrested its progress. I am decidedly of opinion it arises from atmospheric causes. Feeling confident, about the end of last July, from particular observation, coupled with my previous experience, that the blight was again making its appearance amongst the potatoes, I thought it my duty to write Sir James Graham the following, with a slight addition, which at present I do not recollect.

"138, *High-street, Shoreditch, Aug.* 11, 1845.

"Sir,—The importance of the following I hope will excuse so humble an individual addressing you. I am fearful of the entire loss, by blight, of the potato crop of this country. Being myself a large grower in Kent (some years of more than 300 acres), where I farm. I am also a salesman in Tooley-street, and have also been largely engaged in the retail trade, consequently am competent to give an opinion. I received a letter from my foreman at Ash, to say the potatoes were blighted, as in September last year; it was then partial in East Kent. I went on Tuesday last, and found the whole of that part of the country infected, not excepting the smallest spot in the cottager's garden. I traced it the whole distance of the Dover line, from Smarden to the Isle of Thanet; on Thursday last, I went to Maidstone, and found it had made rapid strides there also; returned by way of Gravesend, found all alike. The same evening I visited the large growths about East and West Ham, in Essex, and its neighbourhood. I made inquiry of the country people: they said there was nothing the matter; but I soon convinced them otherwise. The misfortune is, those that are near their growth are stopped instantly, and I am afraid will not ripen, consequently must rot. The disease is quite a new thing; none of the growers seem to know any thing about it, except in East Kent last year; and my reason for making such strict observations is, I was a very serious loser by it. It first appears by black spots on the lower leaves, if an early sort; in about a week it looks as if it had been struck by lightning, as the haulm is turned black and withered, and the potatoes have begun to rot as they did last season, and which I fear will be general. I am given to understand they are so in Holland and Belgium. If it should be so, it will be a shocking calamity for the poor; and feeling apprehensive for the result, if universal, I think it my duty to apprize you of it, so that you may take such measures to alleviate as you think fit.

"I am, Sir, yours respectfully,

"Robert Parker.

"To the Right Hon. Sir James Graham."

To which I received the following answer:—

"*Whitehall, Aug.* 12, 1845.

"Sir,—I am desired by Sir James Graham to acknowledge the receipt of your letter of yesterday, on the state of the potato crop, and to express to you his thanks for the information which you have done him the favour to afford him.

"I have the honour to be, Sir,

"Your obedient servant,

"H. H. D. O'Brian, Private Secretary.

"Mr. Robert Parker."

I subsequently wrote him as follows:—

"*Scovell's Wharf, Tooley-street, Oct.* 23, 1845.

"Sir,—You will most likely recollect my calling your attention on the 11th of last August to the blight of the potato crops. I then stated I anticipated a partial, if not total failure; how far my fears were correct, by this you must have heard. I am now fearful there will not be sufficient seed saved to plant next season. If there should be, many of the growers are beginning to fear the same disease again attacking them, and it is likely thousands of acres will not be planted on that account. My object in writing to you is in hopes that some competent person may be appointed, if possible, to give some decided opinion as to its cause, which I think might be ascertained by careful investigation, and which will greatly relieve the minds of the growers of potatoes generally. I beg to say I have been through most of the potato-growing districts of England and Scotland, and find the injury is much more than is at present known. In many places, particularly in Yorkshire and Scotland, they were not aware of it until I pointed it out to them on the leaves. It has now become general, and the potatoes are rotting fast. Many cargoes have arrived at the wharfs in Tooley-street, that are so badly diseased they must be sold for cattle or thrown overboard, and they were shipped by growers supposing them perfectly sound. I have no hesitation in saying that two-thirds of those that are being clamped for sound will in a short time be found not so.

"I am, Sir, yours respectfully,

"ROBERT PARKER.

"Right Hon. Sir James Graham."

The following answer was returned —

"*Whitehall, Oct.* 24, 1845.

"SIR,—I am directed by Secretary Sir James Graham to acknowledge the receipt of your letter of this date on the subject of the disease existing in the potato crop.

"I am, Sir, your obedient servant,

"S. M. PHILLIPS.

"Mr. Robert Parker, Scovell's-wharf."

With respect to Ireland, would it not be desirable that some competent person be appointed to purchase a large quantity to lay up till the time they are wanted for seed? If that is not immediately done, I am afraid, by the accounts we have, their ground will go uncropped for want of seed. Subscriptions should be raised for that purpose, and the potatoes delivered to the poor at the proper time under guarantee (if possible) they should be planted. The best way to keep them in large quantities for seed would be to hire large granaries, and have them turned exactly as grain is done. From 100 to 150 tons could be so kept on one large floor, by laying them regular two feet high all over the floor, leaving room at one end for the man to shovel and turn them over, which should be done every week, care being taken in severe weather to keep them from getting frozen, and any defective being taken out at the time of turning. If something like the above is not done, those who want to plant at the time of sowing will be glad to catch at any sort they can get, and there will be a general scramble, and they will most certainly get their sorts mixed, and it will be years before they get a true stock again, besides the unpleasantness of having their crops ripening at different periods. I don't see why the same should not be done for the poor cotters of this country; much can be done for them by the country gentry forming themselves into committees, and administering the same relief. It will be much wanred. Many will be tempted to use for their family what they are now trying to save for seed.

I am, Sir, yours respectfully,

ROBERT PARKER.

Scovell's-wharf, Nov. 18.

ON FATTENING CATTLE.

TO THE EDITOR OF THE FARMER'S MAGAZINE.

SIR,—As the period is now arrived when it behoves agriculturists and all those interested in the welfare of stock to ascertain the most economical and advantageous manner of keeping them during the trying season of the winter months, it will not be amiss to call the attention of those parties to this most interesting and profitable subject. It will be expedient, as well as satisfactory, prior to entering fully upon it, to ascertain what probability there is this season of realizing a remunerating profit for the consequent necessary outlay. By taking a cursory glance at the existing means of the country to afford sufficient food for the required consumption, we should say they are by no means large.

The autumn of the last year has been one productive of much food, for the purpose of bringing stock forward in condition, if not of fatting them: they merely now require a little stimulus for a month or so, to make them fit for the market; so that for the next two months we cannot expect the price of either beef or mutton to be much advanced. The consumption of all meat certainly has been greater this past year than has been for some time previous: better prices have been maintained at much firmer rates; and there can be no doubt that the succeeding one will also show a decidedly increased consumption, owing in all probability to the increased demand for labour in all departments of agricultural and mechanical works, more especially in those upon the different railroads now in progress, which causes higher rates of wages to be attained by the labourers, thereby enabling him (and by the heavy labour required, it is absolutely necessary for him) to purchase meat to sustain the stamina to fulfil the several duties in the performance of their allotted task: in consequence of which, this winter will be one that will afford more labour to that class of the community than the previous ones; the demand for food will therefore also be increased—no scarcity of profitable labour is at all anticipated: and as long as that can be found for the surplus population, the prices of all consuming articles must be at remunerating rates.

It is an acknowledged fact that the most prosperous time for the country generally is when remunerating labour is found for the numerous hands who are constantly out of employment during the dreary winter months; this, from present appearances, and from the prospect before us, bids fair to be the position of that part of the community who so much require such assistance.

The supply of beef and mutton at present is more than equal to the demand, owing to what was stated previously; but then, considering fully and attentively the source of the other articles of consumption, viz., wheat and potatoes, there can be no doubt that, owing to the inferior quality of the former and the extensive failure of the latter, the prices of these most necessary articles of consumption will be enhanced beyond their adequate value, when the spring or latter part of the winter creeps upon us; and owing to the high price of lean stock, it seems generally to be thought that not so many head have been bought in this season as usual. These, blending together, must necessarily cause the price of meat to rise by a month or six weeks after Christmas: the supply which is now brought into the market (caused by the excess of food produced this autumn) will be consumed: we shall then find a greater supply required than at present, and, from what we can foresee, at higher prices.

We shall have to depend entirely upon our own resources for the supply necessary for the consumption; for that which we receive from other countries is much too small to affect the price, or have any decided influence upon the market. It is not at all improbable but that, at the time we most require an additional help in the meat market, the supply, though small hitherto sent, will be withheld, it being required for their own population. If such should be the case, the profit arising from judicious grazing will then crown the efforts of those who by their skill and industry have been enabled to profit most by this suggestion.

From this cursory, imperfect glance at the probability of realizing a profit from fattening cattle, we should say that if ever success attended the steps of the artificial grazier, a greater chance is presented this year of doing so than there has been for some time past. If such should really prove or seem at present to be the case, no time unnecessarily must be lost by those interested in it, by availing themselves of the opportunity now offered.

The next point to be considered is one which involves within its sphere much doubt and difference of opinion; but all those who are and have been in the habit year after year of fattening cattle seem fully to agree that, if it was not for the superior quality of the manure made during that proeess, they would prove losers by adopting it. The forcing fattening qualities of oil-cake are fully known and appreciated, and most extensively used by those who require quick returns for the increased outlay. Many ways have been devised to decrease the expenses of fattening, but all have signally failed in attaining that desirable object, for it has been found that, when that is done, it requires longer time to get the cattle in a state fit for the butcher: the most profitable way is, then, to feed high for a short time in preference.

It would occupy too much space to be confined to one letter to fully illustrate the several methods of fattening adopted; I shall, therefore, confine myself to that principally which, by practical experience, I have found to answer, as being the most economical and profitable way of doing so.

The necessity of a careful storing or preserving of that useful root the Swede turnip, for winter use, cannot be too strongly impressed upon the attention of fatters of stock. It needs no comment of mine to state the dependance which in many instances is placed upon it, to carry the farmer through the severe and ofttimes protracted winter; which if by any casuality or unforeseen circumstances fails or is destroyed, great loss is sustained by the owner, and sacrifice of his stock must be made, either if he sells them immediately, or purchases food to keep them on. A sufficient quantity should always be stored for at least one month's consumption; more would be better, if possible, as they keep much better when preserved properly, than when out in the field: this would answer for all contingencies which might arise from severe frost or very bad weather.

The best method of preserving this valuable root is that which was brought before the notice of the Royal Agricultural Society, and for which a premium was given—viz., placing them between hurdles, making a kind of coop, one hurdle each way, which would hold about five loads. This may be continued to any length, according to the quantity to be preserved. After being stacked, and brought to a kind of roof, they must be thatched, to preserve them from the wet; an open place should be chosen to allow a free circulation of air. Preserving Swedes is one of those farming operations which require expedition and dry weather; the least damp or wet falling, the operation must cease: a very fine, dry day must be chosen; then store them as quickly as possible. It is a good plan to pull them up a week before stacking, laying them in heaps in the field. When taken up for storing, the greens should be twisted off by the hand, the roots remaining untouched. When preserved perfectly dry, I have kept them in as good condition and as fresh as when first stacked, till the latter end of May, they having made very little, if any, shoot during that time—a very great assistance they often prove in a backward spring, if not required to be consumed during the winter.

The next consideration is the artificial food to be provided for the cattle that will produce the greatest return in the shortest time. Experiments have been tried, and experience has proved the efficacy and advantage of cooking food for fatting beasts; they are found to thrive faster in proportion to the expense. Various methods are followed. Where part of the food given them is cooked, even then the plan answers. The cheapest and most advantageous manner of fatting is that adopted and explained by Mr. Warnes, of Trimingham, Norfolk, called the "Compound Feeding." It combines in its system all the necessary objects in fatting, and is found to answer the purpose of the artificial grazier in a most extraordinary and remunerating manner, and, when once tried, is sure to be constantly followed, owing to its efficacy and economy. The outline of the method is as follows:—The cattle are placed in loose stalls; the mixture given to them is composed of meal, consisting of one part of linseed to two of other corn, or any other proportion, at the option of the feeder; this is added to a copper of boiling water, and poured from thence upon chaff composed of half straw and hay, or, according to the feeder's desire, mixed up well, rammed down, and always given in a warm state—no cattle will refuse it. Sheep are equally as expeditiously fatted as neat cattle. This feeding, I have found, will fat a beast in three months well; whereas by the usual plan it would take five or six months to put the same quantity of fat upon him. The efficacy of oil-cake is allowed; now, it seems much more reasonable, if the sum expended in oil-cake was laid out in the linseed, and that applied properly, it must naturally render much more benefit than when the oil (the principal fatting quality of it) is extracted from it, and then given as cake. There are several ways of applying it; if not ground, it requires to be soaked in water 48 hours previous to using; if less, there is danger of husks accumulating in the stomach of the animal, forming into a ball, thereby endangering its life. By using linseed in fattening stock, it does not exclude the use of the other corn, viz., peas, beans, and barley; but, on the contrary, cattle are found to fat kindest when a mixture of one or two of the above are added. If intended to be given in a whole state, I should certainly recommend boiling the corn first; and, even if ground, by boiling it, it is made to go farther: no waste can, by following this plan, be sustained, but which is often the case when given to cattle in a dry state.

It must be left to the discrimination of the several feeders to adopt which plan they think most proper and likely to answer their purpose; but, as far as my experience carries me, the above is found decidedly in every point the most efficient one, reducing the expense at least one-third the usual rate allowed, and requiring not more than half the usual time for rendering the cattle fit for market.

Fearful I have trespassed longer upon your valuable time than I had any warrant to, I must conclude this indifferent, imperfect sketch, but shall be happy, if necessary, to afford any further communication upon the subject; in the mean time I must beg to subscribe myself,

A Brother Farmer.

CLASSIFICATION OF SOILS.

(*From Law's Translation of Boussingault's Work on Rural Economy.*)

Agriculturists class soils according to their fertility, and the cropping which they will stand to advantage. In practice, two grand divisions have been adopted: *strong* soils, and *light* soils. Every soil belongs wholly or in part to one or other of these divisions.

In strong soils clay is the predominating element: in light soils it is sand which prevails. Humus always adds to the qualities of these two kinds of soil, though possessed of properties so opposite; but its utility is especially remarkable in argillaceous or clayey soils, the extreme stiffness of which it diminishes.

Stiff or strong soils share in the advantages and disadvantages peculiar to clay; they absorb a great deal of moisture, and they do not dry readily, retaining obstinately a considerable quantity of water. The humus which they contain, and the manures which are spread upon them in the course of cultivation, remain with them for a long time, preserved, as it were, from the too active agency of atmospheric influences. The fertilizing power of these substances is further rarely interfered with by too great a degree of dryness of soil: nevertheless, in very wet seasons, and in years of extraordinary drought, the advantages which I have enumerated disappear. In wet seasons clay lands become immoderately humid; sometimes they approach the state of mere puddle; and on the contrary, under severe and long continued drought they become so hard that the roots of vegetables can no longer penetrate them, and then they crack in all directions, and the roots perish for want of being properly covered. I might add that severe frost is the cause of effects disadvantageous in the same degree; so that very stiff clays are liable to the same bad effects under the influence of two causes diametrically opposed—the great heat of summer and the severe cold of winter. In such soils all agricultural operations are often impracticable; changed into a liquid mud, neither horse nor plough can be put upon them; or baked into a mass having the hardness of stone, the share will not penetrate them.

Light soils rarely accumulate an excess of moisture in their interstices, so that they are liable to suffer under want of rain of even short continuance. They are worked with infinitely greater ease, and at much less expense: vegetation upon them is quicker, and harvests earlier; but manure is less profitable than in clayey soils, because the rains dissolve and carry it away.

The defects of these two kinds of soils are precisely of a nature to compensate one another; and it is, in fact, by a mixture, or that which is equivalent to a mixture of these two extreme kinds of soils, that those lands are formed which are admitted to be the best adapted to cultivation, and the most fertile of all. Messrs. Thaer and Einhoff, in submitting to mechanical analysis an immense number of arable soils, and in studying, at the same time, the system of culture best adapted to these soils and to their relative fertilities, have given us results of great importance, and which may be made the basis of a practical classification of arable soils.*

An argillaceous or clayey soil, properly so called, generally contains about 40 per cent. of sand. If the quantity of sand be less than this, the crop from such a soil will be more or less precarious, and the tenacity will be such that considerable difficulty will be experienced, and necessary expense incurred, in working it. Such a clayey soil (having at least 40 per cent. of sand) when it contains a sufficient quantity of humus and is properly treated, may be regarded as favourable for wheat. Barley succeeds better than wheat when the quantity of sand is as low as 30 per cent. With less than 30 per cent. oats will thrive. Wheat may still be advantageously cultivated upon lands that contain from 40 to 50 per cent. of sand; beyond this term, when the soil contains from 50 to 60 per cent. of sand, it is more advantageous to grow barley. Such a soil will not be completely pulverized by reiterated ploughing, as will that which contains a larger proportion of siliceous matter; and it does not become hard and cracked under drought like lands that are more essentially clayey, because it retains a sufficiency of moisture:

* Thaer's Rational Principles of Agriculture, (in French), vol. ii. p. 115.

it is equally well adapted for trefoil of all kinds, for tubers, for plants with tap roots, and for many other crops of great marketable value, such as cabbage, flax, tobacco, &c. It is almost always accessible—a circumstance which allows of the greatest care being bestowed upon the crops which are raised upon it. In soils which yield, on washing, from 60 to 80 per cent. of sand, we cannot reckon securely on the success of wheat. At 70 of sand, it ceases to be well adapted to the cultivation of this grain, except with especial precautions; but it is still well adapted to barley, and it is in such a soil especially that rye succeeds best.

Land with such a dose of sand is always easily laboured; but it is more apt to be overrun by foul weeds than a soil that is decidedly argillaceous. Manures are speedily consumed in it, for the reason already given: it is, therefore, advantageous to manure such land frequently, laying on less dung at a time.

A soil having 75 per cent. of sand is qualified by Thaer as an oat soil; and even up to 85 per cent. of sand it may be regarded as suitable to this grain: this term passed, nothing but rye or buckwheat ought to be sown upon it, and that only after it has had a sufficient dose of manure. The reiterated ploughings which some of these sandy soils require, to get rid of the foul weeds which rush up in such quantities upon them, sometimes render them so open that rye will not succeed. The best course is then to lay them down in grass, and allow them to become consolidated by rest.

It is extremely difficult—at least, in this climate of ours—to make anything of soils that contain 90 per cent. of sand; in times of drought they become truly moving sands. As we have already shown, calcareous matter may replace siliceous sand in the part which it plays in an arable soil; like sand, calcareous matter tends to destroy the strong cohesion of the particles of clay; but it appears that chalk or lime, especially when it is in a state of minute subdivision, besides this effect, really contributes to the amelioration of wheat lands. The following table comprises the results obtained by Thaer and Einhoff. I must observe, however, and from causes which have been already explained as influencing the determination of the humus, that this substance is evidently estimated at much too high a figure in several of these analyses, which deserve to be made anew under the precautions that are now familiarly known :—

Soils according to Composition.	Usually designated	Clay.	Sand.	Lime or Chalk.	Humus.
Clay with humus	Rich wheat land	74·	10·	4·	11·5
Ditto	Ditto	81·	6·	4·	8·5
Ditto	Ditto	79·	10·	4·	6·5
Marly soil	Ditto	40·	22·	36·	4.
Light soil with humus ..	Meadow land	14·	49·	10·	27·
Sandy soil, humus	Rich barley land	20·	67·	3·	10·
Argillaceous land	Good wheat land	58·	36·	2·	4·
Marly soil	Wheat land..	56·	30·	12·	2·
Argillaceous land	Ditto	60·	38·	——	2·
Stiffer argillaceous land ..	Ditto	48·	50·	——	2·
Clay	Ditto	68·	30·	——	2·
Stiff argillaceous land ..	Barley of the 1st class ..	38·	60·	——	2·
Ditto ..	Ditto 2nd class ..	33·	65·	——	2·
Sandy clay	Ditto Ditto ..	28·	70·	——	2·
Ditto	Oat land	23·5	75·	——	1·5
Clayey sand..	Ditto	18·5	80·	——	1·5
Ditto	Rye land	14·	85·	——	1·
Sandy soil	Ditto	9·	90·	——	1·
Ditto	Ditto	4·	95·	——	0·75
Ditto	Ditto	2·	97·5	——	0·5

Schwertz has given a summary of the opinions of Thaer upon the value of different soils from an eminently practical point of view. Agreeing with this distinguished agriculturist that it is well to judge of the soil by its produce, he also forms a scale of comparison after the different kinds of grain, taking as extreme terms wheat and barley, the first succeeding in bad argillaceous soils, the second still growing in sandy soils of the poorest description. In these extreme or boundary soils, wheat and barley succeed very indifferently indeed; but between the two extremes are comprised every variety of soil which results from the fusion of the strongest or stiffest with the lightest soils, from the most tenacious clay up to loose sand. In these mixed soils of intermediate qualities, wheat and barley gradually approach one another, taking the place successively of barley, oats, and buck-wheat, until they meet in the middle of the scale in a kind of neutral soil, upon which every variety of grain may be grown.

Schwertz arranged his scale in the following manner* :—

0. Moving sand	0. Stiff clay
1. Rye land	1. Wheat land
2. Rye and buck-wheat land............	2. Wheat and oat land

* "Precepts of Practical Agriculture" (in French), p. 49.

3. Rye, buck-wheat, and oat land	3. Wheat, oat, and barley land
4. Rye, oat, and small barley land	4. Wheat and large barley land
5. Wheat, rye, barley, and oat land.	

The species of soil which suit these different crops are—

1. Light dry sand......	1. Cold stiff clay
2. Moist—very slightly argillaceous sand..	2. A lighter moist clay
3. Argillaceous sand ...	3. A warm, dry clay
4. Sandy clay	4. Rich clay
5. Clay.	

The preceding considerations are more than sufficient to give a precise idea of what is to be understood in regard to the composition of arable soils. Nevertheless, with a view to making the subject more complete, I shall quote a few of the analysis of arable soils published by different chemists at a time when a certain importance was attached to researches of this kind. I may remark, generally, that from the whole of the analysis of good wheat lands which have hitherto been made, it appears that carbonate of lime enters in considerable quantity into their composition; and theory, in harmony with practice, tends to show that it is advantageous to have this earthy salt as a constituent in the manures which are put upon soils that contain little or no lime.

Analysis of a soil under the variety of rape called colza, by M. Berthier.

Silica	78.2
Alumina	7.1
Peroxide of iron	4.4
Lime	1.9
Magnesia	0.8
Carbonic acid	1.4
Water	5.8
	99.6

This soil was dried in the air, after having been reduced to powder; it lost 34 per cent. by drying. It is remarkable that it contains no trace of organic matter, the rather as it was held favourable for colewort. M. Berthier believes that this soil would gain in fertility by the addition of a certain quantity of calcareous matter; and M. Cordier* explains its inability to grow grain to advantage, from the deficiency in lime. The stalk of the grain grown in this soil is weak, especially in wet seasons; and the seed is particularly apt to shake out when it is ripe.

If the presence of lime in a wheat soil is a guarantee against loss by shaking in harvest, M. Berthier's analysis is still far from proving that the presence of lime in a soil is indispensable, inasmuch as beautiful wheat crops are grown in the neighbourhood of Lisle without lime. In proof of this fact I shall here cite the analysis of one of the most fertile soils in the world, the black soil of Tchornoizem, which Mr. Murchison informs us constitutes the superficies of the arable lands comprised between the 54th and 57th degrees of north latitude, along the left bank of the Volga as far as Tcheboksar, from Nijni to Kasan, and stretching over a still more extensive district upon the Asiatic side of the Ural Mountains. Mr. Murchison is of opinion that this land is a sub-marine deposit, formed by the accumulation of sands rich in organic matters. The Tchornoizem is composed of black particles mixed with grains of sand; it is the best soil in Russia for wheat and pasturage: a year or two of fallow will suffice to restore it to its former fertility after it has been exhausted by cropping. It is never manured.

M. Payen found in this black and fertile soil—

Organic matter (containing 2.45 per cent. of azote)	6.95
Silica	71.56
Alumina	11.40
Oxide of iron	5.62
Lime	0.80
Magnesia	1.22
Alkaline chlorides	1.21
Phosphoric acid	a trace
Loss	1.24
	100.00

There is an important element which must always be taken into the account in estimating the value of soils: no matter what their special composition, this element is their depth or thickness. In running a deepish furrow in a cultivated field, we generally distinguish at a glance the depth of the superficial layer, which is commonly designated as the mould or vegetable earth; this is a layer generally impregnated with humus, and looser and more friable than the subsoil upon which it rests. The thickness of this superficial layer is extremely variable, it is frequently no more than about 3 inches; but it is also encountered at every depth, from 3 or 4 to 12 or 13 inches. It must be held an exceptional and unusual case when it has a depth of three feet or more. Nevertheless we do meet with collections of vegetable soil of great depth deposited by rivers, washed down into the bottoms of valleys, or accumulated on the surface, as in the virgin forests or vast prairies of America, Depth of mould or vegetable soil is always advantageous; it is one of the best conditions to successful agriculture. If we have depth of soil, and the roots of our plants do not penetrate sufficiently to derive benefit from the fertility that lies below, we can always, by working a little deeper, bring up the inferior layers to the surface, and so make them concur in fertilizing the soil. And, independently of this great advantage, a deep soil suffers less either from excess or deficiency of moisture; the rain that falls has more to moisten, and is therefore absorbed in greater quantity than by thin soils; and once imbibed, it remains in store against drought.

The layer upon which the vegetable earth rests is the subsoil, which it is of importance to examine, inasmuch as the qualities, and consequently the value, of an arable soil have always a certain relation with the nature and properties of this sub-

* "On the Agriculture of French Flanders" (in French), p. 232.

jacent stratum. Frequently, and especially in hilly countries, the mineral constitution of the subsoil is the same as that of the soil; and any difference that the former may present is owing especially to the presence of humus, and to the looser condition which results from the growth of vegetables, from ploughing, &c., and not from atmospheric influences. By deep ploughing, done cautiously, the thickness of the layer of arable land may be increased at the expense of the subsoil; and when plenty of manure can be commanded, the operation will go on with considerable rapidity. Still it is maintained, and indeed in many cases it is unquestionable, that the soil loses temporarily some portion of its fertility by the introduction of a certain quantity of the subsoil; and that under ordinary circumstances, several years elapse before any amelioration becomes perceptible.

In plains, in high table lands the analogy in point of constitution between the soil and subsoil is not so constant. In such situations the arable land is frequently an alluvial deposit, proceeding from the destrnction or disintegration of rocks situated at a great distance. When the superior strata possess properties that are entirely different from the subsoils, it may be understood how the vegetable earth may be improved by the addition of a certain dose of the subsoil; and this is the case in which amelioration is the least expensive.

The impermeability of the subsoil is one grand cause of the too great humidity of a cultivated soil. A strong soil, very tenacious through the excess of clay which it contains, has its disadvantageous properties considerably lessened if the subsoil upon which it rests is sandy—first, from the evident amelioration which must result from an admixture of the two layers, and next because it is always a positive advantage in having a soil which has a strong affinity for water superposed upon a subsoil which is extremely permeable. The inverse situation is scarcely less desirable; a light, friable soil will have greater value if it lies upon a bottom of a certain consistency, and capable of retaining moisture; with this condition, however, that the clayey layer shall not be too uneven in its surface, that it shall not present great hollows in which water may collect and stagnate: an impermeable subsoil, to act beneficially in such circumstances, must have a sufficient inclination to admit of its draining itself. The most essential distinction, then, in regard to the nature of subsoils is into permeable and impermeable. Acquainted with the nature of vegetable earth, it is easy to judge of the advantages or disadvantages which will be presented by subsoils having the faculty of retaining or of permitting the escape of moisture.

In some situations, particularly upon the slopes of hills, the layer of arable land is of very limited thickness; and it is not uncommon to see it lying upon rocks of the most dense description, such as granite, porphyry, basalt, &c.; in such circumstances the substrata are unavailable, and there is nothing for it then in the way of amelioration except to transport directly vegetable earth from other situations. Mica schist is perhaps the least intractable rocky subsoil; the plough often penetrates it; and, in the long run, it becomes mingled with the arable layer. It is generally agreed that limestone rocks form a less unfavourable substratum. There are, in fact, some calcareous rocks which absorb water, and crumble away; and the roots of various plants, such as cinquefoin, penetrate them deeply; but there are many limestone rocks so hard, that they resist all decomposing action for a very long period of time.

The qualities which we have thus far sought to determine in soils do not depend solely on their mineral constitution, or their physical properties, nor yet on those of the subsoils which support them. These qualities, to become obvious, require that the soils shall be placed in certain conditions, which must not be left out of the reckoning: such are those of the climate enjoyed, and of the position more or less inclined to the horizon in one direction or another. The precepts which we have laid down are especially applicable to the arable lands of Germany, England, and France. But in generalizing, it would be proper to say that clayey lands answer better in dry climates, and light sandy soils in countries where rains are frequent. Kirwan made this remark long ago, in connexion with numerous analyses of wheat-lands. The conclusion to which this celebrated chemist came was this, that the soil best adapted for wheat in a rainy country must be viewed in a very different way with reference to a country where the rains are less frequent. The fertility of light sandy soils is notoriously in intimate relationship with the frequent fall of rain. At Turin, for example, where a great deal of rain falls, a soil which contains from 77 to 80 per cent. of sand is still held fertile; while, in the neighbourhood of Paris, where it rains less frequently than at Turin, no good soil contains more than 50 per cent. of sand. A light sandy soil, which in the south of France would only be of very inferior value, presents real advantages in the moist climate of England.* Irrigation supplies the place of rain; and in those countries or situations where recourse can be had to it, the question in regard to the constitution of soils loses nearly the whole of its interest. Land that can be irrigated has only to be loose and permeable in order to have the whole of the fertility developed which climate and manure can confer. Sandy deserts are sterile because it never rains. Upon the sandy downs of the coasts of the Southern Ocean, a brilliant vegetation is seen along the course of the few rivers which traverse them: all beyond is dust and sterility. I have seen rich crops of maize gathered upon the plateau of the Andes of Quito, in a sand that was nearly moving, but which was abundantly and dexterously irrigated.

A sandy and little coherent soil is by so much the more favourably situated as it lies in the least elevated parts of a district; it is then less exposed to the effects of drought; any considerable degree of inclination is unfavourable to such a soil, inasmuch as the rain drains off too quickly, and because it is itself apt to be washed away. It is to prevent this action of the rains, that the abrupt slopes of hills are generally left covered with trees; and the deplorable consequences which have followed from

* Sinclair's "Practical Agriculture."

cutting down the woods in mountainous countries are familiarly known. Strong soils, on the contrary, are better placed in opposite circumstances. A certain inclination is peculiarly advantageous to them; and, indeed, in working clayey lands that stand upon a dead level, we are careful to ridge them in such a way as to favour the escape of water.

In countries situated beyond the tropics, where consequently shadows are cast in the same direction throughout the whole year, the exposure of a piece of land is by no means matter of indifference. In our hemisphere the lands which have a considerable inclination and a northern exposure receive less heat and light, and remain longer wet than those that slope towards the south; vegetation consequently is less forward upon the former than the latter lands: but, on the contrary, the latter are less exposed to suffer from want of rain; and it is a fact, now well ascertained from data collected in Switzerland and in Scotland, that the slopes which descend towards the north, if they be only not too abrupt, are actually the most productive. This kind of anomaly is explained by the frequence and rapidity of the thaws which take place upon slopes that lie to the south. Frost, when not too intense, is certainly less injurious to vegetables than too rapid a thaw; and it is easy to understand that in situations where, from the mere effect of nocturnal radiation, vegetables are covered almost every morning through the spring with hoar-frost, a rapid thaw must take place every day immediately after the rise of the sun. With a northern exposure, the frost occurs in the same measure; but the cause of its cessation does not operate so suddenly, the fusion of the rime being effected by the gradual rise in temperature of the surrounding air. In other respects, it is obvious that the advantages and disadvantages of different exposures are connected with the nature and constitution of soils. The same may be said with reference to means of shelter from the action of prevailing winds. Stiff wet lands are much benefited by the action of free currents of air; our stiff soils at Bechelbronn remain impracticable for our ploughs during but too long a period of the spring, when they have not been well dried in the months of March and April by strong winds from the east. Light and sandy soils, again, require to be well sheltered. The whole object of studying the soil is its amelioration; the industry of the agriculturist is, in fact, more effectually bestowed, and exerts a greater amount of influence upon the soil than upon all the other and varied agents which favour vegetation.

To improve a soil is as much as to say that we seek to modify its constitution, its physical properties, in order to bring them into harmony with the climate, and the nature of the crops that are grown. In a district where the soil is too clayey, our endeavour ought to be to make it acquire to a certain extent the qualities of light soils. Theory indicates the means to be followed to effect such a change; it suffices to introduce sand into soils that are too stiff, and to mix clay with those that are too sandy. But these recommendations of science—which, indeed, the common sense of mankind had already pointed out—are seldom realized in practice, and only appear possible to those who are entirely unacquainted with rural economy. The digging up and transport of the various kinds of soil, according to the necessities of the case, are very costly operations; and I can quote a particular instance in illustration of the fact. My land at Bechelbronn is generally strong; experiments made in the garden on a small scale showed that an addition of sand improved it considerably. In the middle of the farm there is a manufactory which accumulates such a quantity of sand that it becomes troublesome; nevertheless, I am satisfied that the improvement by means of sand would be too costly, and that, all things taken into account, it would be better policy to buy new lands with the capital which would be required to improve those I already possess in the manner which has been indicated. I should have no difficulty in citing numerous instances where improvements, by mingling different kinds of soil, were ruinous in the end to those who undertook them.

A piece of sandy soil, for example, purchased at a very low price, after having been suitably improved by means of clay, cost its proprietor much more than the price of the best land in the country. Great caution is therefore necessary, in undertaking any improvement of the soil in this direction, in changing suddenly the nature of the soil. Improvement ought to take place gradually, and by good husbandry, the necessary tendency of which is to improve the soil.

Upon stiff clayey lands we put dressings and manures which tend to divide it, to lesson its cohesion, such as ashes, turf, long manure, &c. But the husbandman has not always suitable materials at his command; and in this case, which is perhaps the usual one, he must endeavour, by selecting his crops judiciously—crops which shall agree best with stiff soils, and at the same time meet the demand of his market—to make the most of his land. In a word, the true husbandman ought to know the qualities and the defects of the land which he cultivates, and to be guided in his operations by these; and in fact, it is only with such knowledge that he can know the rent he can afford to pay, and estimate the amount of capital which he can reasonably employ in carrying on the operations of his farm.

In an argillaceous or clayey soil, which we have seen above is the best adapted for wheat in these countries, it would be absurd to persist in attempting to grow crops that require an open soil. Clayey lands generally answer well for meadows; and autumn ploughing is always highly advantageous to them, by reason of the disintegrating effects of the ensuing winter frosts.

Chalk occupies a large space in recent formations; as a general rule, the soil it supports immediately is of no great fertility.

Sir John Sinclair proposed to improve such soil by growing green-crops, and consuming them upon the spot. Properly treated, the chalky soils of England produce trefoil, turnips, and barley; and they are particularly adapted to cinquefoin. It is doubtful whether in France, where the climate is not so moist as in England, chalky lands could be treated to advantage on the English plan. Recent inquiries have shown that chalk contains a small quantity of phosphate of lime—a salt (as we shall see by-and-bye) whose presence is always desirable in arable lands.

Turf or turfy soils yield rich crops when we succeed in converting the turf into humus. The grand difficulty in dealing with turf is to dry it properly, inasmuch as it is generally found at the bottom of valleys, or of old lakes and swamps. By a happy coincidence, turfy deposits frequently alternate with layers of sand, of gravel, of clay, and of vegetable earth, which have been accumulated at the same epoch. By a mixture, by a division of these different materials—preceded in every case, however, by proper draining—mere peat bogs may be turned into good arable soil.

Pyritic turf, however, shows itself more intractable; it rarely yields anything of importance. To improve such a soil, it is absolutely necessary to have recourse to substances of an alkaline nature, such as chalk or lime, wood ashes, &c., which have the property of decomposing the sulphate of iron, which is formed by the efflorescence of the pyrites. Turfy lands can also be brought into an arable state, with the help of paring and burning. Scotch agriculturists, who are very familiar with reclaiming land of this kind, hold that the best method of improving turf or bog lands is to turn them into natural meadows. Where the wet and soft state of the soil does not allow cattle to be driven upon it, the crop of hay should only be cut once: the second crop should be left standing. By proceeding in this way, mere bogs have been turned into productive meadows.* Turfy lands, thoroughly drained and improved, present many advantages connected with their natural but not excessive moistness. In the neighbourhood of Haguenau, magnificient hop gardens are found upon bottoms of this kind; madder also thrives in it equally well; and for certain special crops, it is, in my opinion, one of the richest soils.

Sandy soils do perfectly well in countries which are not exposed to long droughts: their cultivation is attended with little expense, and they grow excellent crops of turnips, potatoes, carrots, and rye; but it is well to exclude clover, oats, wheat, and hemp, which require a soil of greater consistence. In southern countries, a system of irrigation is absolutely necessary, in connexion with the cultivation of sandy soils: if they are not watered, they remain nearly barren; the only mode of making them productive is to lay them out in plantations of timber.

We understand that a preliminary meeting of gentlemen interested in the formation of a Farmers' Club was held at the King's Head Inn, in this town, on Wednesday last, when it was agreed that a society, to be called the "Newport Farmers' Club," should be formed, and Mr. Henry Collins, of the Duffryn, was appointed secretary *pro tem.* Nearly twenty members were at once admitted. We are glad that the farmers of this district are aroused from their apathy, and are likely to unite in supporting a society instituted for such beneficial purposes.—*Monmouthshire Merlin.*

---

* Sinclair's "Practical Agriculture."

POTATO DISEASE IN SCOTLAND. OFFICIAL QUERIES.

LOCALITY, PARISH OF LINTON.

You are requested to answer the following questions, in regard to the locality above indicated, in so far as your knowledge and information, as to that locality enable you to do so:—

1. Has the potato crop, in point of quantity, been more or less abundant than an average?
2. What has been its quality?
3. Has it suffered from the prevailing disease of rotting in the ground, or after being raised?
4. Has the disease been general throughout the locality, or has it been confined to particular districts, or to lands in particular situations?
5. In those districts or lands affected, what proportion of their crop has been lost or seriously injured?
6. What proportion of the crop of the whole locality has been lost or seriously injured?
7. What proportion does the quantity reared throughout the whole locality bear to an average crop?
8. Has the progress of the disease ceased or abated?
9. Have any remedies been attempted to arrest its progress, or to preserve, in a state fit for use, the sound portions of potatoes partially affected?
10. In ordinary years is the locality an exporting or an importing one in regard to potatoes, and to what extent?

If you have any remarks to make, have the goodness to subjoin them, and to return this paper within as few days as possible,

To James Andrew, Esq., 22, Hill-st., Edinburgh.

ANSWERS TO QUERIES.

TO THE REV. A. M. FORRESTER, MINISTER OF THE PARISH OF WEST LINTON.

Dear Sir,—Having been favoured through your kindness with a copy of a circular, containing ten questions on the subject of the potato crop of this year, which I am requested to answer in regard to the parish of Linton locality, of which parish you are incumbent, in so far as my knowledge and information as to that locality enable me to do so; and having had opportunities of collecting information and considering facts gathered in the locality specified, I have much pleasure in addressing to you a few lines containing, in a few words, the general conclusions on each of the points of inquiry which I have been able to arrive at.

Answer to Query 1.—I believe it is pretty generally allowed, and it is my own opinion, that the potato crop of this year, in point of quantity, has been, overhead, a full average. But it is worthy of remark, that in one instance, where the tenant had only half a crop, in good sound soil, they have hitherto appeared to be free from all taint. However, the general crop appears to be *less* in quantity than *last year's*, which in most instances in this locality was abundant.

Answer to Query 2.—The quality, generally speaking, has been good for a wet season; but, as might be expected, the tubers contain a large proportion of watery juices.

Answers to Queries 3, 4, 8, 9.—The general crop has suffered to a certain extent in almost every instance from the prevailing disease, both by rotting in the ground, and after being raised. It is worthy of particular remark, that in many instances, where lifted early in small quantities for use, *and before the decay of the shaw, or foliage more particularly*, the portion of the crop so lifted, appeared, and proved on cooking, to be perfectly sound and healthy; whereas, on lifting the remaining portion, *in the same field*, some time after the shaws had decayed, they turned out to be tainted, like the general crops of the country. However, by being housed, and frequently aired by the door being left open, and in pits, care being taken to lift off the covering every good day, for a while, to air and dry the mass—under both these plans of treatment the disease appears to have been, at all events temporarily arrested.

It is also worthy of remark, that on hanging land, looking north, and where the crop was late planted, and in vigorous growth till near the period of lifting, having thus enjoyed the protection of the shaws, a foliage covering, which aided materially in defending the tubers from the heavy rains, acting in some measure as a natural roof, casting aside the wet into the furrows, they turned out upon lifting, to be scarcely affected at all. In this instance, not only did the shaws cast off the rain into the furrows, but the land having a considerable inclination, the superabundant moisture escaped by the furrows to a lower level, leaving the surface and crops comparatively dry. But even here, wherever the superabundant moisture was collected in any slight depression, or hollow, the disease appeared to some extent.

In another instance, on undulating land, the depressions forming natural cups, or basins, retaining the water as it fell, and affording no means of escaping, *in the same field*, the potato crop was excessively damaged in these natural hollows, whilst the more elevated or shelving parts were comparatively unaffected. In one instance, however, the crop raised off dry land was stored in pits early, and, on opening the pits, the potatoes were found to be a decaying mass. In this instance, however, the crop was raised in very wet weather, stored wet, and of course in bad order for keeping sound.

In another instance, a portion was raised in a field soon after the decay of the shaws, when a very considerable number indeed appeared to be diseased; sometime thereafter the number increased; and within a week, and after the heavy October rains, *when the crop had ceased growing, and had been for sometime exposed without the protection of the shaws*, more than a third of the crop was found to be damaged. After raising too, the loss was considerable, although the diseased tubers were carefully separated.

On dry and level ground, *with an open bottom*, the loss was not so great as under less favourable circumstances. On level ground *with a retentive subsoil*, the loss was great. On inclined ground, *where the crop was late planted*, and *particularly if inclining to moss*, the loss was often inconsiderable.

It would appear that the potato crop had this year suffered severely from the cloudy and extremely cold and wet season; the temperature, especially in high districts, frequently bordering on frost, so early as from the latter end of July to the end of August, and subsequently; and the white and most delicate kinds have suffered most. Such a season was ill adapted for bringing this crop to maturity (scarcely a seed apple having appeared in this locality during the past season), and was undoubtedly eminently unsuited to the constitution of the potato plant, derived, as its original was, and acclimated from a dry and sunny country. This is undoubtedly the cause of the prevalence and severity of the *rot*, which is the disease affecting the present crop. There is therefore no such cause for serious alarm; on the contrary, there is every reason to expect, if the tubers are planted next spring which shall have resisted decay during the ensuing winter, and if next spring, summer, and autumn should prove warm, sunny, and dry, and propitious to the maturation and storing of the potato crop, that the produce will, despite the present visitation upon us, prove sound and abundant. There is no rational reason for anticipating the contrary. I do not apprehend there will be the slightest danger from using tubers for seed, which shall have resisted decay during the winter. It has been ascertained that the potato crop is not affected in the more warm and sunny countries of Europe, which is a pretty convincing proof that the cold and cloudy skies which have prevailed over great part of Europe and America during the past season have been, along with any accidental constitutional weakness in the plant itself, the predisposing and active cause which has generated, extended, and aggravated the disease of ROT, depending, or rather resulting, in a great measure, in active, followed by putrefactive fermentation before lifting, or consequent on storing, more particularly where that operation has been carelessly or improperly performed.

No doubt, *after decay of the shaw*, the chief damage has been received. It would then, *at least*, daily become more apparent: and may be, so far, familiarly accounted for, as it has been found to operate, thus. *In the first place*, so long as the potato crop retained the shaws, or haulm, it was in vigorous growth, and was capable of resisting the unfavourable influence and action of superabundant moisture during the late wet season. *In the second place*, the shaws acted as a protection from the rains, as I have already said, casting them aside into the furrows, leaving the cup, *where perfectly earthed up*, high and dry above. And, *in the third place*, it may be remarked, that on the decay of the foliage covering of the shaws, not only were the drills left exposed, but from the extraordinary prevalence and violent action of the high winds, accompanied by heavy rains during the late season, cups or small depressions were formed on the top of the drills, *at the root of every shaw*; and the interstices, or openings left *on the decay of the shaw*, leading from the surface of the drills down to the tubers; and forming, in fact, natural pipes, or conductors, *from the several cups formed on the surface down to the tubers*, would act in this way. The cups would *receive the rain-water as it fell*, and the pipes, *left by the decay of the stems, would conduct* the moisture received and collected in the cups *directly down to the tubers*, and keep them constantly wet; and they have thus been lying, since the decay of the shaws, in *the very circumstances, and under the very conditions, and exposed to the very influences* most favourable for inducing ROT, which is, without doubt, the only disease with which the potato crop has this year been so severely affected. No doubt, as I have already said, the sets might have been predisposed to disease; because, so to speak, the constitution of the plant has been for some years deteriorating in the country. But had the late season been a genial season, as it was the reverse, the probability is, that the injury would have amounted to nothing more than has been usual in an average of past seasons.

The progress of the disease has not ceased or abated, *where the tubers have been stored wet, or in bad order, or without reasonable precautions*. Few attempts at remedy have been ventured. But I would remark generally that when housed, where there is the necessary accommodation, the tubers should be examined frequently, picked carefully, and where obtainable with little trouble or cost, they may be beneficially sprinkled with gypsum, slaked lime, dry peat ashes, or even with the roughly dried sand; and though exposed with the doors open for air during the day, they must be carefully covered with abundance of straw, and the doors shut during the night. The use of *either of the first three substances* will have a very excellent and healthful effect in preventing the noxious gases, arising from the mass, injuriously affecting the individuals employed in picking, sorting, and turning the tubers.

The portion of the crop destined to be stored in pits has been already covered over. But as these pits will, no doubt, be examined from time to time, *under present suspicious circumstances*; and if it should be found, on such examination, that the tubers are keeping so ill as to suggest the prudence of turning bodily, and storing in fresh pits, I would recommend that the operation be performed in the following manner.

If the surface is dry and firm, let a foundation be laid (where they are at hand) of loose stones, covered with straw, branches of trees, or such like, *well dried*; and let upright chimneys be placed, extending from the ground upwards to above the heap, formed of three or four coarse planks, or boards (deals) nailed together, forming thus a square, and an angular chimney or tube, or let them be formed with draining tiles; or, if neither wood nor tiles are easily procurable, then let them be built of dry stone, or formed of wood faggots; and let these be placed at short distances from end to end of the potato pit. These will air, or ventilate the potatoes in good weather; but, during rain or frost, the chimney must be closed with a bunch of hay, straw, or a sod, or such like. It would appear from all experience, that *perfect dryness and thorough ventilation are the only efficient and attainable remedies, or curatives, or preventives.*

When slaked lime or peat ashes can be easily procured, I would recommend that the diseased part of the potato should be in all cases cut off or excised, and the wounded surfaces dusted with either the lime or ashes before storing, or during the sorting and picking process. The diseased parts cut off may be profitably and safely used in the following manner. As it would be impossible to give more distinct or simply expressed directions, I shall borrow the following, submitted by Mr. Croker at a late meeting of the Cork Agricultural Society, and a copy of which has been early sent to me. The following may be adopted by any family:—

	Farina, or flour dry and fit for use.		
	lb.	oz.	dr.
One weight (20 lbs.) of sound white potatoes will produce....................	3	9	0
One ditto unsound, and diseased part cut off	3	1	0
One ditto unsound minions	3	1	0
One ditto unsound and paired	3	0	0
Unsound, none cut off	3	6	0

Diseased potatoes useless, quite soft, and rotten, will make as good starch as the soundest, and need not have the bad parts cut off; let care be taken to have them well washed, to prevent earthy particles mixing with the flour. He would give accurately what the six loaves of bread produced are composed of, the cost of each, and the weight, by which it would be seen that actually the people had it in their power, at a trifling expense, to procure from diseased potatoes a far better description of food than that they had heretofore been using, and he trusted that what was considered the greatest calamity that could befall them, may prove to be a rich blessing, viz., the change of diet from potatoes to bread.

No.	What composed of.	Price of Wheaten Flour or Oatmeal.	Weight of Loaf.	Price
1.	One pound fine wheaten flour, and one pound of farina...	18s.8d.per cwt., or 2d. per lb.	2lb. 10oz.	2¼d.
2.	Half a pound of fine flour, and one pound of farina	18s. 8d., or 2d. per lb.......	1lb. 10oz.	1¼d.
3.	One pound of household flour, and one pound of farina....	15s. per cwt., or about 1½d. lb.	2lb. 13oz.	1¾d.
4.	Half a pound household flour, and one pound of farina....	Do. do ...	2lb. 15oz.	1d.
5.	One pound of oatmeal, and one pound of farina............	13s. cwt., or less than 1½d. lb.	2lb. 5oz.	1¾d.
6.	Half pound of oatmeal, half pound of household flour, and half pound of farina ..	14s. per cwt., or 1½d. per lb.	2lb. 0oz.	1¾d.

Remarks.—The cost of soda, sour milk, and salt is included, but no allowance for fire, as the potatoes, if sound, should be boiled, taking the same quantity, if not more, than baking the bread.

The proportions were, for the above loaves, a small tea-spoonful of soda, the same as salt, which must be very well blended with the flour or mixture, after which it should be let lie, wet, and worked up with sour skimmed milk, or buttermilk—the latter he preferred; and the longer kept the better, as the sourer the milk was, the more it acted on the soda and made the bread rise better. As all countrywomen know how to make potato-starch, he need only say to them, provide at once a good grater or two, and set to work on the unsound potatoes. Keep your families constantly employed in picking out the diseased ones, thus securing an ample supply of the best food from this description, when the starch is sufficiently washed.

The above is so simple and so sound, that I deemed it worth while to embody it here.

The agency of drying in preventing vegetable decomposition is constantly within the range of the familiar observation of any one. *Even though active fermentation might have set in before the tubers were dug from the soil,* it might be arrested by thorough dryness after housing or storing in the pit. But if housed or stored *wet,* putrefactive fermentation would probably ensue; and this has happened in some instances, to the ultimate destruction of the whole mass. Kiln-drying has been recommended where convenient, and it might be effectual *if the crop were properly treated afterwards;* but this would involve a tedious and expensive process: and therefore, on a large scale, I would have great hesitation in recommending it, as, when farming is practised on a great scale, painful and expensive attention to minuteness in details cannot be, generally speaking, expected. A large farmer resembles a wholesale merchant; a cottier, a retail merchant. What may be suitable for the garden may be too expensive in the field.

Answers to Queries 5 *and* 6:—Perhaps about a seventh part has hitherto been lost, though of course the loss, before spring, may be greater considerably, depending much on the precautions taken in housing and storing. 7: At present, it may be about an average crop, *less one-seventh,* as stated above. The prospective loss is uncertain.

Answer to Query 10.—The county of Peebles, and the parish of West Linton particularly, is a great exporting district of seed potatoes to the low countries round the capital, and to the east, and indeed westward of it, perhaps, in ordinary seasons, to the extent of from two to three thousand bolls, so that the state of the potato crop in this district is of very material importance, both positively and relatively—positively, to the extent of the deficit; and relatively, as an index of the state of the crop in similar districts, so far, although it would appear that, *this season,* such a test cannot so much be depended on. It has been remarked elsewhere, however, and observation in this locality seems to confirm it, *that a soil of bog or peat earth,* very prevalent in this quarter in particular localities, *seems to have a very decided and sensible effect in preserving the crop free from the prevalent disease. This may be of great importance next spring, at seed-time.*

I am, dear sir, yours truly,

James Anderson.

22, *Hill-street, Edinburgh. Nov.* 10, 1845.

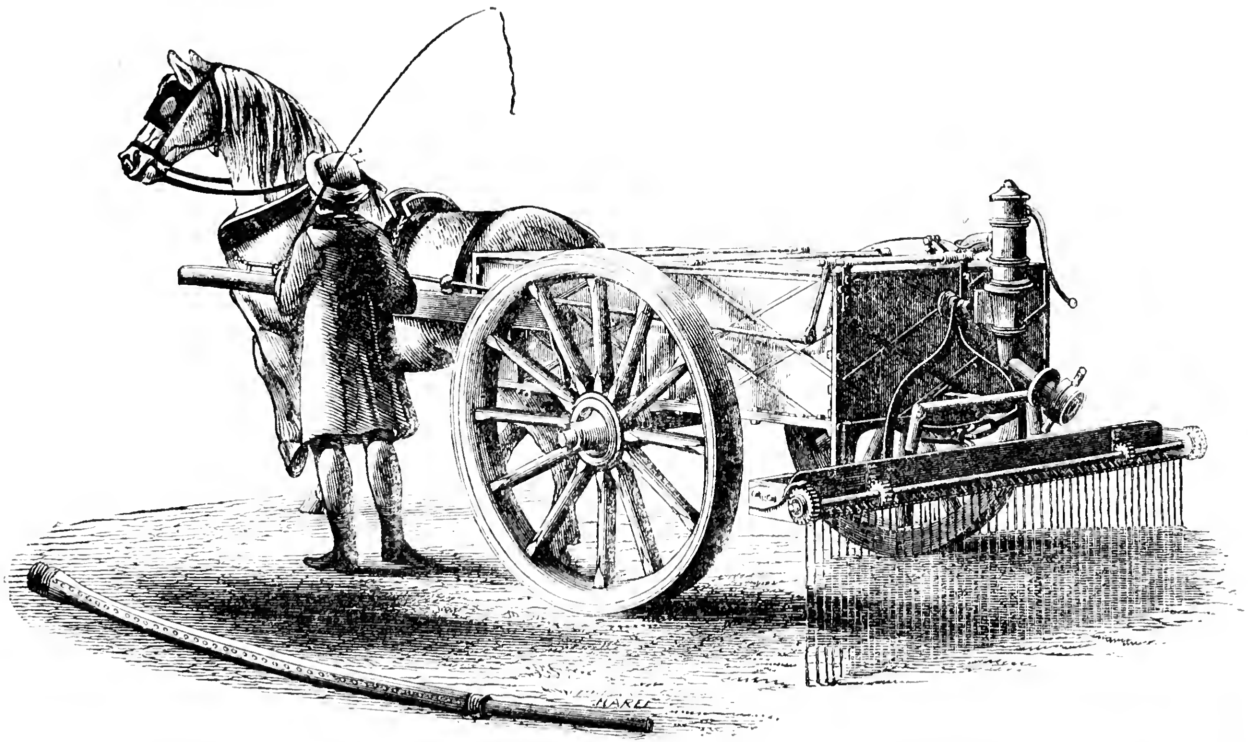
SUGGESTIONS FOR SECURING A CROP OF POTATOES NEXT YEAR, 1846.

It is now an ascertained fact that at this early period the potatoes are sending forth shoots. What a loud call unto us to meet and encourage this effort of nature in time by instant setting! for it is only rational to expect that the vital energy for vegetation will be exhausted if we delay until the usual time. Cull the middle sized—put down whole at the back of the spade; when down, dress lightly with straw or lime; cover as usual with earth. Use no dung except for experiments, there being in the potato this season a strong tendency to decomposition, the effect of which would be heightened by the application of a putrefactive fermentation in the dung, and, consequently, a hastening of decomposition, even as same produces same. Do not be afraid of frost, which is a preservative, as it acts as a cautery on the surface of the clay for the depth of a few inches only. I am persuaded that the proper period for sowing potatoes is in the autumn, when fresh dug; we then have strength and vigour in the parent. What is pitting but foolish sowing, whereby we obtain shoots which are broken off and cast away? Thus the vital energy or first shoot is rejected, that ought to be preserved in the ground by early sowing, in order to procure a healthy and vigorous plant. The cutting of potatoes for seed will be found no saving, as a whole potato may get at least double the space of ground. The advantage of early planting this season is to be taken in a three-fold sense: 1st, should the crop fail; 2nd, replace at the usual time with seed, if fit to sow; and 3rd, if the seed potato in the latter end of spring is doubtful, put down oats or barley, so that early sowing gives ample time for replacing. In order to preserve the present year's crop for human food, submit the potato to a dry atmosphere by spreading them out thin to its action, and when thoroughly dry may thicken them into a heap; by so doing, you introduce solidity, which enables the root to cast off the eruption, and which can only make its inroad upon that part that is predisposed. Being weak and waterish, introduce solidity by drying, and the eruption ceases. Use no lime or ashes for this purpose, as directed; as such are powerful incentives to sprout, and, consequently, a stimulant to vegetation, or a total decomposition of the root for family use.

R. G.

CROSSKILL'S IRON LIQUID MANURE CART,

WITH NEW WATERING APPARATUS AND PORTABLE IRON-PUMP, HOSE-PIPE, ETC., COMPLETE.



The body of the cart is made of cast-iron, well painted, and is much less liable to corrosion than those made of plate iron. It will contain 100 gallons; a larger size is made to contain 200 gallons. The cart is fitted with a brass outlet valve, acted upon by an iron lever rod, with which the driver opens or closes the valve while walking by the side of the horse, as shewn in the engraving. The new invented gravitating pendulum spreading apparatus, with regulator and sliding front, is adapted to water equally upon uneven lands six feet broad-cast. The objection to the working of Crosskill's former liquid manure cart was, its not watering equally upon uneven lands; when it passed over an inclined plane, the liquid naturally flowed to the lower end of the fixed spread-board: by the new plan, the cart is adapted for watering equally upon either level or uneven land; the apparatus being suspended by a pivot, with a regulating guide. An extra apparatus is used to apply diluted sulphuric acid and dissolved bones, with a simple contrivance to water the rows any width apart.

Received the honorary reward of the Royal Agricultural Society of England, also the honorary reward of the Royal Agricultural Improvement Society of Ireland, at the General Meeting at Ballinasloe, 1845; and the honorary reward of the Highland Agricultural Society of Scotland, at the General Meeting at Dumfries, 1845. The great Yorkshire Agricultural Society awarded its best prize to this implement at the Beverley Meeting, 1845; also the prize of the North Lincolnshire Agricultural Society, at the Gainsborough Meeting, 1845.

ON THE WEATHER OF 1845, IN CONNECTION WITH THE FAILURE OF THE CROPS.

The state of the crops this year, and particularly of the potato crop, has given a more than usual interest to the meteorological phenomena of the year, and renders a comparison of them with those exhibited in years of abundance, and also with their respective averages, highly important.

As the crops in the year 1844 were good, I have decided upon comparing the phenomena of this year with those of that year, and both with their averages, as deduced from upwards of twenty years' observation.

Proceeding in this way, I find that no certain difference has existed between the meteorological phenomena of these years, or from their averages, in the following elements:—

The pressure of the atmosphere;
The temperature of the dew point;
The direction, or the strength of the wind;
The amount of cloud; or,
In the quantity of rain fallen.

But a very marked difference has existed in the temperature of the air, of which the following are some of the particulars :—

The mean temperature of the first 13 weeks of 1844 .. was 38 deg. 6
" " " 1845 .. was 35 deg. 4
" " On an average of 25 years was 38 deg. 9

Therefore, the mean temperature of the first thirteen weeks of the year 1844 was very nearly the same as the average; whilst that of the present year was the large quantity of 3½ deg. below the average, and that this period of 1844 was nearly this amount warmer than in the present year.

The mean temperature of the second 13 weeks of 1844 .. was 55 deg. 0
" " " 1845 .. was 51 deg. 9
" " On the average of 25 years was 53 deg. 0

Thus exhibiting an excess above the average, in 1844, of 2 deg.; whilst, in 1845, there appears a deficiency of 1 degree and one-tenth below the average; and that this period of 1844 was more than 3 degrees warmer than the corresponding one of 1845.

So remarkable a tendency to cold being thus shown in the first six months of the present year, I send a more detailed account of the summer temperatures of 1844 and 1845, as such possibly had the greatest effect on the crops :—

1844. Week ending		Mean tem. of the week.	1845. Week ending		Mean tem. of the week.	Average tem. of the week.	The mean temperature of the week, above (A) or below (B) the average. 1844.	1845.
		Deg.			Deg.	Deg.	Deg.	Deg.
July	6	58.9	July	5	61.3	62.2	B 3.3	B 0.9
	13	61.5		12	60.9	63.0	B 1.5	B 2.1
	20	57.9		19	59.6	63.4	B 5.5	B 3.8
	27	67.5		26	60.0	62.8	A 4.7	B 2.8
Aug.	3	58.3	Aug.	2	56.3	63.1	B 4.8	B 6.8
	10	58.7		9	59.5	62.7	B 4.0	B 3.2
	17	58.2		16	55.6	62.8	B 4.6	B 7.2
	24	58.4		23	56.5	61.2	B 2.8	B 4.7
	31	56.5		30	57.6	60.3	B 3.8	B 2.7
Sept.	7	62.7	Sept.	6	54.0	59.2	A 3.5	B 4.6
	14	58.1		13	55.8	57.7	A 0.4	B 1.9
	21	56.5		20	55.0	57.6	B 1.1	B 2.6
	28	52.0		27	50.0	55.6	B 3.6	B 5.6
Oct.	5	54.6	Oct	4	55.0	54.0	A 0.6	A 1.0
	12	51.6		11	47.7	53.2	B 1.6	B 5.5
	19	48.6		18	52.9	50.1	B 1.5	A 2.8
	26	46.1		25	45.9	49.6	B 3.5	B 3.7
Nov.	2	44.2	Nov.	1	48.9	46.8	B 2.6	B 2.1
	9	43.8		8	47.2	44.8	B 1.0	A 2.4
	16	49.9		15	44.5	42.5	A 7·4	A 2.0

From this it appears that the mean temperature of every week, between July 6 and September 28, 1845, was below the average, the mean value of which, during the period, is nearly 4 degrees *below the average of the season;* in some of the weeks, this departure amounted to 6 or 7 degrees, as will be seen in the last column. There can be little doubt that there has existed an intimate connexion between the temperature of the air and the failure of the crops. The temperature, after September 28, cannot have effected the crops to any great amount; but it will be seen that in some of the weeks, it has been above, and in others below the average. The temperature of the corresponding time between July 6 and September 28, in 1844, was 2 degrees below the average of the period.

So remarkable a departure from the average may, possibly, have effect on the public health, as it doubtless has had on the crops, and comparisons of the meteorological phenomena of this year with those of any other plentiful year is highly important.

JAMES GLAISHER.

Blackheath, Nov, 17, 1845.

REVIEW.

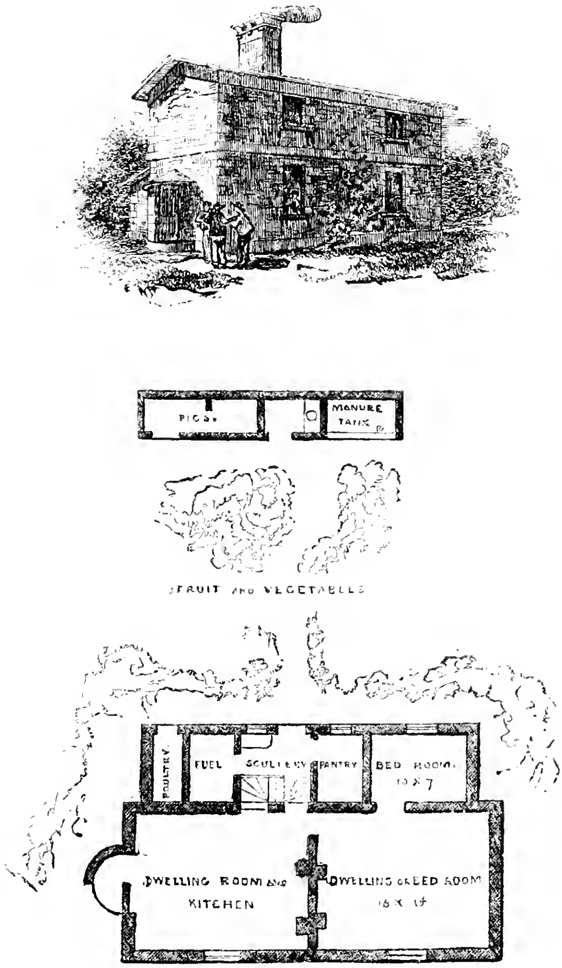
JOHNSON AND SHAW'S FARMERS' ALMANAC, FOR 1846. James Ridgway, Piccadilly.

As it has been established as a feature in the business of this life that the opportunities for study, or even occasional reading, should not or cannot be equal to all, so ought it to follow that the works intended for the especial perusal of those of the more limited means (we speak as to time rather than money) be got up with something even beyond ordinary care and attention. In saying so much, we consider that we are offering advice equally to the advantage of publisher and purchaser; for, in the first place, that reader whose claims to the title are necessarily circumscribed will almost naturally, when he has the chance, turn to such themes as he himself is well able to judge of, and from which, should he meet with many acts of negligence or ignorance, he will undoubtedly withdraw a support, that—in the second place—his author or compiler could never reasonably expect from the world at large. It is, now, precisely on these grounds that one is forced in a moment to acknowledge the high excellence of the Farmers' Almanac. The names of the two good men and true who appear as managers of and fellow workmen on it must, it may be argued, tend of themselves to assure us of it; or to go further still, a careful scrutiny of the mass of information and multitude of facts here collected, the diligence and experience here brought into play, would go far to convince the most prejudiced of its really substantial claims; but yet, after all, it is what we may well term "the immense success" and annually increasing popularity that put the genuine stamp on the work. Only let it be borne in mind that there is scarcely, perhaps not indeed one individual who pays over his shilling for a copy of the Farmers' Almanac, but who consults its pages day after day and week after week in the pursuits "whereby he gains his bread;" that every "kind patron" must also in his own defence be an "impartial judge;" and that British yeomen are justly famed for speaking out readily and plainly: only let all this be recollected, and it will require no very great labour to put the proper estimate on "the power that has increased and is increasing" of the Farmers' Almanac and Calendar.

To say that the Almanac for the ensuing year is based on the same principle as those of former seasons is, "we calculate," in Yankee phrase, "running pretty considerably handy," on its best recommendation; while still, however, subscribers have to join in with Editors in returning thanks to able and intelligent correspondents, to whose contributions and suggestions, we have no hesitation in adding, full justice has been done. Thus combining to make the Farmers' Almanac, as we believe was the intention from the first, not only a necessary and correct remembrancer, but something of a safe adviser, and indeed not a little of an agreeable companion.

As an example of the numerous highly interesting papers introduced, we make a selection of the following, not only on account of its excellency as well as brevity, but also as a proof that the cause of the poor have an equal consideration with that of the rich. In the subjoined plan and exposition of a farm-servant's home, we think that the architect, Mr. Chas. Miles, 96, Great Russell Street, has shown himself a proficient in his profession generally, and a thorough master of a subject of which we are promised, and anxiously expect, a more ample detail. It is, we fancy, in the carrying out of some such idea as this that the peasant would find a home indeed, and the peer an ornament instead of, as too frequently at present, an eye-sore to his estate.

This, is, indeed, when properly considered, a subject of far more importance than a mere superficial view of the plan and detail might at first lead one to allow it; there is, moreover, a novelty of design, together with a practicable utility, in the working out of such an idea, that ought speedily to ensure it a fair trial. We have works, drawings, plans, improvements, and suggestions for farm-houses, farm-yards, rick-yards, stables, cow-houses, and so forth, day after day issuing from the press; while, on the contrary, we are forced to confess that we know of no published specimen in which the necessaries and comforts of the labourer are consulted or carried out with anything like that unity and propriety so evident in every part of the plan now before us. In the actual state of the case, too, we frequently find but little more attention bestowed on such dwellings than it would seem has been given to them by artists and architects. Now and then, certainly, we may meet with a Lady Bountiful, whose great care it is to have her cottages laid out with that completeness and picturesque appearance the very word cottage itself conveys to the minds of most Englishmen; or perhaps be told of some "fine old English gentleman" who has every family on his estate housed with comparatively as much comfort as himself. There may be instances of this kind, although, generally speaking, we fear the care and ability employed in constructing a poor man's home are noways in a proportion to what they might and should be. And yet, how much mischief—how great a want of self-respect and total recklessness of conduct could be traced back to lamentable neglect in this particular! Who shall say but that the present almost barbarian state of the Irish peasant, his insensibility and supineness, must in a great measure be attributed to the wretchedness of the hovel in which he spends those hours the daily labours suffer him to share with his family—the one common room, in the midst of which children and pigs wallow together, and from which he reaps no further benefit than the mere shelter of four naked walls and a half-thatched roof? The natural, however, and certainly national character of these people will, it is affirmed, be always a grand obstacle to any permanent improvement in their social condition. But with the English, Scotch, and Welsh, it is materially different: there is an innate love of tidiness, cleanliness, and order in the lower classes of these three countries, that needs only a proper encouragement and assistance from their employers and providers to work of itself a very decided change for the better, both in their habits and dispositions. How many a man, ere this, has been driven to the pot-house, the game preserves, or some even worse night-work than that, not so much perhaps from the want of proper wages or employment, as the miserable arrangement and appearance of that spot wherein should have been centred the balm of all his cares, and the honest pride of all his heart! How many a heart-broken wife or forsaken family might ground their misfortunes, not so much on the errant husband as the builder or owner of the hut, in which it was impossible to display the notable skill of a good housewife, or the very sight of which, in all its hopelessness of place and plan, struck so jarringly against the manly efforts of the returning "cotter!" Whatever may be the result in a mere pecuniary consideration of the matter, there is no real comparison between the simple disposal of money, food, or clothes to the poor, and the far more judicious endeavour to imbue them with a spirit of feeling and relying on their own exertions. In the one instance we have a pauper kind of charity that seldom fails to give a desponding tone to the mind of the receiver; while, in the other, we see a grateful recompence, which invigorates its enjoyer, as he knows he has done his part to deserve it. We see now no more likely method of increasing or establishing such an *animus* as we have attempted to describe, than in providing the poor man with a home, so conceived and constructed with such helps and requisites, that his own comfort shall mainly depend on his own conduct; and in arranging all this, we repeat, Mr. Miles has commenced a good work, that we hope the Council of the Royal Agricultural Society will receive with that attention it so justly deserves. In our "mind's eye" Mr. Miles goes forth, like the Knight Errant of old, as the champion of the poor and helpless, carrying cheerfulness and contentment wheresoever he is engaged.



DESIGN FOR A COUNTRY LABOURER'S COTTAGE.

BY CHARLES MILES, ARCHITECT.

In describing the Labourer's Cottage, I shall confine my remarks to such points in the construction or arrangement as differ from the usual routine in the laying out and fitting up of this class of house. The tenements may be detached, to afford a greater degree of private comfort, and their distribution such as to form picturesque and agreeable groups. The entrance to the cottage is by a porch, of a novel and simple contruction; two doors being fixed together at right angles, work in a quadrant of masonry, the hinge being the centre, ingress and egress are effected by drawing the doors forward and entering in between them, so passing either in or out; thus fresh air is introduced without causing any draught. During the hot weather the doors may be folded together, when its action becomes that of an ordinary door, but with the advantage of an open porch. This entrance opens into the usual living room or kitchen marked A, which is 18 by 14.

In the poor man's dwelling, the Labourers' Cottage, one fire can only generally be afforded: it is therefore a subject worthy of every attention to make this fire as extensively useful as possible. Some improvements lately patented by Mr. Sylvester in grates and fire-places appear to give adaptations peculiarly fitted to small dwellings. With a very moderate expenditure of fuel the living apartment would be provided with a fund of hot water, a good oven, a cheerful open fire, and a warm hearth. Besides these advantages, this fire-place would also furnish, at pleasure, warmth consistent with preserving dryness in all the rooms; not, however, doing away with the necessity of fires in the other rooms, when these may be actually occupied. The ventilation of all the rooms is secured by the chimney, and a free admission of fresh air, the chimney shaft being so constructed as to render the benefit of a change of air or ventilation in every room at the same time. Adjoining this room is an apartment of the same size, available as a sitting or bed-room; leading from the latter is a chamber 10 by 7, which may be used as a bed-room. There is a pantry 8 by 7. Adjoining the kitchen is a scullery, with a back door, and may be the fuel store. A place is also provided for the poultry. There are two rooms on the first floor, which are approached by a staircase from the kitchen. A drain from the scullery through the vegetable garden to the covered manure tank provided with a pump, together with the pigs, &c., are a short distance behind the dwelling. An underground tank, to collect the rain water from the roof, should be made in a convenient situation. It is intended to build the walls hollow with blocks of moulded concrete, wherever good stone or brick are not to be obtained at a reasonable cost. An entirely new construction is proposed for the roof, which shall be fire-proof, nearly flat, and a sufficiently bad conductor of heat, &c.; with all the expense not to exceed that of a common roof. The floors may be of the same material, thus to render the structure fire-proof. It is my intention to explain the whole of the detail of this cottage, and of the proposed new arrangement of farm buildings, with estimates, in a series of communications to the Council of the Royal Agricultural Society.

THE FARMERS' CLUB.—MONTHLY MEETING.

Tenant's Rights.—The Potato Disease.

The second monthly meeting for the season, of the Farmers' Club, took place on Monday evening, the 3rd of November, at their rooms in Bridge-street, Blackfriars.

Mr. Baker, of Writtle, on taking the chair, stated that the subject which stood on the paper for discussion that evening was the "Tenant's Rights," and it had been the intention of Mr. Shaw to have taken the lead in that discussion; but as that gentleman was unfortunately prevented by a rather severe illness from being present, it rested with the meeting to say what course they would pursue under these circumstances—namely, whether they should proceed with that or any other subject (*hear, hear*).

Mr. Beadell said the subject of "Tenant's Rights" was one of so much interest and importance, that he thought it desirable that they should not commence its discussion in the absence of Mr. Shaw, who had intended to open it; for much of the good likely to result from that discussion might depend upon the manner in which it was first introduced (*hear, hear*). They all knew how well able Mr. Shaw was to do the subject justice, and that his introduction of it would be likely to invite a discussion which would be both interesting and profitable to their members. For his own part, he thought it would be much better if some other subject could be taken this evening, and the question of "Tenant's Rights" deferred until a future evening, when Mr. Shaw would, in all probability, be in attendance (*hear, hear*).

Mr. Wood said the subject of "Tenant's Rights" was of such vast importance to the country at large, as well as to tenants themselves, that he thought it would be highly injudicious to proceed with the discussion of the question in Mr. Shaw's absence (*hear*).

The Chairman, seeing that it was the sense of the meeting that the question should be adjourned, formally put it to the meeting, and it was adjourned accordingly. He said it was now for them to select some other topic, and perhaps gentlemen present might be able to throw some new light upon the subject of the potato disease (*hear*).

Mr. Beadell said he would answer the invitation of the chairman by offering a few observations upon the prevailing potato disease. They had all seen the extent to which it had proceeded. When he had seen it stated in some of the periodicals that five-sixths of the crop would be lost, well knowing how greatly the poor depended for subsistence upon potatoes, especially in Ireland, he felt greatly alarmed, and had taken a means of ascertaining the correctness or incorrectness of the statement. He requested a friend of his, who was going over to Ireland, to write him a letter, stating the actual condition of things as he found them come under his own eye; and as the opinion of a practical farmer, who had had his attention called to the subject might go far to remove the impression that starvation was literally staring the people in the face, he would read them that opinion. This gentleman stated that he had made inquiries on the subject, between Belfast and Newtown Limavaddy, and found that the general answer was that half the crop was destroyed. Whether this was the case in particular districts or not he could not say, but he added—"From the cases which have come under my own actual observation, I know it to be far otherwise; and I should say that about one-sixth is the outside of the loss (*hear, hear*). There never was a better 'plant' of potatoes than there was this year; that was to say, there never was a greater number of acres planted than this year. Had there been no failure from disease, the crop would have been far above the average." He (Mr. Beadell) left Ireland on the 15th September, and up to that time he never saw the potatoes looking more healthy. Had the loss been as great as stated, starvation must literally have stared the Irish people in the face; but he had great confidence in the statement of the party whose letter he had read, and was quite inclined to believe that the matter had been exaggerated (*hear*).

After a short pause,

The Chairman said, as no one else appeared disposed to address the meeting, he would himself offer a few observations as to the extent to which the loss had gone; the published accounts of which he felt sure had been very much overstated. He was quite sure that the deficiency in the potato crop was not nearly so large as had been anticipated, He had heard the opinion of a very large grower in the neighbourhood of London (Mr. Maxwell), who had told him that there would be plenty of potatoes, and that, taking the crops and prices together, he was perfectly satisfied. As far as he (Mr. Baker) could judge of the matter from his own growth, he took it to stand in this way: he supposed that this year about one-half as many again had been grown as on ordinary occasions; and therefore, supposing that one-half were destroyed by the disease, there would still be three-quarters of an ordinary crop left. In one of his fields he had this year grown as many as nine or ten varieties, and he observed that all the rougher kinds escaped more than the others; the rough shaws, for instance, had escaped almost entirely; seven out of eight were good. But he had lost nearly the whole of the smooth and more delicate kinds. The Scotch kidneys, and some new varieties which he had from London, were nearly all gone. He had dug most of his potatoes early, and placed them in a potato-house, divided into bins, taking care not to put the tiers more than two feet in thickness, so that they could be occasionally turned over and examined, and he had found very few became bad. How they might do in clamps, he could not say; he believed some which had been clamped had been found to rot very much. The result of his own observation, however, was that if potatoes were sound when put into the bins, no further infection went on. He had made a remark at their last meeting, to which he would again call their attention, namely, that he did not think we cultivated new kinds sufficiently; but that, by growing the same kinds year after year, they wore out—in fact, that similar consequences ensued as from breeding in-and-in, in the animal creation; the result was, that we deteriorated instead of improving the quality of the potato (*Hear, hear*). This theory appeared to be borne out by the fact, that the newer kinds were generally much less subject to the disease than the old ones. The Regents, for instance, had almost entirely escaped, and the Red-Lions—another new description, introduced by Dr. M'Lean, of Colchester—had in many places escaped altogether. The mangold-wurzel potato was another instance; he had never heard of their being attacked at all. A person who had addressed a letter to Sir Robert Peel on this subject, and who appeared to have availed himself of every opportunity of investigating the matter, expressed the same opinion with regard to the new varieties having generally escaped. He (Mr. Baker) thought the government ought to interfere with a view of encouraging the cultivation of new kinds, either by importation or other means. For they all knew that potatoes were neither so good, nor productive, nor so hardy as they used to be—all attributable perhaps to the same cause. They were well aware what an influence change of soil exercised on the cultivation of the potatoes. They might, in fact, be grown over and over again in the same soil, until they lost their distinctive character. He had himself grown the kidney variety until it had become perfectly round, and would not have been known to be a kidney potato at all (*Hear, hear*). As to the prevailing disease being new, he would not himself venture to make such an assertion. All cultivators of potatoes must recollect the disease which a few years ago attacked the sets—very similar, in character, to that from which they had this year suffered. That it arose from atmospheric causes, he thought, was beyond question, because it was so general and uniform all over Europe; and he believed that if we had a genial season next year, we should see no more of the disease.

Mr. Gale, of Shepton-Mallet, said he was very glad to learn, from what he had heard this evening, that the failure of the potato crop was not likely to be so great as had been expected. In Somersetshire the prevalent disease had been altogether fatal to the potatoes. In a parish adjoining Shepton-Mallet, sixty acres which had been let to labourers for the purpose of planting had been thrown up as not worth the digging; in fact, the potatoes were all rotting in the ground.

Mr. Beadell begged to ask Mr. Gale how much the labourers paid for this land?

Mr. Gale replied, about £2 per acre.

Mr. Beadell said this was what was called "setting," and not "letting," land: it was the curse of Ireland, and a system which he hoped soon to see done away with (*hear*). There must be a very good crop indeed, or there could be no chance of success (*hear, hear*). There was one remark, however, which he was very desirous of making, and that was, that this disease did not appear to be universal. He was, during the preceding week, down at Northfleet; and on making inquiries respecting the extent of the potato disease in that neighbourhood, a tenant assured him that they knew nothing of it in that district. It was consoling to think that there might be other districts like the neighbourhood of Gravesend, in which the disease was not known. That the disease was attributable to atmospheric causes, he thought there could be no doubt; but it was far from being universal (*hear, hear*). As far as his experience went, it attacked particular kinds of potatoes: the regents were scarcely touched at all, while a very favourite potato, called the pink-eyed kidney, was almost entirely destroyed; the red lions were scarcely at all attacked, and, generally speaking, he had found, as remarked by Mr. Baker, that the new varieties were much more free than the old ones (*hear*).

Mr. Tyler, of Epping, said, some of the old ones escaped, too, in particular localities. The shaws, for instance, escaped in his neighbourhood, and they were a very old-fashioned potato; those planted early were not attacked at all, while those which had been planted later in the season were almost all rotten. He did not think there was any rule to be laid down with regard to old sorts or new sorts. The peach potato appears not to have escaped in any instance whatever: nine out of ten are rotten, whereas the regents had escaped almost entirely. He did not think, however, that it depended on the sorts.

The Chairman said he knew an instance of some potatoes being planted in a garden, part of which had altogether escaped, while others suffered severely from the disease. Those which were near and under the shelter of the wall had escaped, but those which were near a path which formed a sort of channel for the water were generally infected. No doubt the wall gave out some degree of heat in the night, but those near the path were exposed to a great deal of moisture and cold, and to more sudden changes of atmosphere. Here the disease could be traced almost immediately to atmospheric influence (*hear*). He had also been informed by a friend of his that the potatoes which had been grown near hedge-row timber had escaped: this was doubtless owing to the protection which the trees afforded; and his friend had remarked that "this was the only instance in which I ever knew the trees to do me any good" (*hear, and a laugh*). It was only by collecting and bringing together facts like these, however simple and isolated they might appear, that they had the least chance of tracing the causes of the evils under which we were suffering, and of finding a remedy (*hear*).

Mr. Turner, of Devonshire, agreed in the opinion which had been expressed, that nothing so much required change of soil as the potato. There was no doubt that potatoes which had been grown in a light and dry soil had escaped much better than those grown in a moist soil. His hwn opinion was that the disease was greatly attributable to the cold frosty nights which had occurred just at a period at which the potatoes were growing faster than at any other time. He had never known them grow so much stalk as they had this year. In Devonshire, he believed, the disease had been heard of sooner than in any other part of England; and in some districts of that county the potatoes had been nearly all injured; while in others, where new sorts had been introduced, they had almost entirely escaped. He did not, however, think that the mischief done was to the extent which had been represented in the newspapers. The system of clamping, however, ought to be avoided; for it would not do at all in the present state of things: the only way to save them was to get them into houses, and sort them once or twice over. Those which were touched were not wasted, for the labourers were feeding their pigs with them; and the only difference was that instead of fatting them after Christmas, they were doing it now(*Hear, hea*). He was in hopes that in Devonshire a great number would be saved. In Norfolk he had seen them taking up the mangold wurzel potatoes scarcely injured at all. These appeared almost entirely sound, while the older sorts had suffered very much. The great point was to sort them well, avoid clamping, and protect them from the frost.

Tenants' Rights.

Mr. Beadell wished to know whether the question of tenants' rights would be taken for discussion at the next ordinary meeting, or whether a special meeting of the club would be held for the purpose? (*Hear, hear*).

The Chairman reminded the meeting that it had been determined by the club that all fixed discussions should come on in their turn; and that omitted discussions should stand over until those had been disposed of.

Mr. Beadell thought the question to which he had alluded a matter of so much importance that it ought not to be allowed to stand over.

The Chairman was of opinion that a special meeting ought to be fixed for the discussion of this subject rather than that the order of other fixed discussions should be interfered with (*Hear*).

Mr. Beadell agreed with the Chairman in thinking that it was very important that discussions should not be interfered with when once fixed, and therefore hoped that a special meeting of the club would be fixed for the discussion of the subject of tenants' rights.

After some discussion as to the day which would be most convenient for this purpose,

The Chairman said he thought it would be better to leave it to Mr. Shaw to fix his own day, of which due notice could be given.

Mr. Hobbs said, as one of the committee he greatly regretted that the absence of Mr. Shaw had prevented the discussion of this important subject to-night, the more especially as that absence was caused by indisposition (*Hear, hear*). The subject was one of so important a character that he thought it ought to take precedence of all others; and he was quite sure that had it been opened to-night, and adjourned to one of the early weeks in December, it would have attracted to this club a large number of farmers from all parts of England. He should have been very glad if it could have been brought on in the Smithfield week (*Hear*). Whenever it should be brought on he hoped that they would not only come themselves, but that they would bring their friends also (*Hear*).

After some further conversation, Mr. Wyatt proposed, and Mr. Turner seconded, the following resolution, which was carried unanimously:—"That in consequence of the indisposition of Mr. Shaw, the committee be requested to call a special meeting of the Farmers' Club, on Wednesday, 10th December, for the purpose of bringing under consideration the subject of tenants' rights, which had been previously fixed for discussion this evening."

After a short discussion on the best mode of treating the subject, which it was agreed should be left to Mr. Shaw's discretion, thanks were voted to Mr. Baker for his conduct in the chair, and the meeting separated.

CARLTON-UPON-TRENT FARMERS' CLUB.—At the monthly meeting of the Carlton-upon-Trent Farmers' Club (when upwards of forty members attended), held in the evening of the 13th inst., J. E. Denison, Esq., M.P., President of the Club, honoured the meeting by introducing Lord Portman, President of the Royal Agricultural Society of England. The principal subject of discussion was the potato question, when his lordship fully stated his views, and recommended autumn planting; and, for preserving the tubers until the spring, to thoroughly dry them, and keep them separate from each other by slacked lime or lime and sand. The proposition was then put to the meeting by Mr. Denison, whether autumn planting was thought advisable, when every member was an advocate for making the trial. Another interesting topic was, whether deep or shalow draining was the most desirable? The members did not come to a satisfactory conclusion; some contending that three feet deep and eight yards apart, whilst others believed that two feet deep and six yards apart, was the most efficient. Mr. But-

tery also read a short paper on the succulent properties of the thousand-headed cabbage. At the next meeting, Mr. Chouler, of South Muskham, will introduce the subject of the best method of growing and consuming turnips.

SUMMARY OF THE RACING SEASON, 1845.

An English racing season is the counterpart of a legitimate play. Its busy scenes, teeming throughout with plot and counterplot—its startling effects—its keen encounter of the wits—its exciting incidents—all are essentially dramatic; it lacks one feature only of the poet's theme—the moral.

After the conclusion of a noisy overture in the key of H.P.C., replete with curious phrases, most mysteriously framed, the curtain rises upon the opening of the Spring Meetings. The principal characters severally introduce themselves to an attentive audience, and on the drop falling on their preparations for an approaching struggle, leaves us all hanging betwixt hope and fear.

Act 2 brings on the ups and Downs of Epsom, where a succession of exciting scenes ensues; leaving a portion of the *dramatis personæ* high in the estimation of a discerning public; and dooming others to the dull side of the gingerbread, and to be snubbed accordingly.

Act 3 keeps on the even tenor of the plot, without apparently entailing any serious consequences in its various events. Ascot, in this act, forms the principal attraction, as a spectacle, "got up, regardless of expense," and crowded houses usually testify their satisfaction at this portion of the entertainment, even although it may be thought somewhat devoid of powerful excitement.

The opening of the 4th Act with the gorgeous display at Goodwood vividly arouses all the passions of the spectators, and keeping their attention riveted upon the scene, finally leaves them at the near approach of Doncaster, wound up to an exceeding pitch of speculative enthusiasm at the close advent of the catastrophe.

With Act 5 comes the climax. The trial scene at Doncaster at once perfects the hopes and fears of the majority. The three concluding incidents upon Newmarket Heath wind up the plot. Poetic justice is duly administered. Truth walks out of her well "on this occasion only." Dark mysteries are solved, deep riddles are read, and folks gape wide to find so little in them. Soberly all retire from the scene; some, alas! sadly, having learned much which they long wished to know, wiser—would that we might add always, happier—men.

It comes not within the legitimate province of a summary like the present to follow out the many intricacies of the drama enacted during the past season, nor yet to enter into the troublesome details of all those various incidents which, in the aggregate, call forth the exercise of our critical acumen. Suffice it that we have had good reason to be pleased with the entire entertainment, and, satisfied thus far, we may proceed at once to test the individual merits of the principal performers.

Idas, the first who entered prominently on the scene, and for a time fixed our attention, has been denounced by many as a rank imposter. He was not so. He is as good as ever he declared himself to be—that is to say, one of the best in England for a mile. This I consider him to be still. His tether does not reach a yard beyond that distance. If people will back one-mile winners for the Derby course, they alone are to blame for their folly; and though we doubtless shall see the experiment repeated, the fallacy will never have me for a follower.

That the Derby of 1845 was a mere huge amalgamation of mischances, subsequent running has proved beyond all question. The fact is useful, showing, as it does, how many difficulties intervene to mar the prospects of a favourite, and befriend the field.

The alterations which common report informs us are to take place next year at Epsom will be more likely to increase than to diminish these. The horses are to be saddled, promenaded, cantered, and shown out before the Stand. A thing to please the crowd of cockneys on the hill, but a far different matter for the owner of a fidgetty horse. "The play's the thing"—at all events at Epsom; but if I were the owner of a good horse, likely, as most good horses are, to be fretful and nervous at the beginning of a season, I would prefer to pay a £50 fine, rather than worry him by such parade before so wild a crowd.

All the Oaks winners ever run most strangely in and out, nor has Refraction proved herself any exception to the rule. The reason is, I take it, that all mares are most uncertain in their temperament, and consequently in their health; and that sufficient care is not had to ensure condition, or to withdraw them if unfit. Although unfortunate in one or two instances, I do not fear much contradiction in now repeating my assertion made last June, that REFRACTION IS THE BEST MARE OF HER YEAR.

The palm of merit for the horses must, I think, be equally divided amongst two or three. At all events we have not seen enough of relative superiority in either Sweetmeat, Cowl, The Emperor, The Baron, or Alarm, to give an absolute predominance to either. Sweetmeat most certainly has the call by his separate performances; but they have scarcely been of that high class to give him a distinctive title to the championship of the turf. A race amongst this lot (excepting, of course, Cowl, who has broken down), with the addition of Refraction, at a mare's allowance, would be a sight to cure sore eyes. Perhaps, as four years olds, they may meet in some of next year's cups, in which case the selection of a winner will become rather puzzling.

Whilst in the humour for awarding premiums for merit, I may as well go through the ranks, and deal out honour where honour is due. In this case, amongst the aged horses, the names of Oakley, Discord, and The Shadow, must shine most pre-eminent. Amongst the six-year-olds Queen Mab alone is worthy of honourable mention. Philip, Quebec, and Pineapple, figure most prominently under figure 5. Lothario and The Emperor will be the leaders of the four year olds. Sweetmeat, Refraction, Merry Monarch, Libel, Hope, Miss Sarah, Cowl, Alarm, The Baron, Miss Elis, Midlothian, Mentor, and the Turquoise Colt, have been the most fortunate amongst the three year olds. The two year olds have been well represented by Sting, Princess Alice, Arkwright, Wit's-end, Cuckoo, Tugnet, Wilderness, Malcolm, Cherokee, and Joy.

Moreover, I am most decidedly of the opinion that the palm of average merit must be awarded to the three year old produce of the present year in preference to that of any other age. All the great races of the year—the Ascot Vase, the Goodwood Cup, the Goodwood and Great Yorkshire Stakes, the Chesterfield Cup (Goodwood), the Cup at Doncaster, the Cambridgeshire Stakes, and the Cesarewitch, have all been appropriated by the three year olds; whilst out of 36 Queen's Plates given in England, and usually carried off by the elder branches of the turf, twelve have this year fallen into the clutches of the three year olds.

I think too that, with perhaps the one exception of Sweetmeat, the mares of '45 have proved themselves superior to the horses. The Goodwood Stakes, the Chesterfield and Goodwood Cups, the Great Yorkshire Stakes, The Gratwicke, Ham, Champagne, and a host of other two year old stakes, all bear witness to the truth of this assertion. No mares ran in the Derby, and the only one that started for the St. Leger ran a good second; whilst of the aforesaid 36 Queen's Plates no less than 19 have been carried off by mares, leaving the horses in an absolute minority of two.

Some few impostors have been discovered and exposed during the past year. Foig-a-Ballagh, Alice Hawthorn, Ironmaster, Zanoni, Valerian, and last, though not least, Weatherbit. These are the bubbles which have burst before our eyes. Venus the Ugly Buck, Una, Cowl, Ajax, Nottingham, and the Miss Whip Colt, had the misfortune to break down.

The season was wound up well by a most glorious Houghton Meeting at Newmarket; and the turf prospect of the coming year is rich beyond precedent. A new idea, though not, I think, a very happy one—has been struck out in the establishment of a Triennial Stake at Newmarket, for which the entries are agreed to run in three consecutive years, at the respective ages of two, three, and four years old. The object here is too far distant. Few men keep a good horse for three years—fewer still would keep a bad one, and the chances and changes are so manifold and great that the intended test must ultimately fail in the proper application. Experience will prove the truth or falsity of my opinion. In the mean time I must avow a strong objection to these long antedated produce entries. Rarely indeed does such a stake produce a race of merit, or an animal of worth.

I know not how to wind up this brief summary better than by the compilation of a tabular chronicle, which, speaking for itself in figures, will tell its own tale by comparison with the year 1842. The present decrease of amount in some meetings will be found more than compensated by the increase of others. The tide of public favour rarely flows continuously in one channel; least of all, on the turf is its stream constant, or its flow long unbroken.

TABLE OF THE AGGREGATE RESULTS OF TWENTY OF THE PRINCIPAL RACE-MEETINGS IN ENGLAND, DURING THE SEASONS 1845 & 1842.

	1845.			1842.		
Meeting.	No. of Races.	Started.	Amount of Stakes.	No. of Races.	Started.	Amount of Stakes.
Ascot	29	218	11065	27	142	9035
Bilbury	8	54	1485	6	22	1115
Chester	20	124	6443	17	92	4443
Croxton Park	9	80	1025	8	51	972
Doncaster	23	99	12930	22	104	13268
Eglinton Park	20	91	2303	16	62	1845
Epsom	14	130	9375	15	132	9605
Goodwood	35	182	20580	28	174	20075
Liverpool	14	100	5075	18	99	8085
Manchester	13	56	1580	15	48	1590
Newcastle	16	9[illegible]	3323	17	79	3748
Newmarket Craven	27	89	7945	29	89	10040
Do. 1st Spring	25	67	8325	31	102	9175
Do. 2nd Spring	16	68	2482	12	46	1245
Do. July	10	41	1630	12	49	2325
Do. 1st Oct.	15	46	4265	12	35	3345
Do. 2nd Oct.	42	171	11940	25	122	5120
Do. Houghton	61	268	13065	36	147	6570
Newton	16	71	2540	13	62	2029
Wolverhampton	8	42	1665	11	44	1997

Nov. 11. BUNBURY.

MALT CONSUMED IN PUBLIC BREWING.

The quantity of malt wetted by the undermentioned brewers in London and its neighbourhood, for the year ending the 10th of October, 1845.

	Qrs.		Qrs.
Barclay, Southwark	117,415	M'Leod, Stockwell	2,880
Truman, Spitalfields	105,63[illegible]	Cooper, Shadwell	2,813
Reid. Liquorpond-street	54,290	Lane, City-road	2,777
Whitbread, Chiswell-st	51 442	Whitehurst & Bowden, Lambeth	2,457
Meux, St. Giles	48,940	Herington, Kensington	2,403
Combe, Long Acre	4[illegible],064	Fleming, Camberwell	2,265
Calvert, Thames-street	30,705	Jones, Hoxton	2,070
Hoare, East Smithfield	29,886	Gurney, Lambeth	1,926
Elliott, Pimlico	28,775	Stains, New-road	1,924
Charrington, Mile End	21,294	Draper and Child, Oxford-street	1,809
Thorne, Westminster	20,134	Con, Bermondsey	1,597
Goding, Lambeth	18,004	Rawbone and Hawks, Chelsea	1,542
Mann, Mile End	16,540	Holt, Ratcliff	1,540
Gardner, St. John-st	16,310	Honeyball, Stamford-hill	1,504
Taylor, Limehouse	16,270	Hill, Gray's-inn-road	1,486
Broadwood, Golden-sq	14,562	M'Leod, St. Newington	1,400
Courage, Horslydown	12,290	Dickenson, George-st	1,313
Wood, Westminster	10,322	Turner, Clapham-road	1,310
Moore, Old-street	7,300	Jenner, Borough	1,234
Tubb, St. George's Fields	6,418	Masterman, Ratcliff	1,150
Manners, Whitechapel	6,116	Blogg, Somers Town	1,070
Kempson and Topham, Mortlake	5,492	Church, Hackney-road	1 019
Strong and Larchin, Ratcliff	5,125	Whest, Hackney-road	1,013
Abbot, Bow	4,980	Blogg, Clerkenwell	846
Harris, Hampstead-road	4,846	Lock, Clapham-road	772
Hazard, Brentferd	4,500	Collins, Westminster	741
Hale, Redcross-street	4,207	Mantell, Bloomsbury	739
Miller, Mary-street	4,103	Addison, Homerton	695
Gaskell and Downs, Spitalfields	3,576	Paris, Laystall-street	542
Bryan, Portman-square	3,369	Hubbard, Stockwell	525
Clark, Clerkenwell	3,345	Dupree, Homerton	520
Plummer, Chelsea	3,191	Clarke, Wellclose-sq	520
Keen, Pentonville	2,896	Eisdell, Walworth	517

Total quantity of malt wetted in public brewing in the United Kingdom, during the following years:—

	Qrs.
1837	4,030,534
1838	4,040,395
1839	4,082,[illegible]68
1840	3,985,272
1841	3,678,013
1842	3,588,477
1843	3,566,300
1844	3,701,307

HOP DUTY.—An account of the duty on Hops of the growth of the year 1845, distinguishing the districts, and the old from the new duty.

Districts.	Duty. £.	s.	d.	
Barnstaple	115	17	7¼	
Cambridge	23	6	2½	
Canterbury	66,040	5	7¾	
Cornwall	4	6	7¼	
Derby	113	5	5¼	
Dorset	10	7	10¾	
Essex	645	6	7¼	
Gloucester	21	1	8¾	
Grantham	53	11	2	
Hants	6,054	0	11½	
Hereford	12,054	8	1¾	
Hertford	762	5	1½	
Isle of Wight	3,837	9	1¾	
Lincoln	587	17	9¾	
Lynn	11	3	9¾	
Oxford	17	18	7	
Reading	6	0	10¾	
Rochester	94,017	19	11¼	
Salisbury	14	6	9	
Stourbridge	694	4	1½	
Suffolk	402	18	9½	
Surrey	3	1	7	
Sussex	99,166	5	10¾	
Wales, Middle	26	12	7¾	
Worcester	3,852	7	6	
	288,536	10	7¼	
Old duty, at 1d. 12-20 per lb.	158,008	17	2¼	4-20
New duty, at ¾d. 8-20 per lb.	116,879	3	1½	16-20
Additional duty of 5 per cent. per act 3 Vic., c. 17	13,738	10	3¼	
	288,536	10	7¼	

G. A. COTTRELL, Accountant-General.

Excise Office, London, Nov. 17, 1845.

AGRICULTURAL QUERIES.

TO THE EDITOR OF THE MARK LANE EXPRESS.

SIR,—I am anxious to improve a quantity of wet land by draining, for which purpose inch-pipe tiles are suitable, and should feel greatly obliged if any of your correspondents will inform me where they are to be procured convenient for shipping, and the price, to be delivered free on board a vessel either in the Thames or the Humber. I am, yours respectfully,

A SUBSCRIBER.

A correspondent inquires the best mode of destroying the wire-worm.

A correspondent wishes to know the best method of making cider fine as soon as it comes from the pound, before it gets in a state of fermentation.

ANSWERS TO AGRICULTURAL QUERIES.

TO THE EDITOR OF THE MARK-LANE EXPRESS.

Sir,—In answer to one of your readers wishful to know the best method of preserving Swede turnips and mangel wurtzel from rotting, the best and most effectual plan that I have experienced as a practical farmer is to throw plenty of prepared gypsum amongst them, which will secure them from rotting in either house or stack. The same plan I am adopting for potatoes this season, and have no doubt of success. I must say that I am very careful in sorting well. Last year, in order to try the efficacy of gypsum, I tried a small quantity of potatoes, and entirely excluded them from the air; and at the year's end, a few days ago, I found them quite sound and firm, and, after boiling for use, of good quality also. I have little doubt, if farmers would throw plenty of gypsum amongst their potatoes this season, great quantities that are likely to be lost might be preserved. I beg also to remark that I have found gypsum a most excellent thing in preventing the dry rot in the seed potato in the spring, when planting. I usually salt the sets well while cutting, and have found a great improvement in the crop from giving the land, before planting, from ten to twenty cwt. per acre. It gives a much greater vigour to the plant, with greater abundance of produce, much more healthy, and clean in their skins, as well as worth more money at market. I have also found gypsum to be very valuable in preserving potatoes, while new, in going to market, being fully as good a fortnight after as when newly taken from the ground. As railways are now opening in every direction to all large towns, it will give the farmer an opportunity of sending them a very considerable distance to market without incurring any risk of not keeping or preserving.

I am, sir, your obedient servant, &c.,

Oct. 21, 1845. A Cumberland Farmer.

Sir,—In reply to an inquirer as regards potato seed, I would advise him to gather the largest and best formed berries, when ripe, which is easily told by the stalk becoming withered; then let him separate the pulp from the seeds, and dry them in the sun. Sow the seeds in beds in March, and take the potatoes up in October, which will be about the size of small plums; select the best, and keep them nice and dry. Plant them the following April, about fifteen inches apart; and when they get about two inches high, let him drill them with fresh earth. This may be done as usual, until they are fit to be taken up.

Your obedient servant,

Hethersett, Nov. 1. J. A. B.

AGRICULTURAL REPORT.

GENERAL AGRICULTURAL REPORT FOR NOVEMBER.

In commenting upon those matters relative to the produce and cultivation of the soil, one great duty we have to perform this month is that of calmly considering the various communications which continue to reach us, from nearly every part of the kingdom, relative to the yield of the present year's grain crops, and the extent of the failure in the supply of that most valuable edible—the potato. The absence of statistical data of course renders it a matter of impossibility for us to determine what may be the actual falling off, yet we may observe that many statements—utterly at variance with facts—have been promulgated, without their authors appearing to have any particular object in view. Be this as it may, it is unquestionable that such statements, while they tend to embarrass and perplex many, are too frequently productive of serious inconvenience to the general community. Having ourselves had frequent opportunities of comparing the yield of this season's wheats, grown in particular localities, with those produced in other quarters, we are led to the conclusion—though, be it observed, we are quite convinced the crop is beneath an average one—that the deficiency is not so great as some parties have affirmed. On referring, however, to quality, we are prepared to allow the reports thereon to be correct; indeed, nothing can more forcibly illustrate these remarks than the averages themselves, which not unfrequently form the most accurate result both of quantity and quality. Under these circumstances, we may be asked our opinion as to the future prospects of the wheat trade. This we most willingly give, knowing, as we do, that upon this point will rely the operations of the growers, so far as supply is concerned. In the first place, then, notwithstanding the deficiencies to which we have just alluded (for we must not lose sight of the important fact that at this very moment we have what may be termed rather a large quantity of old wheat in the country), we cannot lead ourselves to believe that wheat will be selling at famine prices; but that they will continue steadily to advance for some time hence, is, we think, placed beyond a doubt. Our reason for such a conclusion is, that consumption is going on at a rate almost without a precedent, and which, of course, is chiefly produced by the labouring classes being in the enjoyment of adequate employment. One circumstance which would prevent famine prices is, the almost certainty that at no distant day, a sweeping change will be effected in the laws affecting the import of foreign corn; and another, the immense supplies of flour which are almost daily entering our ports from our North American possessions, and which are brought into immediate consumption. Again, such high prices would have the natural effect of lowering the duties on foreign produce to a nominal sum; hence, the whole of the bonded stocks would become available for our markets. There are, we know, some persons who ridicule the idea of even additional importations having any effect upon prices here, informing us, as they do, that, from their limited quantities, it would be impossible for us to make up the deficiencies in the home yield. This is a short-sighted view to take of this important subject. We are perfectly aware that the produce of wheat, this year, in most of the large continental wheat countries, is smaller than for some past seasons, and besides which, the shipments thence to England—from the demand which has sprung up in other portions of the world—will be smaller than usual. But how stands the case in the United States and Canada?—places which, in our judgment, are likely, at no distant day, to become almost the granaries of the world. Having received, per the last packet, a most important letter on this very point from Messrs. Wylie and Egana, of New Orleans, we are enabled to write in positive terms on the subject. These gentlemen inform us that the total produce of grain in the United States this year has exceeded 800,000,000 bushels: or an average of 41 bushels to every human being of the entire population. If, therefore, we allow ten bush. a year for each of the entire population, young and old, amounting now to about 20,000,000, we shall find a surplus of no less than 600,000,000 bushels. Supposing that one-half of that immense quantity be allowed for the feeding of cattle, &c., it is impossible not to come to the conclusion that the Americans, in the event of low duties here, will supply us with quite as much corn as we can conveniently take from them.—We now come to the consideration of the potato disease, as it is technically called. This, too, has *suffered* from overdrawn statements. Not that we are about to deny it is widely spread, or that the consumers will, in the long run, be compelled to pay very high rates for them; still we maintain that large quantities, grown on light soils, have been raised and pitted in good order. In this particular, therefore, we see no cause for becoming seriously alarmed at our future prospects. The questions to consider, in order to solve this important matter, are—What is the cause of the disease? Will all the diseased potatoes be entirely lost, without the slightest benefit to the growers? The whole of our readers are perfectly aware that nothing is so injurious to the potato as a wet season. The past having been one of the most unfavourable in this respect almost ever known, the crop, in many parts—especially that grown on the low and heavy lands—has become tainted with *rot*. Hence, the growers are acting wisely in giving them to their stall-fed and other animals, which are, we have every reason to know, thriving well upon them. This, as a matter of course, must effect a great saving in the outlay for the purchase of other food, and be the means of using those potatoes which otherwise would have been wholly lost. Bearing upon the question of the future range in the value of wheat, we must not forget that the supply of all spring corn is good, and which may, in many instances, be used as partial substitutes for wheat. Having now explained our honest opinions upon the above topics, we must leave them in the hands of our subscribers, who will, we think, do well to read them with attention.

The weather, during the greater portion of the month, has been extremely changeable, though fine, the time of year considered. Ploughing and sowing have progressed with a tolerable degree of rapidity, with the land in fine condition for the reception of the seed. Owing to the large available quantities of pabulum, the stock on most farms has fared extremely well; yet we regret to state that a scarcity of sheep exists in many of our large agricultural districts.

Our advices from Scotland and Ireland are to the effect that a slight falling off is observable in the supply and quality of the present year's wheat crops, but those of other grain are represented as tolerably good. The shipments of most grain to the London market, have been more extensive than was pretty generally expected, considering the alarming rumours afloat respecting the failure in the potato crop.

In the course of the month, the imports of live stock from abroad into London and Hull have been again extensive—761 oxen and cows, 1,533 sheep, 8 calves, and 40 pigs having arrived in the former; 370 beasts, and 450 sheep in the latter port. With the exception of about 100 oxen from Hamburgh, the whole of the above imports have taken place from Rotterdam, in, for the most part, good condition.

The last official statement of the importations during the last three years, and which are made up to the 10th of October in each year, give the following totals:—

	1843.	1844.	1845.
Oxen and bulls	780	2,283	7,384
Cows	834	1,675	4,106
Calves	35	53	542
Sheep........	175	706	6,918
Lambs	6	16	112
Swine and hogs	289	216	520

The annexed returns refer to the supplies and prices of fat stock exhibited and sold in Smithfield cattle market in the month just concluded. The former, as well as those at the corresponding period in 1844, have been as under:—

	Nov. 1845.	Nov. 1844.
Beasts	1,7433	12,560
Cows	500	596
Sheep	120,390	123,200
Calves	1,060	1,040
Pigs	2,555	2,600

The comparison of prices may be thus stated:—

Per 8lbs. to sink the offal.

	Nov. 1845.	Nov. 1844.
	s. d. s. d.	s. d. s. d.
Beef	2 6 to 4 6	2 4 to 4 2
Mutton	3 6 to 5 2	2 6 to 4 2
Veal	4 0 to 5 0	3 0 to 4 0
Pork	3 6 to 5 4	3 0 to 4 0

The bullock supplies for the month have been chiefly derived from the following quarters:—

Northern counties	8,700 head.
Eastern do.	1,050
Western and Midland......	2,300
Other parts of England.....	1,300
Scotland	390
Ireland	240

The remainder of the supplies have been drawn from the neighbourhood of the Metropolis.

On each market day the demand for most kinds of stock has ruled firm, and prices have in some instances had an upward tendency. Large purchases have been effected for the country.

Newgate and Leadenhall markets have been rather scantily supplied with both town and country killed meat, owing to which the general demand has ruled firm, and the quotations have again improved; beef having sold at from 2s. 6d. to 3s. 10d.; mutton, 3s. 4d. to 4s. 8d.; veal, 3s. 10s. to 4s. 10d.; and pork, 3s. 6d. to 5s. 4d. per 8lbs, by the carcass.

The supplies from distant parts have been thus derived:—

	Beasts.	Sheep.	Calves.	Pigs.
Scotland........	154	1170	—	1240
Yorkshire	177	1340	—	1660
Norfolk	152	470	—	—
Suffolk	89	270	—	300
Cambridgeshire..	138	230	—	290
Essex	149	345	330	195
Surrey	167	680	470	53
Devonshire	—	—	—	860
Wiltshire	177	530	304	520
Other parts	260	950	480	1110 0

METEOROLOGICAL DIARY.

Barometer.			Thermometer.			Wind and State.		Atmosphere.		
Day.	8 a.m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a.m.	2 p. m.	10 p. m.
	in. cts.	in. cts.								
Oct. 22	30.39	30.47	41	52	48	N. N. West	gentle	cloudy	cloudy	cloudy
23	30.50	30.50	29	51	36	S. by East	gentle	fine	sun	fine
24	30.40	30.20	30	51	38	S. by East	gentle	cloudy	sun	fine
25	30.20	30.38	34	52	36	N. East	gentle	haze	sun	fine
26	30.36	30.26	29	46	39	N. West.	gentle	fine	cloudy	cloudy
27	30.17	30.10	36	50	46	W. by South	brisk	cloudy	cloudy	cloudy
28	30.09	30.09	44	54	50	W. by South	gentle	cloudy	cloudy	cloudy
29	30.00	29.90	44	54	45	W. by South	gentle	fine	sun	fine
30	29.90	30.08	42	57	48	W. by South	gentle	fine	sun	fine
31	30.10	30.17	46	55	45	N. East	gentle	fine	sun	fine
Nov. 1	30.17	30.16	35	54	44	East	gentle	fine	sun	fine
2	30.19	30.25	39	50	44	East	brisk	fine	cloudy	fine
3	30.28	30.30	35	49	36	East	gentle	fine	sun	fine
4	30.26	30.00	28	43	34	E. N. East	gentle	haze	sun	fine
5	29.39	29.80	32	51	49	S. East	brisk	cloudy	cloudy	cloudy
6	29.70	29.35	49	58	51	S. East	brisk	fine	sun	cloudy
7	29.55	29.56	46	54	49	S. by East	variable	cloudy	cloudy	cloudy
8	29.49	29.48	48	56	48	S. West	lively	cloudy	cloudy	cloudy
9	29.55	29.55	45	54	47	S. by East	gentle	fine	sun	cloudy
10	29.50	29.48	45	53	43	S. by East	gentle	fine	sun	cloudy
11	29.30	29.27	41	47	44	S. E. to West	gentle	cloudy	cloudy	cloudy
12	29.44	29.64	36	50	37	S.W. to N.W.	gentle	fine	sun	fine
13	29.70	29.90	33	46	41	North	gentle	fine	sun	fine
14	30.00	30.00	31	43	41	S. East	gentle	fog	fog	cloudy
15	29.92	29.85	38	49	45	South	gentle	cloudy	cloudy	cloudy
16	29.66	29.30	43	48	43	South	brisk	cloudy	cloudy	cloudy
17	29.39	29.58	40	49	40	N. by West	brisk	fine	sun	cloudy
18	29.26	29.52	40	53	42	Southerly	variable	cloudy	cloudy	fine
19	29.10	29.10	42	56	48	Southerly	variable	cloudy	cloudy	cloudy
20	29.10	29.30	—	50	40	Westerly	brisk	fine	cloudy	cloudy
21	29.47	29.42	36	45	42	S. West	gentle	cloudy	cloudy	cloudy

ESTIMATED AVERAGES OF NOVEMBER.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.27	29.080	62	23	42.9

Real Average Temperature of the period.

High.	Low.	Mean.
50.97	40.5	45.735

North and N. East Winds..	6	days.
East and to South	5	
South and South West......	9	
West and to North	10	

WEATHER AND PHENOMENA. — October 22, Gloom all day—23, Beautiful, the commencement of another brilliant period—24, A few clouds early —25, Hazy morning, clear day—26, Sharp frost, followed by change of wind—27 and 28, Overcast —29 to end, Beautiful. November 1, Month opens with N. & E. wind, clear, bracing, and sunny, like a fine March to the 4th, Hazy morning, great frosty rime—5, Still fine, but wavering—6, Rain commences, S. East winds, steady and wet, more or less till the 11th—The 9th had beautiful sunny intervals—12 and 13, Two clear and beautiful days —14, Foggy throughout, the haze breaking into clouds after 7 or 8 p.m.—15, Rain, with South wind—16, Small rain most of the day—17, Much finer—18, Much rain, fineish day—19, Some fine sunny gleams after noon—20, Very fine all the forenoon, then cumuli, stratus clouds formed rapidly in West—21, Much small rain: these rains have mostly fallen in the nights.

LUNATIONS.—Last quarter, October 23rd, 8 h. 14 m. morning; new moon, 30th day, 11 h. 42 m. night; first quarter, November 6th, 6 h. 15 m. afternoon; full moon, 13th day, 12 h. 55 m. midnight.

REMARKS REFERRING TO AGRICULTURE.—Barring the potato disease, everything seems to be propitious. Of that, nothing more can be said till the winter decide the then condition of stores.

Ploughing and sowing have progressed capitally, the soil in happy condition; since the rains, though pretty ample in quantity, have always been followed by periods of lovely weather. Wheat up, is rather gay; nor is this a matter of surprise, as October terminated with so strong a sun, and November has been so genial. Last year, the cold had set in: now we can only register three or four night, or rather morning frosts.

Our register, through circumstances, does not note the night temperature of the 20th; but it was not below 43°.

J. TOWERS, Maidenhead Thicket.

CALENDAR OF HORTICULTURE—DECEMBER.

RETROSPECT.—Since the date of our last (Oct. 20) the weather, upon the whole, has been superb. Nearly a month did the sun shine with power, and through the first week of November there was little deterioration. Thus the ground became in fine condition either for cropping or trench-digging. Five or six degrees of frost, with strong rime, came on the fourth morning, and completed the destruction of the kidney-beans; causing also the fall of the mulberry, ash, and walnut leaves. On the 7th the wind wavered, and during six following days we had rain more or less copiously. This was wanted; and, therefore, came most opportunely. Fine weather again followed, and permitted us to experimentalize by planting several rows of a fine white potato (one very like it, if not a pure champion) in the following way:—The ground had been under peas, and was fairly manured several weeks before with horse droppings, old leaves, and burnt vegetable rubbish, which, by the bye, contains nearly one-tenth of soluble salts, sulphates, and muriates—some with excess of potassa.

A drill was opened by line nearly six inches deep, and a whole potato pressed in along it at nearly every 10-inch space apart: at 2½ feet distances other rows were so planted, and the plot was finished off, working backward, row by row.

Every potato was more or less touched by the tawny blotches which always indicate a diseased surface, and upon each was sprinkled about a table-spoonful of air-slaked lime. At this time it was clearly seen that there was a strong disposition to grow: many shoots had pushed; and we hear the same thing is generally noticed, as is also the extreme solidity and hardness of texture of the sound pulp underneath the damaged surface.

The vegetables generally were in admirable condition in the third week of November, when no frost of moment had occurred, and rain fell at intervals, with west and south-westerly winds.

OPERATIONS IN THE VEGETABLE GARDEN.

Artichokes, if not already protected, will require either landing-up, or to be surrounded with masses of leaves or litter. They are now so luxuriant that frost is sure to destroy the leaf.

Asparagus-forcing ought to be followed up, by placing the roots in mould over deep beds of tree leaves: these heat well, if raked up with some of the grass of parks or fields where they may happen to lie. Asparagus can also be excited over water-tanks, in pits prepared for heating by hot water.

Sea-kale should be similarly treated; or it can be well excited in dark mushroom-houses. Keep a supply of mushrooms, by moderate temperature, in those receptacles which are frequently attached to the back wall of the vineries.

Celery, if the weather permit and the soil be dry enough, should be fully earthed with all despatch; and then, if frost set in, the rows can be protected by broad boards laid sloping, as a pent-house or ridge.

Early peas and beans are sown for succession, in ground previously manured.

Cauliflowers under glasses must have air in mild weather: remove the decaying leaves: take up all the stems and litter of Cape-broccoli plants that are cut.

Manure richly the surface of plots intended for onions, and fork this in at some fine period prior to sowing.

Top-dressing becomes more important than manuring by the spade: the soluble parts of the manure pass gradually into the soil; and the dry matters upon the surface undergo chemical changes through the agency of air, light, and rain-water.

Fork-digging is also coming into vogue. To trench requires the spade; but the operation may be nearly superseded by taking out one spit of earth, then forking the second spit by a 13-inch three-tined instrument, broad at the points but strong at the shoulders, which effectually loosens the earth, while, if required, a rich addition of manure may thus be made to it. In common cases a thorough forking of the upper spit will aërate and sufficiently break up the ground, while it economizes time and manual labour.

Fruit Department.

Prune nothing by preference; but some gardeners are obliged, by stress of work, to divide their operations. Fruit trees are apt to suffer from frost and rain, by wounds badly healed, and the berry-bearing shrubs, if now spurred and cut back, are liable to loss of crop, small birds injuring the buds during winter. It is a good season for mulching ground with lettery dung, or with mixed dung and leaves taken from linings of hot-beds.

Cover securely the fig-trees; otherwise severe frosts below 10° Fahrenheit are sure to destroy the figs, if not to kill the wood.

Examine apples and pears in store: again, they decay fearfully, owing perhaps to inequality of temperature; for as to insects, the summer and autumn have seen scarcely a tithe part of the numbers which perforated or knawed the fruit of 1844.

Attend particularly to the late vinery—where the West's St. Peters ought now to be in perfection. This is the sweetest, most juicy, and delicate-skinned variety of the season. Fires ought to be lighted at sun-rise, and kept up till 3 or 4 P.M. When the flue becomes active, give air at low openings or sashes in front, and also by trap-doors or blinds at the back wall. The current should be such as to carry off all damp, but not to admit fog or a drop of water: the more perfect the aridity, the better and the more secure the crop. For the same object prune off every green shoot, and most if not all the leaves. Dig these into the borders as appropriate manure.

Begin to force the early vinery of spring: commence at 55°: syringe the stems; raise heat to 60°, then 65° as the buds advance. A vine stem ought to be inside the house: if not so, when planted it would be wise to build or case it in, opening the inside work, so as to let the warm air surround it. Fork the ground, and cover deeply outside with manure and leaves.

Keep the pine stoves and pits in steady action, so as to admit of no check. The fruiting-house, where the pots have been dry, may be excited early or by the middle of the month, the heat raised to 70°; and then a copious quantity of water being given to each pot, the plant will speedily show its fruit. We are aware that many persons object to this wholesale method of bringing an entire house to a fruiting condition; but a family of rank will require a handsome supply; and unless there be a fruiting-house with perhaps two-hundred noble plants in it, there can be no dependence upon a regular cutting. It will be also evident that, in order to stock such a house, the succession-pits must always be kept active; otherwise the check of a day may prove a bar to the attainment of strong stocky plants, which alone are capable to produce a queen-pine of from 3lb. to 5lb.

Greenhouse and Plant Stove.

The dark season prohibits the supply of much water; fire or water-heat to 40° ought to be given to the former, and from 50° to 60° to the latter department: air is proper for both, provided it be admitted by front and back openings, not by sliding sashes. We urge, also, sliding screens of oiled calico, made secure by wooden fillets and pins, so as to supersede mats, and to obviate accidents by wind. They are far better than rollers also, affording shelter and shade, abating radiation through the glass, and economizing fire. Expense would soon be remunerated by absence of breakage.

Mats do well enough for low pits sunk in the ground; the sashes not more than two feet above it at the back walls. To such we would transfer all the semi-hardy shrubs, heaths, epacris, acacias, and the like; and therein if plunged in sawdust and covered by Russia-matting first, and by compact straw matting over that, every plant nearly would be protected, and brought through the winter without artificial excitement, especially if the portion of exposed brick-work be backed with fern or masses of straw.

In the open ground attention should be paid to cover with leaves, moss, &c., the roots of the best shrubs; and, above all, to whisk off any snow that shall fall upon evergreens, before the sun shines strongly upon them.—Nov. 18.

REVIEW OF THE CORN TRADE

DURING THE MONTH OF NOVEMBER.

About the period when we last addressed our readers, the weather had, after a long interval of excessive wet, begun to take up—indeed, the close of October was altogether as favourable as the early part of that month had been the reverse. Farmers were therefore enabled to get in the remainder of their grain crops, and some of the corn was saved in far better order than, from the previous heavy rains, could possibly have been expected. The first fortnight in November was also highly auspicious, and at length the protracted harvest was brought to a close. We are sorry to say, however, the result, as regards the produce of wheat, is very far from satisfactory. In some of the southern and south-western counties the yield, though decidedly inferior both in quantity and quality to that of last year, is perhaps not very much below that of average seasons; but in the eastern and northern parts of the kingdom the crop is decidedly deficient, and, taken as a whole, the falling off in quantity cannot be estimated at less than a fifth. This, though sufficiently serious, might perhaps not have been productive of any very great inconvenience, as there can be no question that a larger stock of old wheat was held by the growers on the 1st of September than in any previous year for some considerable time past. The misfortune, however, is that the extreme wet and cold weather experienced throughout the greater part of the summer and spring, whilst it detracted from the productiveness, and injured the quality of the wheat, had a much more serious effect on the crop of potatoes. In many localities the latter was almost completely destroyed; and hitherto we have heard of no extensive district which has altogether escaped the disease by which the root has been attacked. These two evils—a deficient wheat harvest, and a failure to an extent almost unprecedented on the potato crop—must inevitably cause all kinds of food to rise in value; and though we see no reason to apprehend the scarcity and excessively high prices which those birds of ill omen—the writers for the Anti-Corn-Law League, and its supporters—have for months past been predicting with a satisfaction they have been at no pains to conceal, still it must be confessed there is reason to fear that the value of bread stuffs, &c., may become high enough to occasion a vast amount of distress and misery among the poorer classes.

The important rise which took place in the price of grain in September and October was seized upon as a favourable opportunity, by the opponents of the existing corn laws, to promulgate a report that ministers had come to a determination to issue an order in council, admitting all kinds of grain free of duty. This rumour was repeated from mouth to mouth; and one of the London morning papers actually contained a paragraph, affirming that orders had been received at the Dublin Custom House to permit foreign grain to pass free of duty.

These reports, it may easily be conceived, were not received by the farmers without uneasiness; and so much distrust was beginning to be felt respecting the real intentions of the government, that producers of and dealers in corn were at a loss how to act, and trade was for a time at a perfect stand. Whilst this continued, the price of wheat was depressed about 5s. per qr., barley 2s. to 3s., and oats at least 5s. per qr. The downward movement on the two latter articles has scarcely yet been checked; but, since the alarm has subsided, wheat has again gradually crept up 1s. to 2s. per qr. from the lowest point.

How long the present corn laws may remain in force, it is impossible to determine. We certainly do not place implicit faith in Sir Robert Peel; but we never for a moment imagined he could adopt so senseless and impolitic a step as to suspend their operation by an order in council. The mere rumour of a probability of such a course being taken by Great Britain immediately drove prices up all over the continent, and even induced some of the foreign powers to prohibit the exportation of grain. Had the Premier been weak enough to allow the outcry of famine raised by the free-traders to influence him so far as to sanction an order in council, wheat would unquestionably ere now have advanced at the chief continental ports to a point some 10s. per qr. above that at which it may now be bought—if, indeed, it had not put it altogether out of our power to obtain supplies by causing nations who would, under other circumstances, never have dreamt of such a step, to stop shipments altogether.

Whilst we condemn in the strongest manner the wickedness and weakness of that portion of the press who have, by the grossest exaggerations, endeavoured to excite public alarm on the score of a sufficiency of food having been produced in Great Britain for the support of her inhabitants, we do not wish to conceal the real state of affairs.

We have already given it as our opinion that the crop of wheat is materially short of that of average years, that potatoes have failed extensively, and we now add that we entertain great doubts whether that portion of the last-named crop, still apparently sound, will keep through the winter. It cannot, therefore, be questioned that a large importation of grain will be required about the autumn of next year, and that prices will, from the present time until another harvest shall have been secured, rule higher than they have done of late years. At present the duty on wheat is 14s. per qr., with more chance of its advancing in the first instance than receding; but, long before our own crop shall have been consumed, the duty must decline to the lowest point. Our merchants are fully aware of this; and if matters are allowed to work quietly, they will not fail to purchase up the supplies brought to the foreign markets gradually: they will, no doubt, have to pay high terms, as the harvest has been more or less defective all over Europe, but nothing like the rates which our neighbours would demand if, by suspending the corn laws we should proclaim our dependence on them for food. To reduce the duty to the lowest point, would require an advance of about 10s. per qr. on present rates, or perhaps scarcely that, for it is fair to infer that the wheat of this year's growth will come to hand in better condition after it shall have been some time in stack. As we have no doubt that an importation will be required, we are inclined to believe it would be to the interest of the community at large that the duty should be reduced at an early period; for it is only in years of plenty that we consider an impost any advantage. By this means the mouth of the League would be effectually stopped; for there could be no outcry against the corn laws when they were found to repeal themselves immediately it was necessary for the good of the country. It would also have this advantage, that, so soon as the position of the averages made it tolerably certain that a low duty might be calculated on, our merchants and speculators would redouble their exertions to obtain the required quantity; and when the time arrived that our home-grown wheat had dwindled into a narrow compass, there would be abundance of foreign in the warehouses to make up the deficiency.

With the exception of wheat and potatoes—certainly an important exception—the crops have not turned out badly in quantity. Of barley we think quite an average bulk has been grown; and though really fine malting samples will be comparatively scarce, it will not be difficult to get tolerably good parcels suitable for the brewers and distillers; whilst of feeding barley there is, we believe, considerably more than last year. Oats have also yielded a good return, not only in England, but also in Scotland and Ireland; and beans and peas we estimate at fair average crops. To this may be added that there is abundance of excellent hay and straw for cattle feeding, besides turnips, mangold-wurzel, &c. The outcry about starvation and famine may therefore be regarded as one of those desperate and disgraceful resources to which none but a faction, such as the Anti-Corn-Law League would have given countenance.

We have already, in the commencement of this article, stated that a material fall has taken place in the value of all kinds of grain since the close of October; but we do not deem this general remark sufficient to give a clear idea of the alterations which have taken place in the position of the trade; we shall therefore follow our usual plan of laying before our readers a detailed account of the operations of the month at Mark-lane.

The arrivals of wheat coastwise into London have not on the whole been large, and compared with the receipts of the corresponding period in 1844, they show a decided falling off. Owing, however, to the circumstance above referred to, viz., the uncertainty at one time felt whether ministers would or would not interfere with the corn-laws, very great langour characterized the operations during the first fortnight in November. On Monday, the 3rd inst., factors found it altogether impossible to effect a clearance of the stands, though willing to submit to a reduction of 2s. per qr., and on that day week a further decline to about the same extent had to be acceded to before the millers could be induced to purchase. Business remained in this position during the greater part of the succeeding week, and the lowest sales made were at prices about 5s. per qr. below the highest point in October; latterly confidence has been in some degree restored, and there has been a decided improvement in the demand since about the middle of the month, though hitherto the reduction in prices has been only partially recovered. On Monday, the 24th, millers manifested a marked disposition to get into stock, and the supply being moderate, an advance of 1s. to 2s. per qr. on previous rates was pretty generally established. The very soft, indifferent condition in which the greater proportion of the new English wheat has hitherto come to hand, has rendered an extensive mixture of old absolutely necessary to fit it for grinding; and as the old of home growth had been previously reduced into a very narrow compass, old foreign wheat has been taken rather extensively for that purpose. The value of the latter has therefore at no time been depressed to the same extent as the price of our English; still holders, if anxious to sell, have been obliged to make some concession, and quotations are not at present quite so high as they were about the close of last month. For the best high-mixed Danzig 68s. to 70s. per qr. duty paid must still be regarded as extreme quotations, and anything below first-rate qualities may be purchased at proportionably lower terms. Nearly the whole of the rather large arrivals from abroad has been landed by importers in bond, and little or no addition having been made to the old granaried stocks of free by the fresh importations, fine qualities of duty-paid wheat have become extremely scarce.

During the first week or two in October, scarcely a transaction took place in bonded wheat, and for the whole of that period prices were perfectly nominal. Within the last few days the demand has, however, partially revived, and several small parcels (mostly Danzig) have changed hands at from 55s. to 58s. per qr. These rates are actually lower than quotations at the ports of shipment on the continent, and freights having risen considerably in the Baltic, it would, at present, be impossible to import wheat from that quarter, without at least paying 10s. per qr. more than the article may be bought for at Mark-Lane. Unless, therefore, a very material fall takes place in the duty, the recent purchases abroad must turn out the reverse of profitable.

The nominal top price of flour has undergone no variation since our last monthly article; at one period there seemed some prospect of millers giving way, but the firm tone which the wheat trade has since assumed renders an advance more likely than a decline. Country manufactured flour was, in the early part of the month, sold at 1s. to 2s. per sack below the rates current in October; but on the 24th inst. the fall was partly recovered, and since then good Norfolk households have been firmly held at 46s. per sack in the river.

The arrivals of flour from the United States and Canada, into London, have not been particularly large, and the demand for both kinds has been sufficiently active to prevent any decline taking place in quotations. Fine brands of United States flour, in bond, have been sold as high as 30s. up to 32s. per barrel, and Canadian at 36s. per barrel, duty paid.

The market has, since our last, been rather liberally supplied with barley of home growth. Judging from the quality of the bulk of the arrival, we think really choice malting parcels are likely to be very scarce this season. By far the greater proportion of the supply has consisted of coarse inferior samples, not at all adapted to make malt of suitable quality for the ale-brewers. The best sorts have, consequently, commanded relatively high rates, and though the general runs have receded in value quite 2s. per qr. since the termination of last month, picked samples have at no time been sold much below 40s. per qr., which must still be regarded as the top price. The prospect of rather a material reduction in the duty has induced importers of foreign barley to land in bond, and the stock in granary has therefore slightly increased. The duty has already receded to 5s. per qr., and is likely to be 1s. to 2s. per qr. lower before the close of the present year.

The malt trade has been a good deal influenced by the languor which has characterised the operations in the barley market. Selected parcels, it is true, have suffered no abatement, from the same reason that fine barley has maintained its previous value, viz., the real scarcity of choice lots; anything below prime quality has, however, been nearly unsaleable, and on the common sorts a fall of from 1s. to 2s. per qr. has been submitted to without leading to extensive transactions.

The enormous rise which took place in prices of oats in September and October (nearly 10s. per qr.) very naturally led to a restricted consumption, whilst it held out the strongest inducements to forward supplies from all quarters to the London market. The arrivals in the river Thames have consequently been very large, particularly during the two weeks between the 8th and the 22nd Nov. For some time factors remained firm; but, as the days allowed for discharging expired, they were compelled to give way, to get the vessels cleared. The first reduction acceded to amounted to about 1s. per qr.; afterwards a further decline of 2s. per qr. took place, and the lowest sales made were at quite 5s. 6d. per qr. below the extreme rates of October. The depression was at its height on the 19th November; from that time a gradual improvement took place, and the greater part of the supply has now passed into the hands of the dealers. The fall on foreign oats, free as well as bonded, has been fully as great as the reduction on home-grown corn. Archangels, which were currently selling in bond last month at 26s. per qr., may now be had at 22s. 6d. per qr., and they have been sold even lower.

For a time there was a prospect of the duty falling to the minimum point, but the rapid decline in prices worked a great change in the position of the averages, and there is now little chance of this grain (at least for some time to come) being admissible below the existing rate.

The late crops of beans were, owing to the fine weather during the concluding ten days of the past month and the first fortnight in November, secured in better condition than the previous excessive wet had led us to expect. This circumstance, and the increased supplies induced by high prices, occasioned the receipts to become greater, about the middle of the month, than the demand was capable of clearing off: and though really handsome samples of old have not given way to any marked extent, secondary sorts, whether of this or last year's growth, have fallen from 3s. to 4s. per qr. in value. The averages, nevertheless, still come high, and the duty is likely to remain at the minimum point for some time. Foreign beans have felt the effect of the decline in prices of English; and Egyptians, which were at one period worth at least 40s. per qr., have been lately offering 2s. to 3s. per qr. under that rate, without inducing buyers to come forward very freely.

With occasional inquiries for peas for shipment to Holland, Belgium, and Scotland, the demand for this article has about kept pace with the supply; and though slight fluctuations have from time to time occurred, as the one or the other has predominated, there is at present no great difference between prices now and at the close of October. Large blue are still worth 55s. to 60s.; the best white boilers nearly as much, and fine maples 44s. to 45s. per qr. On the whole a large quantity of peas has been exported since the Dutch and Belgian inquiry first commenced, a fact which must keep prices high all through the winter.

In the foregoing remarks we have made allusion to the rise which the belief that our ports would be thrown open occasioned in prices of wheat at most of the foreign markets: other circumstances have assisted to keep up the excitement abroad; still the latest accounts from the Baltic and Mediterranean are of a more subdued tone than previous advices.

That the grain crops generally have yielded an indifferent return all over Europe cannot be questioned; and the same disorder which has done such extensive injury to potatoes in Great Britain, has also been experienced in most of the north-eastern continental countries; indeed, in Holland and Belgium it has been more severely felt than with us. It may, therefore, be easily imagined that the prospects of England requiring supplies had more than usual influence on prices.

On receipt of the reports from hence, hinting at the probability of an order in council for the free importation of corn, the best high-mixed wheat rose at Danzig to 60s. per qr. free on board; whilst so much eagerness was shown to secure vessels, that freight to London, which in the early part of the season was 3s. 6d., rose to 6s. 6d. per qr. Secondary and ordinary qualities of wheat advanced in the same proportion; and though the excitement has since in some measure subsided, still considering the heavy expenses attending the transit at this period of the year, it would require a rise of at least 10s. per qr. on present prices, to bring up our quotations sufficiently to cover the cost, freight, and insurance of recent purchases at the port referred to.

All kinds of spring corn are equally dear; and so great is the distress in consequence of the high price of rye in Upper Poland, that the export not only of that article, but likewise of barley, oats, and pulse, has been prohibited. The Prussian Government will, it is expected, follow the same course in regard to these articles; but there is no talk of prohibiting the shipment of wheat from any part of the Baltic. As a proof of the extreme scarcity of the cheaper kinds of grain at Konigsberg, we may mention that purchases of oats, &c., have actually been made in the Danish Islands, and even in the river Elbe, for shipment to the town named, at prices higher than were permitted to be paid by the English orders. Wheat has for some time been and continued at the date of our last advices, higher at Konigsberg than at Danzig, though comparatively little business had been done in the article on foreign account at the first-mentioned port.

The contradiction of the rumours relative to the opening of the British ports produced more influence on quotations at the lower than the upper ports in the Baltic. We have on former occasions stated that the wheat-harvest yielded a much more satisfactory return in Mecklenburg, Pomerania, Silesia, Ukermark, and some neighbouring localities, than in other parts of Germany; and we may with confidence calculate on receiving rather large supplies of excellent red wheat from Rostock, Wismar, Stralsund, Stettin, and other ports on the same line of coast, next spring, provided the position of the trade here is such as to encourage consignments. During the time of the greatest excitement, holders at the places named demanded from 53s. to 55s. per qr. free on board for the best qualities; but by the most recent reports, it appears that contracts for shipment in spring might be closed at a little over 50s. per qr., free on board.

At Hamburg, prices have also given way materially within the last fortnight; good red Upland, which was at one time sold as high as 56s. to 57s. per qr., having latterly been offered at 51s. to 52s. per qr.

The most recent intelligence from the Mediterranean ports is to the effect that the less encouraging British advices had had a marked influence on the corn-trade. Taking into consideration, however, the inferiority of the quality of the wheat generally received from that quarter, as compared with the shipments from the Baltic ports, we still consider the latter the better place for making purchases.

At Marseilles, good soft Polish Odessa wheat could not, according to the latest accounts, be put on board below 48s. per qr.; and at Leghorn, Genoa, &c., quotations are equally high. We do not, therefore, look for large arrivals from the South-east, unless prices should rise higher here than we either wish or expect.

From Odessa we have advices of recent dates. About the close of October, some large purchases of wheat were made there: for the best qualities 31s. to 33s., and for ordinary to good sorts from 26s. to 30s. per qr., free on board, was paid. The flat English accounts had not reached there, but we expect the next reports to come lower.

Having noticed the principal places from which wheat is likely to be shipped to England on this side of the Atlantic, we must in conclusion say a few words respecting the prospect of the shipments from America.

The exports of flour from Canada, though large, are not likely to come up to the quantity at one time expected. The accounts from Montreal, per the Great Western, states that the shipping season was fast drawing to a close. High prices had been paid there, as much as 33s. per barrel having been realized for superfine flour; we need scarcely say that purchases at that rate will not pay a profit in the English markets at present.

At the principal ports in the United States, flour rose materially after receipts of the English letters, brought out by the Caledonia steamer. At New York, as much as 6¼ dollars was paid in the early part of the present month, being a higher price than realized at any previous period this year. On the whole, rather important purchases had been made on British account in the markets of the States, some of which have still to come to hand.

CURRENCY PER IMPERIAL MEASURE.

NOVEMBER 24.

WHEAT, Essex and Kent, new, red 54	58	61	White 59	63	67
Old, red	61	65	Do. ..64	66	71
RYE, old	34	38	New....	38	40
BARLEY, Grinding, 31 34 Malting	36	37	Chevalier	38	39
Irish	28	30	Bere ...	26	27
MALT, Suffolk and Norfolk	58	63	Brown..	56	60
Kingston and Ware	60	—	Chevalier	65	—
OATS, Yorksh. & Lincolnshire, feed	26	27	Potato..	27	29
Youghall and Cork, black..	26	27	Cork, white	27	28
Dublin	27	—	Westport	27	—
Waterford, white	27	—	Black ..	26	27
Newry	28	—			
Galway	25	26			
Scotch, feed	28	29	Potato ..	30	36
Clonmel	27	28	Limerick	28	32
Londonderry	27	28	Sligo	26	27
BEANS, Tick, new	42	44	Old, small	52	54
PEAS, Grey	44	46	Maple ..	45	46
White	52	54	Boilers..	—	56

FLOUR, Town-made 55 60 Suffolk 50 — per sk. of 280lbs.
Stockton and Norfolk 48 Irish 50 52

FOREIGN GRAIN AND FLOUR IN BOND.

WHEAT, Dantzic	56	58	fine — 62
Hamburg	52	54	
Rostock	54	56	
BARLEY	26	28	
OATS, Brew	24	28	Feed .. 25 28
BEANS	44	48	
PEAS	50	55	
FLOUR, American, per brl	30	32	Baltic .. — —

IMPERIAL AVERAGES.

Week ending	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.	
Oct. 11th	57	9	31	3	23	4	34	2	43	1	44	4
18th	58	2	32	0	23	5	34	5	44	5	43	0
25th	59	5	33	0	24	11	34	5	45	5	44	1
Nov. 1st	60	1	34	3	26	2	33	2	45	3	43	10
8th	59	7	35	1	25	2	35	7	45	1	44	9
15th	58	6	35	0	26	3	38	2	44	5	45	7
Aggregate average of the six weeks which regulates the duty.	58	11	33	5	24	10	35	0	44	8	44	3
Duties payable in London till Wednesday next inclusive, and at the Outports till the arrival of the mail of that day from London . .	14	0	5	0	4	0	7	6	1	0	1	0
Do. on grain from British possessions out of Europe .. .	1	0	0	6	0	6	0	6	0	6	0	6

COMPARATIVE PRICES OF GRAIN.

WEEKLY AVERAGES by the Imp. Quarter, from the Gazette, of Friday last, Nov. 21st, 1845.	s.	d.	AVERAGES from the corresponding Gazette in the last year, Friday, Nov. 22nd, 1844.	s.	d.
WHEAT	58	6	WHEAT	46	4
BARLEY	35	0	BARLEY	35	9
OATS	26	3	OATS	21	9
RYE	38	2	RYE	34	2
BEANS	44	5	BEANS	38	4
PEAS	45	5	PEAS	35	7

POTATO MARKET.

SOUTHWARK, WATERSIDE, Nov. 24.

We regret to state that we cannot give a better account of the appearance of Potatoes in this market, and it is distressing to witness the immense sacrifice of property. The greater part of the fleet that arrived at the close of last week and the beginning of this was in a very damaged state; several cargoes were abandoned by the consignee, and many other lots were discharged that did not pay the current expences. The saleable samples of York reds were sold from 5s. to 100s.; Regents, 60s. to 100s.; superior Regents, perfectly free from the disease, 110s. to 120s. There is one cargo of Jersey blues in the market, selling slowly at 75s.; saleable Scotch, from 10s. to 80s.

WOOL MARKETS.

LIVERPOOL, Nov. 22.

SCOTCH.—There is still a trifling business doing in laid Highland Wool, the consumers only taking supplies for their immediate wants; the holders are, however, very firm in price. In crossed as well as Cheviot there is also only a retail demand, and prices well supported.

		s.	d.		s.	d.
Laid Highland Wool, per 24lbs		9	3	to	9	9
White Highland	do	12	3		13	3
Laid Crossed	do.. unwashed	11	6		13	0
Do.	do.. washed	12	6		14	0
Do. Cheviot	do. unwashed	12	0		14	6
Do.	do.. washed	15	0		18	0
White Do.	do.	24	0		28	6

FOREIGN.—The near approach of our public sales, and the share panic in Yorkshire, have caused a limited demand for all kinds of Wool. A farther quantity of fine Wool has been withdrawn for the present, and altogether there will be offered 350 bags Botany, 600 bags American fleece; the low will consist of Entre Rios, Cordova, Oporto, Syria, and Egyptian.

PRICES OF SHARES.

Shares.	Div. last half year	RAILWAYS.	Price per Share.
		Aberdeen.................... 5l pd	6¼ a ½
24,000	2l p sh	Armagh, Coleraine, Portrush 25l sh 1⅜l pd	1½ a ¾
4,000		Aylesbury and Thame .. 25l sh 1⅜l pd	
		Belfast and County Down	
		Bideford and Tavistock .... 1⅜l pd	
9,500	10s	Birmingham and Gloucester 100l sh pd	125 a 4
10,000		Do. New, iss. 7½ dis. .. 25l sh 17½l pd	31¼ a 30½
30,000		Birmingham and Oxford Junction, 20l sh 2l pd	4¼ a 3¾
		Boston, Stamford, and Birmingh. 22s pd	
9,500		Brighton, Lewes, & Hastings, 50l sh 20l pd	
15,000	1l 8s p sh	Bristol and Exeter .... 100l sh 70l pd	
		Ditto New............ 33⅓l sh 2l pd	7¾ a 8
6,610	12s p sh	Bristol and Gloucester .. 50l sh 30l pd	
		Bristol and Liverpool Junction	
36,000		Caledonian............ 50l sh 5l pd	9¾ a 10
		Do. Extension.......... 50l sh 2½l pd	3¼ a 3
50,000		Cambridge and Lincoln .. 25l sh 1½l pd	3⅜ a ½
		Do New............ .. 25l sh 1⅞l pd	2⅞ a 3
		Canterbury and Dover .... 1⅜l pd	
		Cheltenham and Oxford .... 2l pd	2½ a ⅜
		Chelmsford and Bury .... 1⅜l pd	1⅛ a 0⅞
42,000		Chester and Holyhead ... 50l sh 15l pd	16½ a 15¾
		Chester and Manchester ...... 42s pd	¾ dis
		Clydesdale Junction .... 5l pd	
		Cork, Blackrock, and Passages . 22s sh 22s pd	
		Cork and Killarney .... 50l sh 2½l pd	
40,000		Cork and Waterford .... 25l sh 1½l pd	1¼
		Cornwall................ 50l sh 5l pd	5
4,800		Coventry, Nuneaton, Bir. & Leicester, 25l sh 1¼l pd	1½ a ¾
		Derby, Uttoxeter, and Stafford 2⅜l pd	
		Direct Manchester (Remington's) 20l sh 2¾l pd	2¼ a 2
		Do. Do. (Rastrick's).... 5¼l pd	4¼ a 4
		Direct Northern .... 50l sh 2½l pd	2⅜ a 1¾
35,000		Direct Norwich .... 20l sh 1l pd	
		Dublin and Armagh .... 1⅜l pd	
21,600		Dublin & Belfast Junction .. 50l sh 5l pd	
19,000		Dublin, Belfast, & Coleraine, 50l sh 2½l pd	
12,800		Dublin and Galway...... 50l sh 4l pd	4 a 3½
17,000		Dundalk and Enniskillen 50l sh 2½l pd	
144,000	3s p sh	Eastern Counties .. 25l sh 14l 16s pd	19¼ a ¾
		Do. New............ 25l sh 6l 16s pd	6¼ pm
144,000		Do Perpetual, No. 1.. 6l 13s 4d sh pd	
144,000		Ditto ditto, No. 2 .. 6l 13s 4d 4l 13s 4d	¼ pm
		East Dereham and Norwich .... 1l pd	
4,000		Eastern Union......... 50l sh 20l pd	
		Ditto Quarter Shares ... 12½l sh 2½l pd	
		East Lincolnshire .... 1¼l pd	¾ a ¼
		East and West of England .... 1⅜l pd	
18,000	1l 10s p s	Edinburgh & Glasgow .... 50l sh pd	67 a 9
18,000	7s 6d p s	Ditto Quarter Shares...... 12½l sh pd	
26,000		Ditto New ¼ Shares .... 12½l sh 5l pd	8
26,000		Edinburgh and Northern, 25l sh 1½l pd	
		Edinburgh and Perth.......... 1½l pd	4½
10,800		Ely and Huntingdon ... 25l sh 5l pd	
		Enniskillen and Sligo .... 2½l pd	
		Exeter, Yeovil, & Dorchest., 50l sh 2½l pd	2½ a ¾
		Glouc., Aberystwith, and Central of Wales .... 25l sh 1⅜l pd	1⅛ a ¼
		Goole and Doncaster.... 20l sh 42s pd	½ pm
10,918	5l per ct	Grand Junction .... 100l sh pd	
10,918	5l per ct	Ditto Half Shares .... 50l sh pd	
10,918	5l per ct	Ditto Quarter Shares ...... 25l sh pd	
		Grand Union (Nottingh. & Lynn) 1⅜l pd	1⅛ a 2
		Great Eastern and Western.... 2½l pd	2¼ a ⅜
12,000		Great Grimsby & Sheffield, 50l sh 5l pd	
20,000		Great Southern & Western (Ireland) 50l sh 15l pd	20¾ a ½
		Ditto Extension........ 50l sh 7½l pd	12 a 11
		Great Munster................ 2½l pd	
10,000	3l p sh	Great North of England.... 100l sh pd	216 a 13
	10s p sh	Ditto New.............. 40l sh 5l pd	50 a 49
		Ditto New...... .... 30l sh 2l pd	26 a 8
		Great North of Scotland ...... 2½l pd	
25,000	4l per ct	Great Western .... 100l sh 80l pd	149 a 7
25,000	4l per ct	Ditto Half Shares .... 50l sh pd	87 a 4
		Ditto Quarter Shares.......... 2½l pd	14½ a 13½
37,500	4l per ct	Ditto Fifths............ 20l sh 20l pd	35 a 4
		Guildford, Farnham, and Portsmouth, 50l sh 2½l pd	2
20,000		Harwich .... 20l sh 1l pd	
8,000	1l 15s p s	Hull and Selby .... 50l sh pd	101 a 100
8,000	8s 9d p sh	Do. Quarter Shares....... 12½l sh pd	20½
8,000		Do. Half Shares .... 25l sh 2l pd	
15,000		Inverness and Elgin ... 20l sh 1l pd	
50,000		Irish North Midland....... ... 1⅜l pd	
		Isle of Axholme .... 2⅜l pd	

5,000		Kendal and Windermere 25l sh 1½l pd	
		Killarney Junctions	
16,000		Lancaster and Carlisle... 50l sh 30l pd	50
		Leeds & West Riding Junct.. 1⅜l pd	
		Leicester and Birmingham 20l sh 22s pd	¾ pm
		Leicester and Bedford.. 20l sh 22s pd	½ pm
		Leicester and Tamworth, 20l sh 42s pd	¾ pm
		Limerick and Waterford 50l sh 7l pd	
5,100	4½l per ct	Liverpool & Manchester.... 100l sh pd	
7,968	4½l per ct	Ditto Half Shares .... 50l sh pd	
11,475	4½l per ct	Ditto Quarter Shares .... 25l sh pd	
		Liverpool & Leeds Direct 50l sh 2⅜l pd	1⅝ a 2⅛
		Lpool., Manch., and Newcastle Junction .... 2½l pd	4½ a 3⅞
4125000l	5l per ct	London & Birmingham........ Stock	215 a 12
41,250	5l per ct	Ditto Thirds .... 32l sh 10l pd	40 a 1¼
54,450	5l per ct	Ditto Quarter Shares .... 25l sh 2l pd	24¼ a 3
		Ditto Fifths..... .... 20l sh 2l pd	20½ a 2
48,000	3s	London and Birmingham Extension 25l sh 1⅜l pd	1⅜ a ½
		London & Blackwall .. Av. 16l 13s 4d	8¾ a 9
		Ditto New .... 1½l pd	3¼ a ½
36,000	30s p sh	London and Brighton ...... 50l sh pd	60 a 59½
4,500		Ditto Consolidated Eighths 50l sh 35l pd	
		Ditto Sixths.................. ½l pd	
33,000	8s 0d p sh	London & Croydon .... Av. 18l 15s 9d	20¾ a 19¾
35,000		Do. Guaranteed 5 per Ct.. 9l sh 8l pd	
		Lon., Chelt., Oxf., Glouc., and Hrfd., 25l sh 1⅜l pd	
43,077		London & Greenwich .. Av. 12l 15s 4d	
11,136	10s	Preference or Privilege.. Av. 18l 17s 2d	
		London, Hounslow, & Western.. 2l pd	1⅛ a ¼
46,200	2l 0s p sh	London & South West... Av. 41l 6s 10d	72 a 5
		Ditto Consolidated Eighths, 40l p sh 20l pd	
		Ditto New...... .... 50l sh 7½l pd	17½ a 16½
		Ditto New.............. 40l sh 6l pd	
90,000		London and York ...... 50l sh 2½l pd	4⅛ a 3⅞
20,000		London and Windsor.... 25l sh 1l pd	
		London, Warwick, & Kidder. 50l sh 2½l pd	2½
		London, Salisbury, & Yeovil 50l sh 2½l pd	2⅞ a ⅞
10,000		Londonderry & Coleraine, 50l sh 2½l pd	6¾
10,000		Londonderry & Enniskillen 50l sh 2½l pd	
8,000		Lynn and Ely .... 25l sh 5l pd	7½ a 7
		Lynn and Dereham .... 25l sh 5l pd	6 a ⅝
13,000	2l 18s 5p s	Manchester & Leeds .. 100l sh 76l pd	
13,000	25s 8d p s	Ditto Half Shares ...... 50l sh 34l pd	
13,000	2s	Ditto Quarter Shares .... 25l sh 2l pd	
22,750		Ditto Sixteenths...... 6l 5s sh 4½l pd	
30,000	1l p sh	Manchester & Birming .. 40l sh 40l pd	70 e-new
30,000		Do. ¼ Shares .... 10l sh 4l pd	11 e-new
		Do. New ¼ Shares ...... 10l sh 2l pd	8½ a 8
		Do. Continuation and Welsh Junction .... 1⅜l pd	1⅜ a ½
		Manchester, Buxton, and Matlock, 20l sh 42s pd	3 pm
		Manchester, Bir., & Mould Junction	
		Manchester to Southampton... 2l pd	3⅜ a 3
4155400l	3l per ct	Midland .... Stock	145 a 2
12,500		Ditto Fifths .... 20l sh 2l pd	
		Ditto New.............. 40l sh 6l pd	20 a 19½
978500l	46s 3d p c	Ditto Birmingham & Derby.... Stock	118 a 10
15,000		Midland Grt. West. (Irish) 50l sh 2½l pd	
		Do. Extension to Sligo........ 2¾l pd	
20,000		Newcastle & Berwick ... 25l sh 5l pd	13 a 12
	2l p sh	Newcastle and Carlisle.... 100l sh pd	
		Newcastle, Durham, and Lancashire Junction .... 1⅜l pd	
20,000	19s 6d p s	Newcstl & Darlingt Junc... 25l sh 25l pd	55 a 4
	10s p sh	Ditto New (Brandling).. 25l sh 15l pd	44 a 5
		Newport and Abergavenny.... 2½l pd	
		New Ross and Carlow .... 22s pd	
		Newry and Enniskillen, 50l sh 2½l pd	1¼
24,000		Newark, Sheffield, & Boston 25l sh 2⅜l pd	3⅛ a ¼
36,000		North British .... 25l sh 17½l pd	23¾ a 4½
		Ditto New .... 3½l pd	6⅛ a ½
		North Devon................... 2l pd	
10,256	1l 10s	Northern & Eastern .... 50l sh 45l pd	
3,136	22s 6d	Do. Scrip .. iss. 5 dis... 50l sh 35l pd	
12,208	7s 6d	Do. ¼ Shares .... 12l 10s sh pd	
		Do. New....................... 1l pd	
		North Kent & Direct Dover 50l sh 2½l pd	2⅝ a ¾
		North Staffordshire.... 20l sh 42s. pd	3½ pm
12,000		North Wales............ 25l sh 3½l pd	3¾ a 4½
19,000		Norwich and Brandon .. 20l sh 16l pd	22
19,000		Ditto New .... 10l sh 3l pd	6½
		Northampton, Banbury, and Cheltenham........................ 2l pd	2¾ a 3
		Nottingham and Boston .. 20l sh 1⅜l pd	2⅜ a ⅛
		Nottingham, Erewash Valley, & Manchester .... 1⅛l pd	
		Nottingham and Mansfield	
		Oxford, Witney, & Cheltenham.. 1⅜l pd	1⅛

END OF VOLUME XXIII.

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London.

INDEX TO THE TWELFTH VOLUME.

(SECOND SERIES.)